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# Mediators in the Association Between Affective Temperaments and Suicide Risk Among Psychiatric Inpatients

Denise Erbuto, Marco Innamorati<sup>ORCID</sup>, Dorian A. Lamis, Isabella Berardelli, Alberto Forte, Eleonora De Pisa, Monica Migliorati, Gianluca Serafini, Xenia Gonda, Zoltan Rihmer, Andrea Fiorillo, Mario Amore, Paolo Girardi, and Maurizio Pompili

*Background:* Affective temperaments have been shown to be related to psychiatric disorders and suicidal behaviors. Less is known about the potential contributory role of affective temperaments on suicide risk factors. In the present study, we investigated whether the effect of affective temperaments on suicide risk was mediated by other variables, such as hopelessness, mentalization deficits, dissociation, psychological pain, and depressive symptoms. *Methods:* Several assessment instruments, including the Mini International Neuropsychiatric Interview (MINI); the Temperament Evaluation of Memphis, Pisa, and San Diego Autoquestionnaire (TEMPS-A); the Beck Hopelessness Scale (BHS); the Gotland Male Depression Scale (GMDS); the Dissociative Experiences Scale (DES); the Psychological Pain Assessment Scale (PPAS); and the Mentalization Questionnaire (MZQ), were administered to 189 psychiatrically hospitalized patients (103 women, 86 men) in Rome, Italy. *Results:* In single-mediator models, hopelessness, depressive symptoms, and mentalization, but not psychological pain or dissociation, were significant mediators in the association between prevalent temperament and suicide risk. In a multiple-mediator model, a significant indirect effect was found only for depression. Results demonstrated that patients with negative temperaments reported higher suicide risk, psychological pain, hopelessness, and depression,

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and less mentalization than patients with no prevalent temperament or hyperthymic temperaments. *Conclusions:* Hopelessness, depression, and mentalization are all factors that mediate the relation between affective temperaments and suicide risk. Identifying factors that mediate the effects of affective temperamental makeup on suicide risk should enhance screening and intervention efforts.

Suicide is one of the most serious public health problems representing a frequent cause of medical emergencies (World Health Organization, 2014). Major depressive disorder (MDD) and bipolar affective disorder (BD) have been associated with increased risk of suicide (Ribeiro, Huang, Fox, & Franklin, 2018). Other specific suicide risk factors might be found in individual personality traits and affective temperaments (Tondo, Vázquez, Sani, Pinna, & Baldessarini, 2018); these factors may predispose individuals, indirectly, to mood disorders (MDD or BD), increasing the risk of suicide. However, the presence of depression or affective temperaments is not sufficient for the prediction of suicidality (Pompili, 2010). Recent studies demonstrated that other psychopathological features, such as hopelessness, dissociation, psychological pain, and mentalization, could increase the risk of suicide (Kılıç, Coşkun, Bozkurt, Kaya, & Zoroglu, 2017; Pompili et al., 2014; Ribeiro et al., 2018). To our knowledge, no studies have investigated the relation between affective temperaments, factors influencing or predicting suicidal behavior, and suicide risk.

Personality traits and affective temperaments (cyclothymic, depressive, hyperthymic, irritable, and possibly anxious temperamental subtypes) appear to be stable risk factors predisposing individuals to various psychiatric disorders (Akiskal, Akiskal, Haykal, et al., 2005; Karam, Mneimneh, Salamoun, Akiskal, & Akiskal, 2005; Vázquez, Gonda, Lolic, et al., 2017). Furthermore, several studies have investigated associations between affective temperaments in psychiatric disorders and suicidal behaviors (Akiskal et al., 2005; Pompili et al., 2008; Rihmer, 2009; Vázquez et al., 2017). A recent review of 23 studies demonstrated that depressive and irritable temperaments were strongly associated with suicidal

risk, while hyperthymic temperament appeared to be protective (Vázquez, Gonda, Lolic, Tondo, & Baldessarini, 2018). Furthermore, the association between affective temperaments and hopelessness and depression in psychiatric patients is well documented (Iliceto, Pompili, Lester, et al., 2011; Pompili et al., 2014). Specifically, patients with depression were more likely to have higher anxious temperament, higher hopelessness, and lower hyperthymic temperament scores (Pompili et al., 2014). Moreover, psychological pain has been reported as a main ingredient of suicide risk (Orbach, 1994; Pompili, Lester, Linaars, Tatarelli, & Girardi, 2008; Shneidman, 1993). It refers to the hurt, anguish, or ache that takes hold in the mind; the pain of excessively felt shame, guilt, fear, anxiety, loneliness, or angst, and the dread of growing old or of dying badly (Pompili, Iliceto, Lester, et al., 2009; Shneidman, 1993). Recently, scholars have adopted a phenomenological view of the suicide phenomenon (Pompili, 2018). Several studies have demonstrated that psychological pain has greater value in predicting suicide than depression and hopelessness, and mediated the association between psychological symptoms and subsequent suicidal ideation (Campos, Gomes, Holden, Piteira, & Rainha, 2017; Troister & Holden, 2010).

Consequently, in the current study, we examined this important psychological construct and its association with affective temperaments in contributing to suicide risk among psychiatric patients. According to the definition provided by Peter Fonagy and Anthony Bateman, mentalization refers to “the ability to reflect upon, and to understand one’s state of mind” (Bateman & Fonagy, 2012); “to have insight into what one is feeling, and why”; and is assumed to be an important coping skill that is necessary for effective emotional regulation

(Bateman & Fonagy, 2012). Previous research has demonstrated that difficulties with emotional regulation are one of the primary characteristics of personality disorders (Fonagy & Allison, 2016; Petersen, Brakoulias, & Langdon, 2016). However, only a few studies have investigated mentalization in affective disorders (Fischer-Kern et al., 2013; Power, Iacoponi, Reynolds, et al., 2007; Santos et al., 2017). Results have indicated that, in depressive disorders, deficits in mentalizing capacity were related to illness duration, number of admissions, and cognitive impairment. Based on developmental psychopathology considerations, Luyten and Fonagy (2017) hypothesized an integrative cascade model of depression, suggesting that depression emerges from an alteration of the domains of stress regulation, reward, and mentalizing (Luyten & Fonagy, 2017; Pasquini, Berardelli, & Biondi, 2014). Few trials have investigated the role of mentalization on suicide risk, one of which found that deficits in mentalization were associated with higher suicide risk in psychiatric patients. Furthermore, patients with moderate to severe risk of suicide were 1.7 times more likely to report more mentalization deficits than those with no or low risk of suicide (Innamorati et al., 2017).

Dissociation is widely recognized as an important psychological process in patients with mental health problems (Collin-Vézina & Hébert, 2005; Putnam, 1997). The central feature of dissociation is disruption to one or more mental functions (American Psychiatric Association, 2013). Such disruption may affect not only consciousness, memory, and/or identity but also thinking, emotions, sensorimotor functioning, and/or behavior (Briere, Dietrich, & Semple, 2016). Moreover, dissociation may accompany almost all psychiatric disorders and may influence their phenomenology as well as response to treatment (Lyssenko, Schmahl, Bockhacker, et al., 2017). In a state of dissociation, mental processes involved in suicidal behavior and the associated affects can be split off from the rest of the personality (Levinger, Somer, & Holden, 2015). In addition, cognitive functioning and reality testing often appear to have been shut down or

sequestered. Indeed, some researchers have hypothesized that suicidal individuals are characterized by a disposition toward dissociation manifested in relative insensitivity to physical pain and indifference to their bodies (Orbach, 1994). In a recent review of 19 studies focused on the association between dissociation and suicide risk, Calati, Bensassi, and Courtet (2017) found that individuals with prior suicide attempts and nonsuicidal self-injury reported higher levels of dissociation.

Hopelessness, a psychological construct, is defined as an emotional state characterized by negative beliefs and expectancies about oneself and one's future (Beck, Steer, Kovacs, et al., 1985). The hopeless individual believes that negative aspects of his or her life will never improve, and he or she will never achieve goals and success in life (Abramson et al., 1989; Abela, Aydin, & Auerbach, 2006). Hopelessness has been shown to strongly correlate with suicidal risk (Beck, Brown, Berchick, et al., 1990b; Ribeiro et al., 2018), and the interaction between negative cognitive styles and negative life events contributes to a sense of hopelessness (Liu, Kleiman, Nestor, et al., 2015; Pössel & Thomas, 2011). Thus, hopelessness is often sufficient alone to result in depression and has received significant attention in the literature. These findings highlight the importance of assessing hopelessness in patients diagnosed with affective disorders as well as those who may be at risk for suicide.

Our understanding of the associations among suicide risk, psychological pain, dissociation, depressive symptoms, mentalization, and temperamental features is still limited, and no previous studies have been devoted to understanding the role of mediation of these psychological factors in the relation between affective temperaments and suicide risk. The goal of this research was to assess whether the effect of affective temperaments on suicide risk was mediated by other variables such as hopelessness, mentalization deficits, dissociation, psychological pain, and male depression.

## METHODS

### Patients and Clinical Assessments

Participants were consecutively hospitalized patients enrolled between January 2014 and April 2016 at psychiatric units of Sant'Andrea Medical Center, an affiliate of the Sapienza University of Rome. Inclusion criteria were adult inpatients aged  $\geq 18$  years, with an expert, clinically determined *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition, Text Revision (*DSM-IV-TR*) psychiatric diagnosis supported by examination based on the Mini International Neuropsychiatric Interview (MINI) (Sheehan, Lecrubier, Sheehan, et al., 1998). Exclusion criteria included the presence of a degenerative neurological disease and comorbidity with abuse of alcohol or drugs.

Study subjects participated voluntarily and provided written informed consent, following review and approval of the study protocol by the local research ethics review board, with assurance that data would be reported only anonymously and in aggregate form.

The study included a total of 189 psychiatrically hospitalized, adult patients (103 women, 86 men); age averaged ( $\pm$  SD)  $39.59 \pm 13.94$  years. The distribution of primary *DSM-IV-TR* psychiatric diagnoses included nonaffective psychotic (11.6%,  $n = 22$ ), bipolar I (BD-I; 26.5%,  $n = 50$ ), bipolar II (BD-II; 3.2%,  $n = 6$ ), major depressive (MDD; 13.8%,  $n = 26$ ), schizoaffective (22.8%,  $n = 43$ ), other (15.9%,  $n = 30$ ) Axis I disorders, and personality disorders (10.1%) (Table 1).

During the psychiatric visit, on the first day of admission to the psychiatric units of Sant'Andrea Medical Center, a battery of psychological questionnaires was administered.

### Outcome: Suicidal Risk

The presence of any suicide attempts in the past seven days before admission to

the hospital was recorded, and all patients also had a clinical assessment of lifetime suicidal status by experienced psychiatric investigators backed by the suicide-assessment component of the MINI examination (Sheehan et al., 1998). The MINI is composed of six items assessing the presence of suicide attempts and ideation (death wishes, active suicide ideation, and suicide planning) in the past month, and lifetime suicide attempts. In the present sample, the Cronbach's alpha for the MINI suicide risk module was 0.89.

### Predictor: Affective Temperaments

The 110-item Temperament Evaluation of Memphis, Pisa, and San Diego Auto-questionnaire (TEMPS-A) is a self-rating questionnaire consisting of 109 items for men and 110 for women (Akiskal et al., 2005) assessing subaffective trait expressions as they were conceptualized in Greek medicine and in German psychiatry. Akiskal and his coworkers proposed criteria for these temperaments that are relevant for mood disorders based on an affective continuum (Akiskal & Mallya, 1987), ranging from subthreshold affective traits at one end to severe affective psychosis at the other end (Akiskal & Pinto, 2000). The questionnaire assesses affective temperaments, including predominantly depressive (dep), cyclothymic (cyc), irritable (irr), anxious (anx), and hyperthymic (hyp) subtypes (Akiskal et al., 2005). Cronbach's alphas in the present sample were 0.70 for dep, 0.82 for cyc, 0.82 for irr, 0.86 for anx, and 0.85 for hyp.

### Mediators: Psychological Pain

The Italian version of the Psychological Pain Assessment Scale (PPAS) (Shneidman, 1999) was administered, which was back-translated with discrepancies between the back-translation and Shneidman's original version being addressed and corrected. On the PPAS, the purpose of the test was described and psychological pain was

TABLE 1. Characteristic of Patients According Their Affective Temperament (N = 189)

Factors	All Subjects	Affective Temperaments					Statistic [ANOVA or $\chi^2$ ]	p Value	Significant Post Hoc
		1. None	2. Negative	3. Hyperthymic	4. Mixed	5. Mixed/Hyperthymic*			
Cases (n)	189	94	28	31	29	7	—	—	—
Age	39.59 ± 13.94	40.37 ± 14.22	39.86 ± 14.93	38.81 ± 12.78	37.07 ± 14.07	42.14 ± 12.71	$F_{3,177} = 0.44$	0.73	—
Sex (%)							$\chi^2_3 = 2.84$	0.42	—
Women	54.5	53.2%	42.9%	61.3%	62.1%				
Men	45.5	46.8%	57.1%	38.7%	37.9%	42.9%			
Diagnosis									
Axis I							$\chi^2_{18} = 24.75$	0.13	—
None	6.3	5.3%	17.9%	0.0%	3.4%	14.3%			
BD1	26.5	28.7%	14.3%	32.3%	20.7%	42.9%			
BD2	3.2	3.2%	3.6%	3.2%	3.4%	0.0%			
MDD	13.8	16.0%	7.1%	3.2%	27.6%	0.0%			
Psychosis	11.6	12.8%	7.1%	12.9%	10.3%	14.3%			
Schizoaffective disorder	22.8	23.4%	25.0%	29.0%	13.8%	14.3%			
Other	15.9	10.6%	25.0%	19.4%	20.7%	14.3%			
Personality disorders	10.1	6.4%	21.4%	3.2%	17.2%	14.3%	$\chi^2_3 = 8.78$	0.03	—
Suicide attempts in past 7 days	20.6	22.6%	17.9%	6.5%	34.5%	14.3%	$\chi^2_3 = 7.44$	0.06	—
MINI suicidal risk	2.22 ± 2.30	2.03 ± 2.28	3.23 ± 2.20	0.80 ± 1.52	3.38 ± 2.21	2.14 ± 2.55	$F_{3,174} = 9.34$	< 0.0001	1v3, 1v4, 2v3, 3v4
Psychological pain	6.10 ± 2.78	6.11 ± 2.75	6.652.45	4.45 ± 3.07	7.26 ± 2.12	6.17 ± 2.86	$F_{3,177} = 5.75$	0.001	2v3,3v4
BHS	6.99 ± 4.84	5.94 ± 3.89	10.70 ± 4.61	3.07 ± 2.41	11.14 ± 5.05	6.43 ± 3.26	$F_{3,177} = 29.64$	< 0.0001	1v2, 1v3, 1v4, 2v3, 3v4
GSMDD	15.10 ± 8.77	14.00 ± 8.12	18.70 ± 8.05	7.39 ± 4.86	23.10 ± 6.53	16.71 ± 8.88	$F_{3,177} = 25.30$	< 0.0001	1v3, 1v4, 2v3, 3v4
DES-T	18.83 ± 18.00	14.10 ± 14.51	23.01 ± 16.60	16.81 ± 18.00	29.02 ± 20.99	32.14 ± 28.40	$F_{3,177} = 6.88$	< 0.0001	1v4
Mentalization	2.80 ± 0.75	3.07 ± 0.69	2.46 ± 0.68	3.09 ± 0.68	2.16 ± 0.45	2.07 ± 0.66	$F_{3,177} = 18.56$	< 0.0001	1v2, 1v4, 2v3, 3v4

Note. Data are means ± SD; percentages are proportions of stated characteristics within temperamental groups. Data for the mixed/hyperthymic group are reported in Table 1, but they were excluded from the bivariate analyses. Bonferroni correction for multiple tests:  $p = 0.05/11 = 0.0045$ . Diagnoses: BD = bipolar disorder; MDD = major depressive disorder; Other = mainly anxiety disorders and substance addiction. Prevalent temperament: none = patients with TEMPS scores < 1 standard deviation (SD) than the sample mean; negative = patients with one single dimension (either depression, cyclothymia, irritability, or anxiety) > 1 SD than the sample mean; hyperthymic = patients with hyperthymia scores > 1 SD and depression, cyclothymia, irritability, and anxiety < 1 SD than the sample mean; mixed = patients with two dimension (among depression, cyclothymia, irritability, or anxiety) > 1 SD and hyperthymia < 1 SD than the sample mean; mixed/hyperthymic = patients with hyperthymia and other dimensions > 1 SD than the sample mean.

defined. Page 1 requests personal data (age and sex), presents the purpose of the test, and defines psychological pain. The respondents were then asked to rate their current psychological pain on a scale of 1 (*Least*) to 9 (*Most*). Page 2 presents 10 pictures, and respondents were requested to rate the psychological pain experienced by the main character in each picture on a scale of 1 to 9, and the sum of these ratings were calculated. Page 3 asks respondents to rate the worst psychological pain they have ever experienced on a scale of 1 to 9, and then to check which of 28 feelings were prominent at that time (e.g., abandonment, anger, betrayal, despair, guilt, grief, fear, loneliness, hopelessness, loss, lure of death, shame, self-hate, sadness). Page 4 requests that respondents provide an essay describing their time of worst-ever psychological pain.

### Hopelessness

The Beck Hopelessness Inventory (BHS) (Beck & Steer, 1989) is a 20-item scale assessing negative attitudes about the future. Sample items include “I look forward to the future with hope and enthusiasm” and “I might as well give up because I can’t make things better for myself.” This powerful predictor of eventual suicide addresses three major aspects of hopelessness: feelings about the future, loss of motivation, and expectations. In the original validation study, BHS scores were strongly correlated with clinical ratings of hopelessness (Beck, Weissman, Lester, & Trexler, 1974). To date, the validity of the BHS has been investigated and confirmed in clinical and nonclinical samples (Beck & Steer, 1993). Several studies indicated that, in psychiatric samples, the BHS is a valid measure for predicting subsequent suicide behavior (Beck, Brown, Berchick, et al., 1990; Beck et al., 1985; David Klonsky, Kotov, Bakst, et al., 2012; McMillan, Gilbody, Beresford, & Neilly, 2007), as well as general health and social functioning (Pompili et al., 2013). In Italy,

validation studies have been conducted on samples of medical patients, university students, and psychiatric inpatients, indicating satisfactory psychometric properties (Innamorati et al., 2014). In the present sample, Cronbach’s alpha was 0.88.

### Depression

All the patients, including female patients, were administered the Gotland Male Depression Scale (GMDS). The GMDS is a 13-item screening tool for assessing “male depression,” which is rated on a 4-point Likert scale from 0 (*Not present*) to 3 (*Present to a high degree*) with a range from 0 to 39. Together with the assessment of typical depressive symptoms—such as depressed/irritable mood, reduced interest/pleasure in daily life activities, weight loss, insomnia/hypersomnia, psychomotor agitation/retardation, fatigue or loss of energy, feelings of inappropriate guilt, reduced ability to think/concentrate, and suicidality—this instrument also assesses other features that may be commonly reported in depressed people, such as irritability, aggression, and alcohol use. The GMDS does not clearly specify a period of time to assess but indicates that the respondent has to indicate whether any change in the behavior has occurred in respect to his or her habitual behavior. Previously, the GMDS has demonstrated good psychometric properties in measuring nontypical (“suicidality-related”) symptoms of depression in both Italian males and females (Innamorati et al., 2011). Good internal consistency (Cronbach’s alpha = 0.83) has been reported for the GMDS total score in the present sample.

### Dissociation

The Dissociative Experiences Scale (DES) (Bernstein & Putnam, 1986) is a 28-item self-report measure widely used to investigate current frequency of dissociative experiences and symptoms. In this study,

we administered the Italian version of the DES (Mazzotti, Farina, Imperatori, et al., 2016). To answer DES questions, participants were asked to circle the percentage of time (ranging from 0% to 100%) in which they had the experience described (e.g., “Some people have the experience of driving a car and suddenly realizing that they don’t remember what has happened during all or part of the trip”). A subset of eight items of the DES, the so-called DES-Taxon (DES-T), is considered especially sensitive to identify pathological dissociation (Waller, Putnam, & Carlson, 1996). The DES-T total score was calculated by averaging eight items (Items 3, 5, 7, 8, 12, 13, 22, and 27) on the DES (measuring experiences and symptoms such as amnesia [e.g., “Finding new things among their belongings that they do not remember buying”], fugue [e.g., “Finding themselves in a place and have no idea how they got there”], depersonalization [e.g., “See themselves as if they were looking at another person”], derealization [e.g., “Feeling that other people, objects, and the world around them are not real”], and auditory verbal and command hallucinations [e.g., “Hear voices inside their head that tell them to do things or comment on things that they are doing”]). In the present sample, the internal consistency of the DES-T was 0.82. The individual scores range from 0 to 100, and the overall score was the added individual scores divided by the number of items (i.e., 28). The scale has shown to be both valid and reliable as a measure of the respondent’s level of dissociation (Bernstein & Putnam, 1986; Dubester & Braun, 1995).

### Mentalization

The Mentalization Questionnaire (MZQ) is a 15-item self-report scale measuring mentalization, or the ability to represent and understand inner mental states in oneself and others (e.g., “Sometimes I only become

aware of my feelings in retrospect”; “Often I don’t even know what is happening inside of me”) (Hausberg et al., 2012). The underlying theory of this questionnaire originated from the current literature on psychopathology and mentalization (Bateman & Fonagy, 2004; Fonagy et al., 2002; Stein, 2003). Some items of the MZQ were derived from the German reflective functioning manual (Daudert, 2002).

All items were controlled for formulation and plausibility by an expert in psychological diagnostics and experts in the field of mentalization-based treatment (MBT). Respondents were asked to rate each item on a 5-point Likert scale, from *I disagree* to *I agree*. A confirmatory factor analysis (CFA) supported a four-factor solution: refusing self-reflection, emotional awareness, psychic equivalence mode, and regulation of affect (Hausberg et al., 2012). Total scores can vary between 0 and 60, with higher scores indicating less mentalizing ability. Specific cutoff scores are not available for this instrument (Hausberg et al., 2012). We translated and adapted the Italian version of the MZQ from an English version provided from the authors of the measure. Information and further details of the procedure are reported in Innamorati et al. (2017). In the present sample, the Cronbach’s alpha was 0.78.

### Data Analyses

Preliminary assessments of individual factors of interest were conducted with bivariate comparisons of subjects according to their prevalent temperament (chi-square test [ $\chi^2$ ] for  $N \times N$  contingency tables and analysis of variance [ANOVA] for dimensional variables). DSM-IV-TR Axis I (none versus BD1, BD2, MDD, psychosis, schizoaffective disorder, and other specified disorders) and personality diagnoses (any versus none) were included in the bivariate analyses. Prevalent (dominant) temperament is defined as a score  $\geq +1$  SD from the sample mean. Patients with TEMPS-A scores  $< 1$  SD from the sample mean were



considered to have no prevalent temperament (none). The use of prevalent temperaments rather than scores on single dimensions has been used in previous studies (Pompili et al., 2014; Rózsa et al., 2008) to identify individuals with dominance of one dimension of the TEMPS-A on other temperaments. However, no specific cutoff scores are reported in the international literature to be used for this scope, and authors have generally used either the deviation from the sample mean or deviation from the mean of individual temperamental scores to categorize individuals according their prevalent temperament. In the present article we decided to use 1 SD from sample mean, and not 2 SD (Rózsa et al., 2008), to consider a patient with a prevalent temperament, due to the fact that we recruited a psychiatric sample characterized by higher scores on single dimensions of the TEMPS-A than samples from the general population. Cyclothymic, depressive, irritable, and anxious temperaments were grouped together in the same category according to results from past research (Pompili et al., 2012), which reported high correlations between negative temperamental scores and found two natural temperamental groups (a group with prevailing cyclothymic–depressive–anxious temperament and a group with prevailing hyperthymic temperament) which differed for depression and suicide risk. Of the 189 patients, 28 patients presented a negative affective temperament, 31 patients hyperthymic, 29 mixed (seven depressive-anxious, five cyclothymic-anxious, four depressive-cyclothymic-irritable-anxious, three each of the depressive-cyclothymic and depressive-cyclothymic-irritable combinations, two cyclothymic-irritable-anxious and irritable-anxious, and one each of the other combinations), and seven mixed/hyperthymic (Table 1). Patients with one single dimension (depression, cyclothymic, irritable, or anxious) > 1 SD from the sample mean were grouped together (negative) ( $n = 28$ ). Patients with hyperthymic temperament scores > 1 SD and other dimensions < 1 SD from the sample mean

were considered as having a hyperthymic temperament (hyperthymic) ( $n = 31$ ). Patients with two or more dimensions among depressive, cyclothymic, irritable, or anxious > 1 SD and hyperthymic < 1 SD from the sample mean were considered as having a mixed negative temperament (mixed) ( $n = 29$ ). Patients with both hyperthymic and one of the negative dimensions > 1 SD from the sample mean were grouped in a mixed/hyperthymic group (mixed/hyperthymic) ( $n = 7$ ). Considering the small number of patients included in the mixed/hyperthymic group, they were excluded from the analyses.

To assess whether the effect of affective temperaments on suicide risk was mediated by other variables (i.e., hopelessness, mentalization deficits, dissociation, psychological pain, and male depression), a series of single- and multiple-mediator models was tested through the strategy recommended by Preacher and Hayes (2004, 2008).

In a single-mediator model, an independent variable ( $X =$  negative prevalent temperament) is hypothesized to act on the outcome variable ( $Y =$  MINI suicide risk) in two ways:  $X$  change a mediator (e.g.,  $M_i =$  hopelessness or mentalization deficits or dissociation or psychological pain or male depression; path  $A_i$ ) that, in turn, changes an outcome variable ( $Y$ ; path  $B_i$ ), or  $X$  changes  $Y$  directly (path  $C'$ ). A multiple-mediator model is a generalization of the single-mediator model, and all the hypothetic mediators are included in parallel in the model (see Figure 1). In the analyses, we used standardized variables. Patients with no prevalent temperament were treated as the reference category. For indirect effects, bias-corrected and accelerated 95% confidence intervals (CIs) were calculated using the bootstrapping method, as suggested by Preacher and Hayes (2008). All analyses were performed with the statistical package for social sciences SPSS for Windows 19.0 and the macro for SPSS Process 2.16.3.

**RESULTS**

**TEMPS-A Prevalent Temperaments**

In total, 51% percent of the sample reported at least one score on the TEMPS-A  $\geq 1$  SD from the sample mean, indicating the presence of a prevalent temperament. The most common temperaments were hyperthymic (16.4%), mixed negative (15.3%), and negative (14.8%). Finally, less than 4% of the patients reported a hyperthymic/mixed temperament (3.7%), and 49.7% had no prevalent temperament.

Scores differed significantly among temperamental groups for MINI suicidal risk scores ( $p < 0.0001$ ; partial eta squared = 0.14), psychological pain ( $p = 0.001$ ; partial eta squared = 0.09), hopelessness ( $p < 0.0001$ ; partial eta squared = 0.34), depression ( $p < 0.0001$ ; partial eta squared = 0.30), dissociation ( $p < 0.0001$ ; partial eta squared = 0.10), and mentalization ( $p < 0.0001$ ; partial eta squared = 0.25), with considerable selectivity for post hoc comparisons of pairs of temperaments (Table 1). Patients with hyperthymic temperament differed from other groups for suicide risk, psychological pain,

hopelessness, depression, and mentalization (Table 1). Patients with mixed negative temperaments generally reported higher suicide risk, psychological pain, hopelessness, and depression, and less mentalization than other groups (Table 1). Patients with no prevalent temperament differed from other groups for suicide risk, hopelessness, depression, dissociation, and mentalization, and reported more problems than hyperthymic patients and fewer problems than patients with negative and mixed temperaments (Table 1). Finally, patients with negative temperaments reported higher suicide risk, psychological pain, hopelessness, and depression, and less mentalization than patients with no prevalent temperament and hyperthymic patients. Compared to patients with mixed negative temperaments, they reported no significant differences in suicide risk, psychological pain, hopelessness, depression, and mentalization (Table 1).

**Mediational Analyses**

In a regression model with prevalent temperament as predictor and suicide risk as criterion, the regression model was significant ( $F_{3;174} = 9.34$ ;  $p < 0.0001$ ) and all

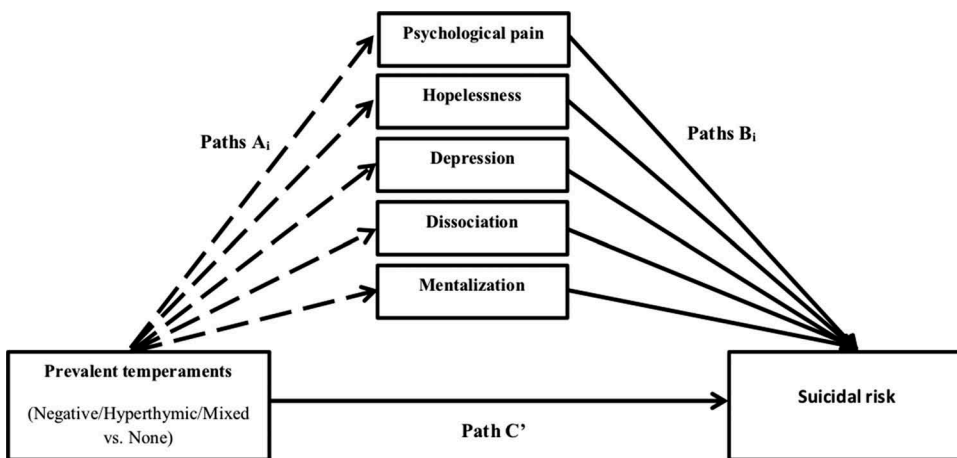


FIGURE 1. Mediation Model With Multiple Mediators (Paths A<sub>i</sub>: Independent Variable → Mediator; Paths B<sub>i</sub>: Mediator → Dependent Variable; Path C': Independent Variable → Dependent Variable).

prevalent temperaments were significantly associated with suicide risk (negative: Beta = 0.52, SE = 0.21,  $t = 2.52$ ,  $p = 0.013$ ; hyperthymic: Beta = -0.54, SE = 0.20,  $t = -2.73$ ,  $p = 0.007$ ; mixed negative: Beta = 0.59, SE = 0.20,  $t = 2.95$ ,  $p = 0.004$ ). Also, regression models with potential mediators as criteria and affective temperaments as the independent variables were all significant ( $p < 0.05$ ;  $R^2$  ranging between 0.09 and 0.34) (Table 2).

When considering the effect of affective temperaments on suicide risk in single-mediator models, the results were mixed. For psychological pain and dissociation as mediators, prevalent temperament had a significant direct effect (psychological pain: omnibus test of direct effect of  $X$  on  $Y$ :  $R^2 = 0.11$ ,  $F_{3,162} = 6.92$ ,  $p = 0.0002$ ; dissociation: omnibus test of direct effect of  $X$  on  $Y$ :  $R^2 = 0.12$ ,  $F_{3,172} = 8.15$ ,  $p < 0.00001$ ) and a nonsignificant indirect effect (psychological pain: omnibus test of indirect effect of  $X$  on  $Y$ : Beta = 0.01, SE = 0.01, 95% CI = -0.0001/0.036; dissociation: omnibus test of indirect effect of  $X$  on  $Y$ : Beta = 0.003, SE = 0.01, 95% CI = -0.01/0.03). The effects of negative, hyperthymic, and mixed negative temperaments were significant (see Betas in Table 2).

For hopelessness and depression as mediators, prevalent temperament had nonsignificant direct effects (hopelessness: omnibus test of direct effect of  $X$  on  $Y$ :  $R^2 = 0.03$ ,  $F_{3,172} = 2.24$ ,  $p = 0.09$ ; depression: omnibus test of direct effect of  $X$  on  $Y$ :  $R^2 = 0.0135$ ,  $F_{3,173} = 1.11$ ,  $p = 0.35$ ), and significant indirect effects (hopelessness: omnibus test of indirect effect of  $X$  on  $Y$ : Beta = 0.09, SE = 0.03, 95% CI = 0.03/0.16; depression: omnibus test of indirect effect of  $X$  on  $Y$ : Beta = 0.14, SE = 0.03, 95% CI = 0.08/0.20). Both negative (hopelessness: Beta = 0.27, 95% CI = 0.11/0.50; depression: Beta = 0.26, 95% CI = 0.08/0.50), hyperthymic (hopelessness: Beta = -0.15, 95% CI = -0.29/-0.07; depression: Beta = -0.35, 95% CI = -0.55/-0.20), and mixed (hopelessness: Beta = 0.29, 95% CI = 0.12/0.52;

depression: Beta = 0.49, 95% CI = 0.30/0.73) temperaments had significant indirect effect.

For mentalization, prevalent temperament had significant direct (omnibus test of direct effect of  $X$  on  $Y$ :  $R^2 = 0.0686$ ,  $F_{3,164} = 4.45$ ,  $p = 0.0049$ ) and indirect (omnibus test of indirect effect of  $X$  on  $Y$ : Beta = -0.0454, SE = 0.02, 95% CI = -0.0241/-0.0073) effects. Hyperthymic temperament had only a direct effect (see Betas in Table 2), conversely negative (Beta = 0.15, 95% CI = 0.03/0.34), and mixed (Beta = 0.24, 95% CI = 0.05/0.48) temperaments had only an indirect effect.

In the multiple-mediator model, where we included in parallel all the mediators, the effect of prevalent temperament on suicide risk was indirect only (omnibus test of indirect effect of  $X$  on  $Y$ : Beta = 0.12; SE = 0.04, 95% CI = 0.06/0.20) and completely mediated by depression (negative temperament: Beta = 0.24, 95% CI = 0.06/0.52; hyperthymic temperament: Beta = -0.36, 95% CI = -0.60/-0.19; mixed temperament: Beta = 0.45, 95% CI = 0.23/0.73). In this model, the direct effect of prevalent temperament on suicide risk was nonsignificant (omnibus test of direct effect of  $X$  on  $Y$ :  $R^2 = 0.002$ ,  $F_{3,149} = 0.18$ ,  $p = 0.91$ ). Thus, when we considered multiple variables generally associated with suicide risk, prevalent temperament affects suicide risk only indirectly, and particularly through depression, so that negative and mixed prevalent temperaments were associated with higher depression and more severe suicide risk, and hyperthymic prevalent temperament was associated with lower depression and lower suicide risk.

## DISCUSSION

In our study of psychiatric patients, we investigated the potential association between prevalent affective temperaments and factors influencing or predicting suicidal behavior. Approximately half of the sample

TABLE 2. Regression Models for Mediation Analyses (Controls Are Those With No Prevalent Temperament)

Criterion/Mediator	Negative Prevalent Temperament			Hyperthymic Prevalent Temperament			Mixed Prevalent Temperament		
	Beta Coefficient (± SE)	95%CI	p Value	Beta Coefficient (± SE)	OR [95%CI]	p Value	Beta Coefficient (± SE)	OR [95%CI]	p Value
<b>Mediators as outcome</b>									
Psychological pain (1)	0.15	-0.29/0.59	0.50	-0.59	-1.01/-0.18	0.005	0.43	0.004/0.84	0.05
Hopelessness (2)	1.02	0.66/1.39	< 0.0001	-0.58	-0.93/-0.23	0.001	1.08	0.73/1.42	< 0.0001
Depression (3)	0.54	0.17/0.92	0.004	-0.74	-1.10/-0.39	< 0.0001	1.04	0.68/1.39	< 0.0001
Dissociation (4)	-0.53	0.12/0.93	0.01	0.16	-0.23/0.55	0.42	0.82	0.43/1.21	< 0.0001
Mentalization (5)	-0.76	-1.15/-0.37	0.0002	0.005	-0.38/0.39	0.98	-1.20	-1.57/-0.84	< .0001
<b>Mediated models: suicide risk as outcome</b>									
Psychological pain (6)	0.48	0.06/0.90	0.03	-0.46	-0.87/-0.06	0.03	0.58	0.17/0.98	0.006
Hopelessness (7)	0.25	-0.18/0.68	0.26	-0.37	-0.77/0.02	0.07	0.30	-0.12/0.72	0.16
Depression (8)	0.26	-0.12/0.64	0.17	-0.18	-0.55/0.19	0.33	0.09	-0.29/0.48	0.64
Dissociation (9)	0.51	0.09/0.93	0.02	-0.53	-0.92/-0.13	0.009	0.56	0.15/0.98	0.008
Mentalization (10)	0.35	-0.09/0.79	0.12	-0.54	-0.96/-0.12	0.01	0.34/0.22	-0.11/0.78	0.13
All mediators in parallel (11)	0.04	-0.40/0.47	0.86	-0.10	-0.53/0.32	0.64	-0.09	-0.54/0.36	0.69

Note. Models fit: (1)  $R^2 = 0.09$ ,  $F_{3,163} = 5.44$ ,  $p = 0.001$ . (2)  $R^2 = 0.34$ ,  $F_{3,173} = 29.38$ ,  $p < 0.0001$ . (3)  $R^2 = 0.30$ ,  $F_{3,174} = 24.45$ ,  $p = 0.0002$ . (4)  $R^2 = 0.11$ ,  $F_{3,173} = 6.77$ ,  $p = 0.0002$ . (5)  $R^2 = 0.24$ ,  $F_{3,165} = 17.24$ ,  $p < 0.00001$ . (6)  $R^2 = 0.17$ ,  $F_{4,162} = 8.13$ ,  $p < 0.00001$ . (7)  $R^2 = 0.18$ ,  $F_{4,172} = 9.64$ ,  $p < 0.00001$ . (8)  $R^2 = 0.30$ ,  $F_{4,173} = 18.45$ ,  $p < 0.00001$ . (9)  $R^2 = 0.14$ ,  $F_{4,172} = 6.74$ ,  $p < 0.00001$ . (10)  $R^2 = 0.16$ ,  $F_{4,164} = 7.68$ ,  $p < 0.00001$ . (11)  $R^2 = 0.34$ ,  $F_{8,149} = 9.48$ ,  $p < 0.0001$ .

exhibited any type of prevalent affective temperaments, one-third of which equally were hyperthymic, negative, or mixed negative prevalent temperaments, and only a negligible part (3.7%) manifesting hyperthymic/mixed temperaments. Our results clearly demonstrated that prevalent temperamental constellations significantly impact factors that contribute to the emergence of suicidal behavior.

Results demonstrated that patients with prevalent hyperthymic temperament reported less psychological pain and hopelessness, less depression, and more mentalization compared to patients with other temperamental constellations. In several previous studies, hyperthymic temperament was considered prevalent in mood disorders mostly associated with bipolar disorder, and it was also shown to be a protective factor for suicide (Baldessarini et al., 2017; Innamorati et al., 2015; Pompili et al., 2012). This is somewhat consistent with Jamison's theory that temperaments modulate biology and environment (Jamison, 1999). Hyperthymic temperament may be protective because it is associated with lower levels of hopelessness, high energy, and more affective coping strategy (Pompili et al., 2008). However, some characteristics associated with hyperthymic temperament, including neglecting problems and lack of adequate coping mechanisms, may be considered risk factors for suicide in certain instances (Pompili et al., 2008). Patients reporting one or more temperaments carrying a depressive component, including depressive, irritable, cyclothymic, and anxious temperaments, have, in previous studies, been shown to be at a higher risk of suicide. In line with this finding, in our study, patients with prevalent mixed negative temperaments reported higher hopelessness, depression, and dissociation, and less mentalization, suggesting an increased suicide risk probably due to difficulties in adapting to changing environments (Kochman et al., 2005). However, further studies are necessary to better explain the relation between affective temperament and dissociation.

Although previous studies found that affective temperaments predicted suicide risk in psychiatric disorders, the present results highlight the relation between affective temperaments and factors impacting suicidal behavior, including depression and mentalization.

### **The Association of Prevalent Affective Temperaments and Mentalization**

In our study, we found that patients with negative and mixed negative prevalent affective temperaments had significantly lower mentalization scores compared to those without a prevalent affective temperament. Moreover, higher mentalization scores were found in patients with a hyperthymic prevalent temperament compared to those with a negative or negative mixed, suggesting inferiority of mentalization in those carrying temperaments with a depressive component compared to those with hyperthymic prevalent temperament. Better mentalization capacities in those with hyperthymic temperament may indicate their protective role.

Mentalization also significantly predicted the presence of mixed versus no prevalent temperament, as well as negative versus no prevalent temperament. Mentalization is a mental ability to understand the mental state underlying overt behavior, including one's own or others' behavior. More complex and sophisticated capacity to represent one's own state of mind influences risk of suicidal behavior, while intense emotions weaken the ability to mentalize. However, given that affective temperaments are considered strongly biologically determined and have been found to be associated with emotional reactivity, early attachment, and self-development (Pompili et al., 2008), further studies investigating how they are related to mentalization and how capacities may mediate the role between affective temperaments and suicidal behavior should be conducted.

### **Association of Prevalent Affective Temperaments With Psychological Pain**

Interestingly, in our study, patients with a negative or negative mixed affective temperament did not significantly differ in terms of psychological pain from those without a prevalent affective temperament. However, those presenting with a hyperthymic prevalent temperament scored significantly lower in psychological pain compared to those with negative or mixed negative prevalent temperaments. This is in line with what was previously investigated on the association of suicide risk and temperaments (Pompili et al., 2012). These authors found that depressive patients with prevailing hyperthymic temperament presented lower suicidal risk than patients with prevailing cyclothymic-depressive-anxious temperament.

Although psychological pain was not a significant predictor in regression models in our study, the association between psychological pain and affective temperaments in the ANOVAs is a novel finding, particularly given its association to emerging suicide risk. Thus, affective temperaments in the emergence of psychological pain should be a target of future affective temperamental research.

### **Association of Prevalent Affective Temperaments With Depression**

Patients with hyperthymic prevalent temperament reported significantly fewer depressive symptoms compared to both those without a prevalent temperament and those with negative or mixed negative temperaments. Negative and mixed negative prevalent temperamental patients reported significantly more depressive symptoms than patients without any prevalent affective temperament, suggesting the important association between affective temperamental makeup and depression. This result confirms the thesis of the protective role of

hyperthymic temperament on suicide risk due to low levels of depression.

### **Limitation of the Study**

This study presents several limitations. The sample is relatively small and studies on larger populations are warranted. Second, answers to critical items on the MINI assessed current suicidal risk, the use of more detailed objective measures may provide a better estimate of suicidal risk. Moreover, only one measure of psychological pain was used. Future studies should assess psychological pain through multimodal assessment strategies. Finally, the cross-sectional design of the present study limited our ability to test for causal or transactional relationships among variables. Prospective studies are needed to confirm the mechanisms (i.e., mediators) underlying the association between prevalent temperaments and suicide risk. Despite these limitations, our study has important clinical implications for identifying, intervening, and treating patients psychiatric patients at risk for death by suicide.

### **Conclusion**

The results of our study indicate that the effect of affective temperaments on suicide risk was mediated by variables such as hopelessness, mentalization deficits, and depression. There is a need to identify factors and processes mediating the effects of affective temperamental makeup in the emergence of suicide risk to be able to identify specific targets for screening and intervention. The variables investigated in this study allow for a better clinical picture and point to specific mechanisms of action that should be targeted in preventive intervention efforts.

### **DISCLOSURE STATEMENT**

No author or immediate family member has financial relationships with

commercial organizations that might appear to represent a potential conflict of interest with the material presented.

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