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Research Paper

An MMPI-2 hopelessness scale: Construction, initial validation and implication for suicide risk ☆,☆☆

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ABSTRACT

This study documents the development of a new MMPI-2 scale, Hopelessness (Hp), designed to identify suicide risk in examinees who, for whatever reason, may be reluctant to endorse items reflecting explicit suicide content. The psychometric and empirical validity characteristics were examined in a sample of 153 Italian psychiatric inpatients, all of whom were administered the MMPI-2, the Beck Hopelessness Scale (BHS), and the Mini International Neuropsychiatric Interview (MINI) shortly following admission.

Item analysis suggested that the removal of one of the twelve original Hp items enhanced homogeneity of the scale and Bayesian confirmatory factor analysis (BCFA) indicated the fit of a unidimensional model (PPPs = 0.50 [PPC = -36.42/37.07]) for the 11-item version, with adequate reliability (ordinal alpha = 0.86). A regression analysis, with the MINI scores as criterion, and Hp and BHS scores as independent variables, indicated that only Hp scores (beta = 0.25, t = 2.32, $p < 0.05$) were independently associated with the MINI suicide risk. These findings indicate that the MMPI-2 Hp scale may be considered a valid and potentially useful measure of pessimistic attitudes toward the future and of potential suicide risk.

Suicide is a major public health issue worldwide accounting for at least 800,000 deaths annually (WHO, 2014), and is a leading cause of death in the United States, with more than 41,000 persons dying by suicide each year according to the Centers for Disease Control, with depression or other mental disorders as prominent risk factors (http://www.cdc.gov/violenceprevention/pdf/suicide_factsheet-a.pdf). Since 1999, an increase of 30% in suicide deaths was observed in the United States, notably with 54% of cases not having a diagnosis of mental disorder (Stone et al., 2018). While the percentage of depressed patients dying by suicide is comparatively low, the identification of individuals who may present a risk for suicide can play an essential role in mental health care (Bostwick & Pankratz, 2000). The increase in suicide deaths has received recent attention from the Centers for Disease Control, which launched a campaign to broaden the understanding of suicide risk, including key factors such as financial difficulties, substance abuse, and legal problems, among others (CDC, 2019; https://www.cdc.gov/vitalsigns/suicide/index.html).

Hopelessness has been recognized as more predictive of suicide than depression (Beck et al., 1985; Maris, 2002; Beck et al., 1993; Beck et al., 1974; Kovacs et al., 1975; McMillan et al., 2007; Wetzel, 1976; Wetzel et al., 1980). An absence of future positive expectations and resulting anguish are also congruent with the experience of depression (Pompili, 2019). Although the Minnesota Multiphasic Personality Inventory (MMPI/MMPI-2), commonly employed in psychodiagnostic assessments, includes assessments of suicide risk (Friedman, et al., 2005), evidence bearing on the ability of the MMPI to discriminate suicide risk on the basis of its scales, scores and profile patterns has been mixed, sometimes inconsistent and, on the whole, not encouraging (Nichols, 1988). Similar research with the MMPI-2, although more limited, has tended to follow this pattern (e.g., Friedman et al., 2015). Literature in this area has been recently reviewed and summarized in Gottfried et al. (2014), and will not be repeated here.

A search of the MMPI-2 literature finds two scales comprising items with explicit reference to suicidality: (1) Suicidal Ideation (DEP4, 5 items; Butcher et al., 2001), a subscale of the Depression (DEP) content scale; and (2) the Suicide Potential Scale (SPS, 6 items; Glassmire et al., 2001). The two scales are substantially overlapping, with SPS containing all but one (#454) of the DEP4 items. An additional more recent scale, the Suicidal/Death Ideation scale (SUI; MMPI-2 items 303, 496, 506,

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☆☆ Norms for Hp from the 1989 MMPI-2 Restandardization Sample are available from Nichols upon request.
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Table 1
Suicide Potential Scale (SPS) item intercorrelations.

Item	150	303	506	520	524	530
150		.41	.42	.41	.29	.33
303			.50	.53	.35	.29
506				.68	.34	.27
520					.36	.29
524						.27
530						

Table 2
SPS Item and Hp Item Intercorrelations.

Item	150	303	506	520	524	530
85	.47	.33	.36	.32	.24	.24
92	.37	.47	.40	.39	.27	.23
94	.37	.38	.35	.33	.26	.24
234	.30	.38	.30	.31	.24	.22
306	.30	.36	.30	.30	.25	.20
454	.35	.50	.45	.44	.28	.24
463	.35	.40	.36	.36	.28	.25
505	.34	.40	.40	.37	.26	.23
516	.36	.50	.45	.46	.31	.25
546	.34	.45	.44	.46	.29	.24
554	.37	.43	.45	.41	.29	.24
75	-.32	-.44	-.37	-.37	-.22	-.20

520, & 524, all keyed True), was released with the publication of the MMPI-2-RF (Ben-Porath & Tellegen, 2008). The content of these items is such that the endorsement of any of them should be apprehended in the manner customary for the so-called critical items (e.g., Butcher et al., 2001), that is as "red flags" that require further inquiry and potential precautions. For some patients at risk for suicidal behavior, endorsement of one or more of the DEP4 or SPS items serves to identify such risk and to stimulate the institution of preventative measures. In other cases, however, such risk may go undetected when these obvious items are not endorsed. For whatever reason, the examinee may elect to avoid calling attention to his/her suicidal ideation, plans, etc, creating a false negative for suicidality in the test results. In some of these cases, the DEP4/SPS false negatives, failure to endorse an obvious item may be for the specific purpose of forestalling precautionary/preventative measures that could or would be implemented were the risks of suicidality explicitly reflected in the examinee's MMPI-2 responses.

There is reason to believe that instances in which suicidal intent is both present and concealed are not rare. For example, Luoma et al. (2002) found that many of those who attempted suicide had received medical or mental health care in the months preceding the attempt. Two additional reports found that more than a quarter of suicides in cases of major depression were receiving psychiatric services at the time of death (National Confidential Inquiry into Suicide and Homicide by People with Mental Illness, 2006, 2012). Still others report that as many as one-fifth of those who die by suicide were in contact with their general practitioner within one week before death (Barraclough et al., 1974; Pirkis & Burgess, 1998).

1. Construction of the hopelessness scale

The initial impetus for the present exploration was the recall of Nichols and Pompili of clinical cases who, following assessment with the MMPI-2, subsequently died by suicide despite having endorsed none of the face valid DEP4/SPS items. It was conjectured that the MMPI-2 item pool might contain a number of items that were highly correlated with the SPS items, but did not reference suicide risk explicitly. Together, these items could, in effect, provide a subtle measure of proneness to suicide. In order to evaluate the extent of association among the SPS items, we gathered their inter-item correlations among the aggregated 25 samples reported by Rouse et al. (2008; N = 83,160). These items and their intercorrelations averaging .38 (range: 0.27 – 0.68) are presented in Table 1. A search was then conducted within the aggregated Rouse et al. (2008) sample for MMPI-2 items meeting two conditions: (1) achieve correlations with each of the SPS items of .2 or greater, and (2) form a coherent theme with high internal consistency. Twelve such items were identified. Briefly paraphrased, these items assert: that life is not felt to be worthwhile (#75F), an urge to do something harmful or shocking (#85), not caring what happens to one (#92), feeling that one has done something wrong or evil (#94), believing that one is condemned (#234), that no one cares what happens to one (#306), that the future seems hopeless (#454), often feeling that something dreadful is impending (#463), that one feels sick of daily routines and wants to escape them (#505), that life is empty and meaningless (#516), that one harbors thoughts of death and the afterlife (#546), and that one wants to give up in the face of life's difficulty (#554). These items were felt to converge upon a theme of despondency or hopelessness. Their mean correlation with the SPS items as a group was 0.49 (range: 0.41 - 0.56), and their mean correlation with each SPS item was 0.34 (range: 0.20 - 0.50), as presented in Table 2. Coefficient alpha was 0.89 for males and 0.88 for females, with item-total correlations ranging between 0.54 and 0.74. Having met the conditions described above, these 12 items were retained for further exploration as a preliminary Hopelessness Scale (Hp). The mean inter-item correlation at 0.38 (range: 0.25 - 0.61) reported in Table 3 was the same as that found for the SPS items, and the correlation between the SPS items and Hp was .75.

The aim of the present study was to further study the Hopelessness Scale (Hp; Nichols, 2011a, 2011b), investigating its composition, unidimensionality and psychometric properties in a clinical sample of psychiatric inpatients. We assessed the discriminant validity of Hp and the Beck Hopelessness Scale (BHS; Beck, Weissman et al., 1974) in their associations with convergent measures of depression and suicide risk.

2. Methods

2.1. Participants

Two hundred fourteen inpatients (105 men and 109 women) admitted to the psychiatric inpatient clinic at the Sant'Andrea Hospital, Rome (Italy) between January 2007 and February 2008 were administered

Table 3
Hp item intercorrelations.

	85	92	94	234	306	454	463	505	516	546	554	75
85		.35	.38	.25	.27	.31	.32	.34 .	31	.29	.37	-.28
92			.39	.30	.37	.47	.36	.38	.46	.36	.42	-.41
94				.33	.32	.39	.43	.38	.40	.33	.43	-.33
234					.30	.39	.35	.31	.38	.30	.32	-.29
306						.40	.36	.35	.40	.30	.37	-.31
454							.48	.47	.61	.43	.52	-.46
463								.44	.43	.39	.46	-.33
505									.48	.37	.48	-.35
516										.42	.50	-.46
546											.40	-.32
554												-.40
75												

Table 4
Characteristics of the sample (*N*=153).

	Whole sample		Men		Women		t-test(df=151)	Sig.
	Frequency	Percent						
Sex								
Men	71	46.4%	-		-		-	
Women	82	53.6%	-		-		-	
Age – Mean | SD	37.46	12.25						
Diagnosis								
BD1	50	32.7%	-		-		-	
BD2	29	19.0%	-		-		-	
MDD	22	14.4%	-		-		-	
Psychosis	24	15.7%	-		-		-	
Others	21	13.7%	-		-		-	
None	7	4.6%	-		-		-	
Hp_11 item –Mean | SD	4.49	2.84	4.46	2.86	4.51	2.85	-.10	0.92
SPS – Mean | SD	2.18	1.71	2.10	1.68	2.24	1.75	-0.52	0.60
SUI – Mean | SD	4.29	3.31	4.18	3.33	4.38	3.31	-0.36	0.72
JBW72 – Mean | SD	41.56	12.05	41.79	11.79	41.37	12.35	-0.22	0.83
D – Mean | SD	27.52	7.31	25.49	6.74	29.27	7.38	-3.29	0.001
DEP – Mean | SD	18.41	7.09	17.94	7.14	18.82	7.07	-0.76	0.45
INTR – Mean | SD	13.78	6.00	13.13	6.19	14.35	5.74	-1.27	0.21
MINI suicide risk – Mean | SD	2.98	2.48	2.77	2.14	3.17	2.77	-0.84	0.40
BHS – Mean | SD	8.31	4.64	8.10	4.44	8.51	4.85	-0.51	0.61

Note. SD = Standard Deviation; BD1 = Bipolar I Disorder; BD2 = Bipolar II Disorder; MDD = Major Depressive Disorder; SPS = Suicide Potential Scale; SUI = Suicidal/Death Ideation; JBW72 = Johnson-Butcher/Waller Overlap; D = Depression, Scale 2; DEP = Depression; INTR = Introversion/Low Positive Emotionality; MINI = Mini International Neuropsychiatric Interview; BHS = Beck Hopelessness Scale.

the MMPI-2 within 7 days of admission. Mean age of the patients was 37.34 years (SD=11.79; range: 18/69 years). Most of the patients were affected by major mood disorders (64.1%).

Inclusion criteria were any DSM-IV-TR Axis I diagnosis and an age of 18 or older. Patients were excluded if they were unable to complete the assessment for whatever reasons, were affected by major disorders of the central nervous system (e.g., dementia, epilepsy, or Parkinson's disease), or refused informed consent to take part in the study. The diagnosis was assessed by appropriately trained clinicians during the first 48 hours after admission with the use of the Mini International Neuropsychiatric Interview (MINI; Amorim, 2000). Following the exclusion criteria proposed by Butcher et al. (1995), the MMPI-2 protocols were screened for number of omitted items, response consistency and under- or over-reporting. MMPI-2 protocols were eliminated if: 30 or more items were omitted, raw scores on TRIN were less than 6 or greater than 12, raw scores on F were greater than 30, or T-scores were greater than 80 on VRIN, L, K, or S. Eleven participants were found to have omitted responses to 30+ items, 47 had scores on TRIN less than 6 or greater than 12, 6 had a score on the F > 30, 4 had a T-score > 80 on VRIN. None had T-scores > 80 on L, K, or S. This screening resulted in a final sample of 153 inpatients (71 men and 82 women), with a mean age of 37.46 years (SD=12.25; range: 18-69 years). Sociodemographic and diagnostic characteristics of the final sample are reported in Table 4. Patients who were included in the final sample and those who were excluded did not differ on sex (one-way Fisher exact test p = 0.23), age (t_{210} = 0.23, p = 0.82), or diagnosis (χ^2_5 = 0.44, p = 0.82).

All patients participated voluntarily in the study, were given a thorough explanation of the study before participation, and provided written informed consent. All research procedures were carried out in compliance with the Code of Ethics of the World Medical Association and the Helsinki Declaration. The study protocol received ethics approval from the local research ethics review board.

2.2. Measures

All the patients were administered the MMPI-2, the Beck Hopelessness Scale (BHS; Beck, Weissman et al., 1974), and the MINI suicide risk interview (Amorim, 2000).

2.2.1. MMPI-2

The MMPI-2 is a 567-item broad-spectrum self-report inventory of personality and psychopathology (Butcher et al., 2001). At present, the MMPI-2 contains 121 publisher-approved scales and subscales, and hundreds of other scales developed since the test's initial publication in 1942 (see, e.g., Dahlstrom et al., 1975). Among these, 7 scales, including one scale from the MMPI-2-RF (SUI; Ben-Porath & Tellegen, 2008), and a marker for the MMPI-2 First Factor (JBW72; Nichols, 2006) were used in the analyses for the current study. Descriptions of the selected scales and their internal consistencies for the current study are given in Table 5.

2.2.2. Beck Hopelessness Scale

The BHS (Beck, Weissman et al., 1974) is a 20-item self-report measure of hopelessness about the future. Items are rated true or false for the previous week; about half of the items are reverse coded. Previous studies have established its predictive validity for deaths by suicide (e.g., Beck, Schuyler et al., 1974; Beck et al., 1985; Beck et al., 1990; Brown et al., 2006). In the sample under study in the current report, the BHS demonstrated adequate internal consistency, with coefficient alpha = 0.86.

2.2.3. Mini International Neuropsychiatric Interview (MINI)

The MINI is a short structured interview with high validity and reliability developed to explore 17 disorders according to DSM-III-R (Sheehan et al., 1998). Although the MINI should not be a substitute

Table 5
Descriptions for MMPI-2 scales proposed in the current investigation.

Scale name	Abbreviation	α	Brief description
Hopelessness	Hp	0.88	hopelessness, pessimism, exasperation
Suicide Potential Scale	SPS	0.75	6 items of obvious suicide content (Glassmire et al., 2001)
Depression	D	0.80	Empirically derived scale measuring symptomatic depression (Butcher et al., 2001)
Depression	DEP	0.90	Content-driven measure of depression (Butcher et al., 2001)
Introversion/Low Positive Emotionality	INTR	0.82	A personality measure of impaired hedonic capacity (Harkness et al., 1995)
Suicidal/Death Ideation	SUI	0.78	MMPI-2-RF 5 item content-driven measure of suicide risk (Ben-Porath & Tellegen, 2008-2011)
Johnson-Butcher/Waller Overlap	JBW72	0.94	An MMPI-2 First Factor marker (Nichols, 2006)

Note. Hp and SUI overlap by one item; SPS and SUI overlap by 4 items

for a psychiatric clinical interview, validation studies confirm the validity of this instrument as a reliable tool in psychiatry (Sheehan et al., 1998; Sheehan et al., 2010). One section of the instrument is dedicated to the assessment of suicidal risk, with questions about past and current suicidal ideation and behavior.

2.3. Procedure

Data for this study were obtained from the psychiatric inpatient clinic at Sant'Andrea Hospital during the first days of hospitalization.

2.4. Statistical analysis

All the analyses were performed with the statistical software Factor v. 10.8.04 (Lorezo-Seva & Ferrando, 2013), Mplus 7.0 (Muthén and Muthén, 1998–2010), R version 3.4.2 (The R foundation for Statistical Computing), and the Statistical Package for the Social Sciences (SPSS) 19.0 for Windows.

For the analyses at the item level we used a polychoric correlation matrix. Corrected item-total correlations and Ordinal alphas if an item was omitted were used to inspect the possible presence of problematic items (i.e., non-homogeneous items with corrected item-total $r < 0.30$ and/or an alpha when the item is omitted > alpha with all the items included).

Adequacy of the correlation matrix for factor analysis was investigated with the Bartlett's test of sphericity and the Kaiser-Meyer-Olkin (KMO) test. Adequacy of the correlation matrix is suggested by a significant Bartlett's test ($p < 0.05$) and a KMO index > 0.70. Results from parallel analysis based on minimum rank factor analysis were used to support the unidimensionality of the scale (Timmerman & Lorenzo-Seva, 2011). Bayesian confirmatory factor analysis (BCFA) approach was used to investigate the structure of Hp. A BCFA using a Markov chain Monte Carlo (MCMC) algorithm was performed to investigate whether the one-factor model fitted the structure of the Hp scale with the eleven remaining items loading significantly on the common latent factor. The Bayesian approach should be preferred over the classical approach because it can incorporate previous knowledge into the analyses (i.e., informative priors) which have influence on the final parameter estimate (van de Schoot & Depaoli, 2014). Indeed, BCFA results could be more reliable with small samples than classical approaches, especially when it is possible to incorporate very informative priors into the model (van de Schoot & Depaoli, 2014). Considering that no previous studies investigated the factor structure of Hp, we first performed a principal component analysis (PCA) and used the factor loadings derived from this analysis as informative priors in the BCFA. Priors variance was set to 0.05. The model fit was evaluated using the Bayesian Posterior Predictive Checking (PPC) and the Posterior Predictive P-value (PPP; Muthen & Asparouhov, 2012). BCFA simulates replicated data under the model of interest, and PPC compares the proportion of iterations for which the replicated χ^2 exceeds the observed χ^2. The fit of the model was based on the PPC confidence interval crossing the zero (i.e., that the lower bound confidence value should be negative and the upper bound confidence value should be positive) and PPP > 0.05. The deviance information criterion (DIC) was not used in the study because it is not available in MPLUS when using categorical variables. For each variable we reported factor loadings and their 95% Bayesian Credibility Intervals (95% BCI), and R^2 estimates. The BCI can be interpreted as the probability that the population parameter is between the upper and lower bounds (van de Schoot & Depaoli, 2014).

As a measure of reliability, we reported the ordinal alpha (Zumbo et al., 2007). T-tests and ANOVA were used to assess sex and diagnostic differences. Pearson's indices of correlations (r) were reported as measures of association with convergent measures. In order to assess discriminant validity between Hp and the BHS, we compared pairs of correlation coefficients with other convergent measures using the approach recommended by Meng et al. (1992), and performed a linear regression analysis with the MINI-based suicide risk scores as criterion, and BHS and Hp scores as independent variables. Lastly, we performed the ROC (Receiver Operating Characteristic) test procedure to assess the performance of Hp scores in categorizing individuals based on whether they had attempted suicide in the last month.

3. Results

3.1. Composition and dimensionality of Hp

Ordinal alpha for 12 items was 0.84, but increased when item #92 was dropped (0.86). This item was thus eliminated from all subsequent analyses. The remaining items were subjected to factor analysis. Bartlett's statistic (= 291.1, df = 55, $p < 0.0001$) and the KMO index (= 0.83) indicated the adequacy of the correlation matrix for factor analysis.

Parallel analysis suggested the retention of only a single factor (% of variance of real data = 54.79%), and the BCFA had nonsignificant PPPs (0.50 [PPC = -36.42/37.07]) suggesting the adequacy of the one-factor model. All the estimates of the factor loadings were significant (posterior $p < 0.01$), and most items had loadings estimates > 0.40, except for item #306 which had a loading of 0.27 with credibility intervals ranging between 0.075 and 0.449, indicating a high variability of the estimate for this item (Table 6).

3.2. Psychometric properties of Hp

Ordinal alpha for Hp was 0.86. Hp scores did not correlate significantly with age ($r = -.02$; $p < 0.77$) or sex ($t_{151} = -0.10$; $p = 0.92$; see Table 4). Furthermore, Hp scores were not associated with diagnosis ($F_{5;147} = 1.74$; $p = 0.13$; not reported in the tables). Hp correlated moderately to strongly ($r \geq 0.40$) and in the right direction with most convergent measures, except for the MINI suicide risk scores, for which the correlations were weak for both Hp and the BHS (see Table 7). Hp and the BHS only had 25% of their variance in common, and for most of the correlations with the convergent measures, Hp and the BHS demonstrated discriminant validity in their patterns of correlations (see Table 7). A regression analysis with the MINI suicide risk scores as criterion and Hp and BHS scores as independent variables, indicated that only Hp (beta = 0.25, t = 2.32, $p < 0.05$) was independently associated

Table 6
Factor loadings for the Hp Scale.

Items	Informative priors from the principal component analysis Factor loadings	BCFA Factor loadings (95% Bayesian Credibility Intervals)	Posterior Standard Deviation	Significance	R^2
MMPI 85 - "Urge to do something harmful or shocking"	0.671	0.592 (0.433/0.717)	0.073	<0.001	0.351
MMPI 94 – "Having done something wrong or evil"	0.519	0.462 (0.283/0.609)	0.084	<0.001	0.214
MMPI 234 – "To be condemned"	0.566	0.510 (0.337/0.650)	0.080	<0.001	0.260
MMPI 306 – "No one cares what happens to us"	0.313	0.27 (0.075/0.449)	0.095	0.003	0.073
MMPI 454 – "Future hopeless"	0.765	0.676 (0.541/0.774)	0.060	<0.001	0.457
MMPI 463 – "Something dreadful is impending"	0.551	0.502 (0.325/0.643)	0.081	<0.001	0.252
MMPI 505 – "Sick of daily routines"	0.834	0.737 (0.620/0.818)	0.051	<0.001	0.543
MMPI 516 – "Life empty and meaningless"	0.829	0.734 (0.617/0.814)	0.051	<0.001	0.539
MMPI 546 – "Thoughts of death and the afterlife"	0.772	0.684 (0.553/0.778)	0.057	<0.001	0.468
MMPI 554 – ""Give up in the face of difficulty	0.703	0.621 (0.320/0.671)	0.067	<0.001	0.386
MMPI 75 – "Life not worthwhile"	0.568	0.516 (0.320/0.671)	0.090	<0.001	0.266

Fit indices: Bayesian Posterior Predictive Checking (PPC) using χ^2; 95% confidence interval for the difference between the observed and the replicated χ^2 values = -36.42 / 37.07; Posterior Predictive *p* (PPP) = 0.50.

Table 7
Correlations between measures (*N*=153).

	SPS	SUI	JBW72	D	DEP	INTR	MINI suicide risk	BHS
Hp raw score	0.64**	0.66**	0.78**	0.52**	0.85**	0.43**	0.34**	0.52**
BHS	0.46**	0.46**	0.40**	0.56**	0.64**	0.54**	0.29**	-
z-value	2.79**	3.28**	6.56**	-0.66^{ns}	4.92**	-1.63^{ns}	0.58^{ns}	-

**Significant for $p<0.01$; ^{ns} not significant.
Note. SPS = Suicide Potential Scale; SUI = Suicidal/Death Ideation; JBW72 = Johnson-Butcher/Waller Overlap; D = Depression, Scale 2; DEP = Depression; INTR = Introversion/Low Positive Emotionality; MINI = Mini International Neuropsychiatric Interview; BHS = Beck Hopelessness Scale.

with MINI suicide risk. These results indicate that Hp and BHS scores could provide partially non-overlapping information.

A ROC curve procedure, with groups of patients with different suicide risk as the dependent variable (patients with suicide attempts in the last month [n = 36] vs. those who did not attempt suicide in the last month), indicated that Hp (area under the ROC curve = 0.67, 95% CI = 0.56 / 0.78; SE = 0.06; p < 0.01) categorizes patients with different levels of suicide risk reasonably well. A raw score of 4.5 or higher on Hp categorized individuals with a sensitivity of 0.61 (61% of all the patients with a suicide attempt in the last month were correctly identified) and a specificity of 0.65 (only 35% of all individuals without a suicide attempt in the last month were incorrectly identified to have attempted suicide).

4. Discussion

This is the first formal study investigating the validity of the Hopelessness Scale (Hp; Nichols, 2011a, b). Nichols used the aggregated Rouse et al. (2008) sample to identify and retrieve twelve items meeting two conditions: (1) achieve correlations with each of the SPS items ≥ 0.2, and (2) form a coherent theme with high internal consistency. In our sample of psychiatric inpatients one item (item #92) had a low item-total correlation and was removed from the Hp scale for subsequent analyses. The remaining 11 items all loaded on a single factor with satisfactory internal consistency (alpha = 0.86), despite one item (item #306), which had low correlation with the latent construct (i.e., 0.27) and highly variable credibility intervals (between 0.075 and 0.449).

Although the reason(s) for the low item-total performance observed for item #92 is unknown, the finding itself may be an anomaly isolated to the current sample on the basis of language, geography, or some other factor. Note that its mean correlation with SPS (see Table 2) is higher than average for the Hp items. For this reason, item #92 should be retained in future examinations of the Hp scale.

Hp scores were independent of age, sex, and psychiatric diagnosis. This is in accord with results from the BHS, which has not been found to be significantly associated with sex and only weakly associated with age (Pompili et al., 2009). In our sample BHS scores were also not significantly associated with psychiatric diagnosis. However, in a similar sample, Pompili et al. (2014) reported significant differences between diagnostic groups of psychiatric patients. Specifically, individuals diagnosed with bipolar II disorder (BD2), and major depressive disorder (MDD), scored higher than individuals diagnosed with bipolar I disorder (BD1).

Hp scores correlated moderately to strongly (from 0.34 with the MINI suicide risk score to 0.85 with DEP) and in the right direction with most convergent measures. The association between Hp and the BHS was only moderate (=0.52, p < 0.01). Finally, the pattern of correlations between Hp and measures of depression and suicide risk showed discriminant validity beyond that of the BHS. Although Hp scores correlated with MINI suicide risk scores at 0.34 (vs. 0.29 of the BHS), in a regression analysis only Hp scores, and not the BHS, were independently

and directly associated with MINI suicide risk scores. This is an important result because several studies have indicated that the BHS could be a valid measure for predicting suicide behavior in psychiatric patients (Beck et al., 1990; Beck et al., 1985; Klonsky et al., 2012; McMillan et al., 2007). Hp scores also appeared to discriminate patients with different levels of suicide risk reasonably well (area under the ROC curve = 0.67, 95% CI = 0.56 / 0.78; SE = 0.06; $p < 0.01$), with 0.61 and 0.65 respectively for sensitivity and specificity.

Our results indicate that the MMPI-2 Hp scale may be considered a unidimensional measure of pessimistic attitudes toward the future. Given that the DSM-5 has now referenced "prominent feelings of hopelessness" (American Psychiatric Association DSM-5 Task Force, 2013) as a feature increasing suicide risk, the importance of its psychometric assessment has increased. Hopelessness has also been widely recognized as a proxy for suicide risk, predicting suicide better than the sole diagnosis of major depression (Beck et al., 1985, 1990). Hp is able to assess different aspects of pessimistic attitudes of the individual toward the future when compared to the BHS and this characteristic is important when planning to assess hopelessness as well as suicide risk in clinical settings. In fact, suicide is a multifactorial phenomenon, spanning several high-risk personality features (such as perfectionism, narcissism, pessimistic attitudes, etc.) and playing a contributory role in psychiatric disorders. As such, suicide assessment remains a major challenge. However, researchers have to study the validity of the MMPI-2 Hp in different samples and investigate with prospective methods its predictive validity for suicide behaviors in comparison to the BHS. The MMPI-2 Hp could be an important measure of suicide risk because it is part of the MMPI-2, a test routinely used in many clinical contexts around the world.

This research has limitations that impair the generalizability of our findings. With regard to population, subjects included in this study were psychiatric inpatients, with complex therapeutic regimens, some with a chronic course of illness and others with a recent onset of psychiatric disorder. Moreover, the sample size was modest, and the patients' diagnoses included bipolar disorder I, bipolar disorder II, major depressive disorder and psychotic disorders.

Other limitations relate to the instruments used in the study. The MMPI-2 and BHS are self-report, psychiatric instruments. This means the test results were influenced by subject self-report, rather than objective observation. Further, the use of individual suicide assessment items from the MINI may be less rigorous than assessment of suicide risk with psychometic instruments such as the Columbia-Suicide Severity Rating Scale (Posner et al., 2011). However, despite such limitations, this research provides initial support for the predictive validity of the MMPI-2 Hp scale in psychiatric contexts, and suggests its utility as an enhanced and possibly better focused MMPI-2 – based measure of both hopelessness and suicide risk for this widely used personality assessment instrument.

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