



A longitudinal investigation of the Concise Health Risk Tracking Self-Report (CHRT-SR) in suicidal patients during and after hospitalization

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ABSTRACT

The Concise Health Risk Tracking Self-Report (CHRT-SR) scale is a brief self-report instrument to assess suicide risk. Initial investigations have indicated good psychometric properties in psychiatric outpatients. The aims of this paper were to examine the construct validity and factor structure of the twelve- (CHRT-SR12) and seven-item (CHRT-SR7) versions and to test if clinically expected within-person changes in suicide risk over time were measurable using the CHRT-SR in two study cohorts hospitalized for suicidal ideation or behavior: (1) patients with major depressive disorder (MDD) who participated in a psychological intervention trial, $n = 65$, and (2) participants with bipolar disorder or MDD in an observational study, $n = 44$. The CHRT-SR12 and self-report measures of hopelessness, depression, and positive psychological states were administered during admission and several times post-discharge. Both versions showed good internal consistency in inpatients and confirmed the three-factor structure (i.e., hopelessness, perceived lack of social support and active suicidal ideation and plans) found in outpatients. CHRT-SR scores had strong correlations with negative and positive affective constructs in the expected directions, and indicated decreases in suicide risk following discharge, in line with clinical expectations. The CHRT-SR12 and CHRT-SR7 are promising self-report measures for assessing suicide risk in very high-risk patient populations.

1. Introduction

Suicide is a major public health problem, with approximately 800,000 deaths worldwide annually (World Health Organization, 2014). Identifying and intervening with populations at high risk for suicide is a major clinical challenge (Crosby et al., 2011; Hottes et al., 2016). Easily implementable methods for accurately assessing current suicide risk are needed, especially among high-risk patients who were recently hospitalized for suicidal thoughts or behaviors. Reliable assessments during admission may allow for more targeted clinical care and thus, can inform prevention-based strategies to reduce risk in the critical post-discharge period (Appleby et al., 1999; Goldacre et al., 1993; Shrivastava et al., 2016).

Recently, the National Institutes of Health (NIH) and other agencies identified critical gaps in suicide prevention and expressed a clear need for the development of tools that systematically assess suicide risk (Miller et al., 2014). Several tools currently exist, including the use of

experimental tasks to infer suicidality, clinician-rated scales, and self-report scales. An important disadvantage of clinician rated measures and implicit tasks is that they require trained staff and/or technology equipment for implementation (Giddens and Sheehan, 2014; Giddens et al., 2014; Sheehan et al., 2014) which may not be appropriate, feasible, or available for patients in the post-discharge period. Self-report measures, on the other hand, can be easily implemented in any setting (Boudreaux et al., 2016; Schmitz et al., 2012), and thus it is important to build the evidence base on self-report instruments.

There are many advantages to self-report instruments, including the ease of administration and reduced staff time and burden. Self-report may also avoid the interpersonal discomfort associated with clinician-administered questions regarding content perceived as private (Huth-Bocks et al., 2007) and may reduce potential response bias (Youngstrom et al., 2015). Presently, however, there is no consensus among clinicians and researchers about which self-report instrument is the gold standard to assess suicide risk (Youngstrom et al., 2015). A widely used

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scale is the Columbia Suicide Severity Rating Scale (C-SSRS), which is an interview that rates participants' levels of suicide ideation behavior or self-harm behavior (Beck et al., 1979) and has been used in several prior studies (Chaudhary et al., 2016; Hill et al., 2017; Posner et al., 2011). While the C-SSRS was modified for use as a self-report scale, it is generally a clinician rated measure, which reduces the practicality of the measure and can lead to inconsistent inter-rater reliability (Giddens and Sheehan, 2014; Giddens et al., 2014; Sheehan et al., 2014).

Thus, in the absence of a clear gold-standard for the self-report assessment of suicide risk, it is important to build the evidence base on existing self-report measures to help guide choices about which self-report scale may be best suited for a specific need (Celano et al., 2017; Iosifescu et al., 2016; Zisook et al., 2011). In particular, there is a need for self-report measures that capture suicide risk 'state,' as opposed to trait-like thought processes (Trivedi et al., 2011). This is especially important given the dynamic fluctuations over time in suicidal ideation and overall suicide risk (Prinstein et al., 2008; Schiepek et al., 2011), and a measure sensitive to dynamic changes in suicide risk could potentially help recognize patients whose risk is becoming imminent (Thompson et al., 2014).

The 12-item (CHRT-SR₁₂) and the 7-item (CHRT-SR₇) versions of the Concise Health Risk Tracking Self-Report (CHRT-SR) scale are recently developed brief instruments designed to detect and quantify three key suicide risk factors: 1) from hopelessness about the future and (2) lack of perceived support, (3) to nihilistic thinking or passive thoughts of death to active plans about death and suicide (Trivedi et al., 2011). Based on the models set forth by Beck and colleagues (Beck et al., 1974), items were developed to encompass stages of escalating suicidal ideation and included in the questionnaire only if there was good face validity for the construct being assessed (Ostacher et al., 2015; Trivedi et al., 2011).

The CHRT was specifically designed to capture suicide risk (Ostacher et al., 2015; Trivedi et al., 2011), and should be more suitable to do so than a scale assessing depression for two reasons. First, while depression has a robust association with suicide ideation, it shows a weaker relationship with suicide attempts and ultimately does not predict suicidal behaviors among ideators (Campos et al., 2016; Klonsky et al., 2016; May and Klonsky, 2016; Nock et al., 2009). Second, suicides do not only occur in patients with depression, but rather are seen across a range of populations, including veterans, patients with schizophrenia (Kim et al., 2017; Villa et al., 2017), personality disorders (Goodman et al., 2017; Parra-Urbe et al., 2017) and substance use disorders (Guvendeger Doksat et al., 2017; Østergaard et al., 2017), amongst others. Thus, it is important to assess suicidality outside of the context of depression, so that suicidality can be captured across these diverse at-risk populations.

The CHRT has been used in clinical research for the past 7 years to specifically assess suicidality (Ostacher et al., 2015; Trivedi et al., 2011), and it is necessary to fully understand its psychometric properties. Prior studies have examined it in clinical sample with relatively low levels of acute suicide risk (i.e., patients with bipolar affective disorder (BPAD)(Ostacher et al., 2015; Reilly-Harrington et al., 2016); patients with major depression (MDD)(Trivedi et al., 2011). The present paper examines it in a high-severity suicidal sample (i.e., psychiatric inpatients who were hospitalized for suicidal ideation or following a suicide attempt). Determining the psychometric properties of the CHRT-SR in high-risk cohorts has never been assessed, yet needs to be done, so as to understand if the psychometric properties and factor structure of this suicidality-specific scale hold in the populations most likely to benefit from more sensitive and valid suicidality assessment.

To address this clinical and research gap, we examined and compared the psychometric properties including internal and external validity, factor structure, and internal responsiveness of the CHRT-SR₁₂ and the CHRT-SR₇ in patients with MDD or BPAD who recently had been admitted to an inpatient psychiatric facility. We hypothesized that the scales would have good internal consistency and external validity,

assessed by comparing them with established scales of negative and positive psychological states linked to suicide risk, and factor structure reliability. Additionally, we expected good responsiveness to within-person changes in suicide risk in the post-discharge period, as evidenced by an overall decrease in the CHRT-SR scores following discharge, reflecting continued recovery over time.

2. Methods

2.1. Study design

The current study included data from two studies involving adults with MDD and/or BPAD admitted to an inpatient psychiatric unit for suicidal ideation or following a suicide attempt. In both cases, participants completed the CHRT-SR, as well as self-report assessments of hopelessness, depression, optimism and positive affect during admission and several times post-discharge. Given the heightened risk that discharge from hospital poses (Appleby et al., 1999; Goldacre et al., 1993; Shrivastava et al., 2016), the parent studies both had short-term follow-ups.

Study 1 was the Happiness, Optimism and Positive Emotions (HOPE) study (clinicaltrials.gov identifier NCT: 02004145), a single-blind randomized controlled trial of a telephone-delivered positive psychology (PP) intervention against a cognition-focused (CF) intervention that enrolled psychiatric inpatients ($n = 65$), between October 2013 and June 2015. Prior to discharge, participants were randomized to the PP ($n = 32$) or CF intervention ($n = 33$). PP focused on promoting psychological well-being by targeting optimism, gratitude, use of personal strengths, and altruism whereas CF focused on recalling events from the prior week in a neutral manner. In both interventions, participants received a treatment manual, performed weekly exercises, and completed weekly one-on-one telephone sessions over 6 weeks. Participants' psychological status was measured during hospitalization on the day prior to discharge and then later by phone at the 6- and 12-week follow-up assessments. Detailed study methods and results have been described elsewhere (Celano et al., 2017), and are outlined below.

Study 2 was the Longitudinal Assessment of Positive States (LAPS) study (clinicaltrials.gov identifier NCT: 01398891), a prospective observational study that examined the natural post-discharge course of positive emotional states among suicidal psychiatric inpatients ($n = 44$), between May 2011 and February 2013; there was no intervention associated with this study. Baseline self-report assessments were conducted during hospitalization on the day prior to discharge; study staff conducted follow-up assessments by phone at 2-, 4-, and 8- weeks post-discharge. Detailed study methods and results have been described elsewhere (Huffman et al., 2016), and are outlined below.

The study site Institutional Review Boards provided approval for all study procedures, written informed consent was obtained from all participants, and this research followed all Declaration of Helsinki guidelines. Sociodemographic and medical characteristics were obtained via patient report and medical record review. At every follow-up assessment, participants were also queried about rehospitalizations, non-suicidal self-injury and suicide attempts.

2.2. Participants

Both studies had similar inclusion criteria. In *Study 1* eligible participants were English-speaking adults who were: 1) hospitalized on an inpatient psychiatric unit at an urban academic medical center or a free-standing psychiatric hospital for acute suicidal ideation (SI) or following a suicide attempt and 2) had a primary admission diagnosis of MDD confirmed by the Mini International Neuropsychiatric Interview (Pinninti et al., 2003; Sheehan et al., 1998) and chart review. In *Study 2*, the inclusion criteria were the same, except that patients with a diagnosis of BPAD or MDD were included. For both studies, patients were excluded if they had: 1) cognitive impairment, assessed using a 6-item

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