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Temperament, Hopelessness, and Attempted Suicide: Direct and Indirect Effects

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Abstract

The present study evaluated if hopelessness mediated the relations between temperament and recent suicide attempter status in a psychiatric sample. Negative and positive temperament (particularly the positive temperament-positive emotionality subscale) uniquely predicted levels of hopelessness. Although these temperament constructs also demonstrated significant indirect effects on recent suicide attempter status, the effects were partially (for the broad temperament scales) or fully (for the positive emotionality subscale) mediated by levels of hopelessness. These findings indicate that a tendency to experience excessive negative emotions as well as a paucity of positive emotions may lead individuals to experience hopelessness. Although temperament may indirectly influence suicide attempter status, hopelessness mediates these relations.

Keywords

temperament; personality; hopelessness; suicide attempt; mediation

Introduction

Substantial effort has been made to understand the influence of cognitive factors on suicidal thoughts and behaviors. Hopelessness is one such construct (i.e., believing that problems cannot be solved, situations will not improve) receiving significant attention in the literature as an important cognitive vulnerability of suicidal behaviors. Individuals are likely to experience hopelessness during episodes of major depression (but lower levels of hopelessness post episode, Sokero et al., 2006). Moreover, prospective (e.g., Beck et al., 1985; Beck et al., 1989; Brown et al., 2000) and cross-sectional studies (e.g., Cox et al., 2004; Beautrais et al., 1999; Van Heeringer et al., 2003) have provided robust support for hopelessness as a robust predictor of suicide attempts and completion. These findings highlight the importance of assessing levels of hopelessness in determining risk for a suicide attempt, as well as the potential utility of suicide interventions aimed at reducing hopelessness.

Investigators have also underscored the role of broad, heritable, and enduring temperament/personality vulnerabilities that may predict suicidal behaviors, including negative temperament (NT; e.g., neuroticism, negative emotionality), positive temperament (PT; e.g., extraversion, positive emotionality), and disinhibition (DIS; e.g., impulsivity; for a review of these constructs see Clark, 2005). Whereas NT and DIS have been positively associated with attempted suicide, PT demonstrates inverse relations with suicidal outcomes at both hospital admission (Beautrais et al., 1999; Benjaminsen et al., 1990; Nordstrom et al. 1995) and over follow-up time periods (Yen et al., 2009). Although this literature may indicate NT, PT, and DIS as important risk factors that should be assessed in determining the likelihood of suicidal behaviors, other research suggests that these temperament constructs may not uniquely predict attempted suicide over and above hopelessness. The few studies adjusting for both temperament and hopelessness have produced mixed findings; whereas both neuroticism and hopelessness were uniquely associated with increased risk of having a history of suicide attempt in a sample of young adults (Beautrais et al., 1999), analysis of U.S. National Comorbidity Survey data found that hopelessness, but not neuroticism, uniquely predicted a lifetime history of suicide attempter status (Cox et al., 2004). Importantly, these studies could not make strong conclusions regarding the directionality of the effects as they did not ascertain levels of temperament and hopelessness prior to the suicide attempt (e.g., they examined current hopelessness with a lifetime history of suicide attempts).

Mixed evidence for NT, PT, and DIS having direct effects on attempted suicide suggests that these vulnerabilities may be too broad to uniquely predict suicidal attempt behaviors, or that their relation with attempting suicide is accounted for by a third variable. For instance, it is feasible that temperament constructs may have an indirect effect on attempting suicide via their influences on more specific vulnerabilities, such as hopelessness (e.g., increased negative affect and decreased positive affect may lead to hopelessness and subsequent suicide attempts). Indeed, the extant literature suggests that high NT and low PT (particularly facets of depression, emotional vulnerability, positive emotionality, and assertiveness) may predict levels of hopelessness (e.g., Chioqueta & Stiles, 2005; Duberstein et al., 2001). Importantly, these studies are limited by neglecting to evaluate relations between DIS and hopelessness, and by sampling narrow age ranges (e.g., undergraduate and geriatric samples). Research has yet to evaluate the relations between temperament and hopelessness in a diversely aged psychiatric sample.

Given these collective findings (i.e., temperament predicting hopelessness, hopelessness uniquely predicting suicide attempts), it is reasonable to suspect that temperament may be indirectly associated with attempted suicide via its influence on hopelessness. To our knowledge, no study has yet to evaluate hopelessness as a mediator between temperament and attempted suicide in a diversely aged sample of inpatients who have recently (i.e., in the past week) attempted suicide. Accordingly, the present study aimed to: (1) evaluate relations between temperament and hopelessness in a diversely aged psychiatric sample, and (2) evaluate the extent to which hopelessness mediates the relationship between temperament and recent suicide attempter status. It was predicted that NT and PT would significantly predict hopelessness, and that hopelessness would fully mediate the effects of temperament

on attempted suicide. No hypothesis was made regarding hopelessness as a mediator of DIS-suicide attempt relations given the limited research to date.

Method

Participants

Study participants were 155 individuals recruited as part of a larger and ongoing study examining the relations between impulsivity and suicide attempts. The case-control design of this study included two groups that were intended to be as similar as possible in regards to demographics and diagnoses but differ on the primary outcome of interest (i.e., “suicide attempter status”). The first group (cases) consisted of 67 individuals hospitalized due to a recent suicide attempt (SA group; defined as a self-inflicted behavior with some intent to die; Silverman et al., 2007) by overdose (78.67%), sharp-instrument (16%), and/or by more violent methods (5.33%), such as by gun or hanging. The second group (controls) included 88 non-suicidal community psychiatric controls (PC group) who reported no lifetime history of a suicide attempts, no suicidal ideation in the past year, and reported being diagnosed with a mental condition, seeking treatment from a mental health professional (e.g., psychiatrist, psychologist, clinical social worker), or being prescribed medications for a mental health problem in the past year. In both groups, potential participants were excluded if they had active delusions/hallucinations, mania, dementia, head injury, neuropathy, or were experiencing significant side effects of new medications.

The SA group was recruited close to discharge from the psychiatric inpatient unit of the only Level 1 Trauma hospital in the state of Mississippi. Potential SA participants were screened face-to-face in a private room on the psychiatric inpatient unit. The PC group was recruited from 1) flyers posted in this hospital’s clinics and public places within the broader Jackson metropolitan area and 2) advertisements in local newspapers and other media sources. PC participants were screened by phone and then again face-to-face, prior to enrollment in the study, in a private assessment room within the same hospital. Both groups completed measures for the present study during a 5 hour assessment session. Participants were paid \$70 for completing the assessment session.

The sample was predominately female (61%) and Caucasian 65%. A smaller percentage identified as African-American (29%), Native American (1%), and mixed race/ethnicity (5%). The average age was 35.74 ($SD = 12.18$, range = 18 to 59). Axis I Disorders were assessed using the Computerized Diagnostic Interview Schedule (Robins et al., 2000). The rates of the most common Axis I disorders were: mood disorders (68%), any substance use disorder (43%), any anxiety disorder (56%), and any psychotic disorder (6%). Groups did not differ by sex or lifetime history of psychiatric disorders, but did differ by age (SA average age = 32.36, $SD = 12.01$; PC average age = 38.32, $SD = 11.74$), unemployment status, (SA = 73%, PC = 33%), and having a high school education or less (SA = 68%, PC = 10%).

Measures

Temperament—Temperament was assessed using the General Temperament Survey (GTS; Clark & Watson, 1990), an abbreviated version of the Schedule for Nonadaptive and Adaptive Personality (SNAP, Clark, 1993). The GTS is a 90-item true-false self-report questionnaire designed to assess three SNAP dimensions: negative temperament (NT), positive temperament (PT), and disinhibition (DIS). Whereas the NT dimension does not contain any subscales, PT (Positive Affectivity and Energy) and DIS (Antisocial Behavior and Carefree Orientation) each consist of two lower-order scales. GTS instructions were modified such that participants were asked to respond to the questions based on “attitudes, feelings, interests, and other characteristics *“prior to your suicide attempt”* (SA group) or *“prior to this assessment”* (PC group). Studies have found the GTS scales to demonstrate internal consistency (coefficient alphas = .85 to .90), 2-month test-retest reliability ($r_s = .72$ to .80), and concurrent validity (e.g., Clark & Watson, 1999; Watson & Clark, 1993). In the present sample, alphas for NT, PT, DIS, and their associated subscales ranged from .78 (DIS-Carefree Orientation) to .94 (NT).

Hopelessness—Hopelessness was measured via self-report using the Beck Hopelessness Scale (BHS), a 20-item true-false questionnaire (Beck et al., 1974). BHS instructions were modified such that participants were asked to respond to items based on their “attitude for the week *prior to your suicide attempt*” (SA group) or their “*attitude for the week prior to this assessment*” (PC group). The BHS has been found to demonstrate adequate internal consistency ($r_s = .82$ to .93) and six week test-retest reliability ($r = .66$; Beck & Steer, 1988). In the present sample, the alpha for BHS total score was .95.

Statistical analysis

Relations between temperament, hopelessness, and suicide attempter status were evaluated using a path analytic framework. Two models were examined in which suicide attempter status was regressed onto (1) hopelessness and the three GTS dimensions (Model 1) and (2) hopelessness and the five GTS subscales (Model 2). The unique effects of temperament on hopelessness and direct and indirect effects of temperament and suicide attempter status through hopelessness were evaluated using weighted least squares - mean and variance adjusted estimation in Mplus 5.2 (Muthén & Muthén, 1998–2009). Independent variables were allowed to freely correlate in both models. Although basic mediation models tend to estimate the direct and indirect effects of a single independent variable on an outcome (e.g., a separate model for each temperament construct), we opted to evaluate a more robust model in which the temperament constructs were evaluated simultaneously as independent variables (i.e., to control for potential confounding effects because of overlap between NT, PT, and DIS). The Preacher and Hayes (2008) bootstrapping method (with 5000 bootstrapped resamples) was used to evaluate the significance of the indirect effects of temperament on attempted suicide. Whereas traditional tests of mediation (e.g., Baron & Kenny, 1986) assume multivariate normality of direct and indirect effects (which often requires very large samples), the bootstrapping technique increases power by not imposing this assumption. Bias-corrected 95% confidence intervals were estimated in order to determine the significance of the indirect effects. Using this approach, an indirect effect is

considered to be significant if zero *is not* included in the 95% confidence interval for the point estimate.

Results

Zero-order correlations

Zero-order correlations between the temperament dimensions and their subscales, hopelessness, and attempted suicide are presented in Table 1. Correlations with age and sex are also displayed as these variables were included as covariates in the subsequent regression models.¹ Whereas recent suicide attempt was significantly correlated with all predictors except sex and the PT-energy scale ($r_s = -.33$ to $.69$; $r_s > |.19|$ were statistically significant at $p < .05$), hopelessness was significantly correlated with all predictors except age and sex ($r_s = -.57$ to $.57$).

Unique effects of temperament on hopelessness

The unique effects of the temperament dimensions on hopelessness were first evaluated by regressing the mediating variable (BHS-total score) onto the three GTS dimensions (NT, PT, DIS) while adjusting for age and sex (Model 1; top-left corner of Table 2). Both NT (completely standardized path, $\gamma = .42$, $p < .001$) and PT ($\gamma = -.33$, $p < .001$) were found to be significant predictors of hopelessness. In order to determine the unique effects of the lower-order temperament constructs, hopelessness was also simultaneously regressed onto NT and the four subscales of PT and DIS, again adjusting for age and sex (Model 2). As presented in the bottom-left corner of Table 2, only NT ($\gamma = .37$, $p < .001$) and the PT-positive affectivity scale ($\gamma = -.42$, $p < .001$) significantly predicted hopelessness in this model. Models 1 and 2 respectively accounted for 43% and 46% of the variance in hopelessness.

Direct and indirect effects of temperament on attempted suicide

Hopelessness was evaluated as a mediator by estimating both the direct and indirect effects of the temperament dimensions (Model 1) and subscales (Model 2) on attempted suicide (see right side of Table 2). In both models, only hopelessness significantly predicted attempted suicide (Model 1 $\gamma = .64$, Model 2 $\gamma = .62$, $ps < .001$) when adjusting for temperament, age, and sex. Whereas the indirect effects of NT ($\gamma = .27$, $p < .001$) and PT ($\gamma = -.21$, $p < .01$) on attempted suicide were significant in Model 1, the direct effects were not (NT direct effect $\gamma = .13$, $p = .12$; PT direct effect $\gamma = .04$, $p = .69$). Along with the 95% confidence intervals (CIs) for the indirect effects (NT = $.14$ to $.41$, PT = $-.38$ to $-.04$), this indicates that hopelessness significantly partially mediates the influence of NT and PT on attempted suicide. In Model 2, the indirect effects of NT ($\gamma = .23$, $p < .001$) and PT-positive affectivity ($\gamma = -.26$, $p < .01$) on attempted suicide were again significant while the direct effects were not (NT direct effect $\gamma = .17$, $p = .09$; PT-positive affectivity direct effect $\gamma = .$

¹Consistent with the extant literature on temperament and hopelessness (e.g., e.g., Chioqueta & Stiles, 2005; Duberstein et al., 2001), we present models that include sex and age as demographic covariates. However, because the SA and PC groups also differed in unemployment status and having a high school education, we also evaluated the mediational models including these variable as covariates. Importantly, the pattern of results were identical across these solutions (e.g., NT and PT-positive affectivity significantly predicted hopelessness, and the effects of temperament on suicide attempter status were significantly mediated by hopelessness).

00, $p = .99$). Along with the CIs for the indirect effects (NT 95% CI = .09 to .36, PT 95% CI = $-.46$ to $-.06$), this indicates that hopelessness significantly partially mediates the effects of NT and fully mediates the effects of PT-positive affectivity on suicide attempter status. In total, this Model 1 and 2 respectively accounted for 62% and 63% of the variance in attempted suicide.²

Discussion

To our knowledge this is the first study to examine the relations between NT, PT, DIS and hopelessness in a diversely aged psychiatric sample as well as evaluate hopelessness as a mediator of temperament-recent suicide attempt relations. Consistent with study hypotheses, whereas NT and PT-positive affectivity uniquely predicted hopelessness, hopelessness significantly mediated the effects of these temperament constructs on suicide attempter status. Our findings that NT and PT-positive affectivity predict levels of hopelessness are consistent with and expand on existing studies that have found similar effects using the NEO-Personality Inventory – Revised to assess temperament/personality (Costa & McCrae, 1992) in more narrowly defined samples (Chioqueta & Stiles, 2005; Duberstein et al., 2001). Collectively, these findings suggest that a tendency to experience excessive negative emotions (e.g., sadness, anger, anxiety, fear; high NT) as well as a paucity of positive emotions (e.g., joy, happiness, and pleasure; low PT-positive affectivity) may lead individuals to have negative expectancies about the future. In other words, the vulnerability to believe that problems/situations are unsolvable and not improvable (i.e., hopelessness) may likely be influenced by heritable and stable dimensions of temperament/personality such as NT, PT, neuroticism, and extraversion.

NT and PT-positive affectivity also predicted suicide attempter status, however, these relations were partially (for NT) and fully (for PT-positive affectivity) mediated via the effects the temperament constructs on hopelessness. These results indicate that individuals who experience increased negative affect and/or decreased positive affect may be at greater risk of attempting suicide, but that these effects are accounted for through the influence of temperament on cognitive factors related to beliefs about the future. Our findings are in line with at least one other study (that did not test for mediation) where the significant effect of neuroticism on a history of suicide attempts became non-significant once adjusting for hopelessness; that is, only hopelessness (but not neuroticism) predicted a history of suicide attempts when simultaneously entered into a regression model (Cox et al., 2004). Moreover, our results question findings from many other studies that failed to assess concurrent levels of hopelessness (e.g., Benjaminsen et al., 1990; Nordstrom et al. 1995; Yen et al., 2009) when investigating temperament-suicidal behavior relations. In contrast, whereas DIS has previously been associated with suicide attempter status at the univariate level, the nonsignificant effects in our models are consistent with findings from prior multivariate

²We also evaluated mediation by estimating a separate model for each temperament construct (i.e., a single temperament construct as the independent variable, not controlling for the other temperament constructs). The results of these more basic models were substantively identical for NT, PT, and PT-positive affective (significant indirect and non-significant direct effects on suicide attempter status with hopelessness significantly mediating these relations). However, differences were found for DIS; although DIS did not have a significant indirect effect on suicide attempter status the analyses presented here, it evidenced a significant indirect effect when neglecting to control for NT and PT. Given the significant zero-order correlations between DIS, NT, and PT, this collectively indicates that the effect of DIS on suicide attempter status is better explained by the overlap of DIS with NT and PT.

analyses (Yen et al., 2009). This suggests that DIS does not uniquely predict suicide attempter status and that clinicians and researchers should prioritize their attention to the role of NT and PT if not concurrently assessing/studying levels of hopelessness.

Overall, the mediation model results underscore the importance of prioritizing the assessment of hopelessness (i.e., particularly over temperament/personality) in determining risk of recent suicide attempt. In addition to using the BHS (Beck & Steer, 1988), clinicians may also wish to routinely ask follow-up questions about the focus of hopelessness in order to further assess risk for attempting suicide as well as identify specific thoughts and beliefs that could be the focus of treatment. For example, it is feasible that individuals who are hopeless about interpersonal situations (e.g., see Joiner, 2005 interpersonal theory of suicide) may be at the greatest risk of attempting suicide. Conversely, perhaps hopelessness about multiple life domains (e.g., work/school, relationships, family, health) has an additive effect on risk for attempting suicide (i.e., compared to individuals who are hopeless about a single non-interpersonal domain). Whereas the true/false responses of the BHS do not provide information pertaining to specific domains of hopelessness, future research may wish to develop and evaluate structured interviews that assess dimensions of hopelessness across multiple domains.

The mediation models also highlight the potential utility of reducing suicide risk via interventions targeting hopelessness. For example, cognitive behavioral therapies for suicidal patients (e.g., Wenzel et al., 2009) may wish to streamline interventions directed at thoughts and beliefs surrounding hopelessness. In particular, psychoeducation on the temporal nature of negative emotions (i.e., negative emotions tend to wax and wane; e.g., Linehan's [1993] emotional regulation skills) may help reduce levels of hopelessness by promoting recognition that emotional suffering can abate with time. Cognitive interventions focused on an individual's problem-solving and coping abilities may also be used to reduce suicide risk by targeting hopelessness (e.g., identifying situations when individuals have successfully problem-solved and situations have improved). Our results also suggest that hopelessness and suicide attempt risk may be indirectly reduced via interventions addressing underlying temperament processes (i.e., NT and PT) such as Barlow et al.'s (2011) Unified Protocol (UP). In other words, "transdiagnostic" exposures targeting several emotions and behaviors influenced by NT and PT (e.g., anxiety, happiness, fear, avoidance) may generalize to increase coping with hopeless thoughts and beliefs (thereby reducing risk for attempting suicide).

Despite strengths in sampling (e.g., recent suicide attempter status; assessment of pre-attempt levels of hopelessness) and methodology (i.e., first examination of hopelessness as a mediator of temperament-suicide attempt relations), study limitations and areas of future research should be acknowledged. The GTS was used because it is a reliable but briefer assessment of NT, PT, and DIS than other temperament/personality questionnaires such as the SNAP (Clark, 1993) or NEO PI-R (Costa & McCrae, 1992). However, one consequence of using the GTS is having a more limited assessment of specific facets of NT, PT, and DIS. For instance, we were unable to examine the effect of assertiveness (a facet of PT) on hopelessness that has been found in nonclinical samples (Chioqueta et al., 2005). Future research is needed to evaluate the relations between other temperament facets, hopelessness,

and suicide in clinical samples. Similarly, although DIS is believed to be related to impulsivity (e.g., Clark, 2005), it is possible that a more specific assessment of impulsivity may have displayed a direct effects on suicide attempter status even while adjusting for hopelessness. Future research should aim to continue to evaluate the direct and indirect influence of personality traits such as impulsivity in predicting suicide attempts.

Nonetheless, our findings contribute to the literature by demonstrating that NT and PT likely contribute to an individual's experience of hopelessness. Moreover, although temperament may indirectly influence attempting suicide, levels of hopelessness mediate these relations. These findings underscore the importance of clinical interventions that target both direct (i.e., hopelessness) and indirect (i.e., NT and PT) predictors of attempting suicide.

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Table 1
Zero-Order Correlations Among General Temperament Survey Dimensions and Subscales, Hopelessness, Suicide, Sex, and Age

	Sex	Age	NT	PT	PT-AF	PT-EN	DIS	DIS-CF	DIS-AS	BHS	SA
Sex											
Age	.04										
NT	-.01	-.10									
PT	.06	-.01	***								
PT-AF	.12	-.05	-.47***	.91***							
PT-EN	-.01	-.05	-.21**	.88***	.64***						
DIS	-.28***	-.30***	.37***	-.26***	-.22**	-.18*					
DIS-CF	-.20*	-.21**	.31**	-.38***	-.29***	-.36***	.87***				
DIS-AS	-.30***	-.33***	.34***	-.04	-.03	.04	.85***	.57***			
BHS	-.11	-.12	.57***	-.51***	-.57***	-.31***	.30***	.32***	.19*		
SA	-.03	-.24**	.43***	-.29***	-.33***	-.15	.30***	.31***	.20*	.69***	

Note. NT = Negative Temperament (total score); PT = Positive Temperament (total score); PT-AF = Positive Temperament – positive affectivity subscale; PT-EN = Positive Temperament – energy subscale; DIS = Disinhibition; DIS-CF = Disinhibition – carefree orientation subscale; DIS-AS = Disinhibition – antisocial behavior subscale; BHS = Beck Hopelessness Scale (total score); SA = suicide attempt within the past month.

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 2
Unique Effects of Temperament on Hopelessness and Direct and Indirect Effects of Temperament on Suicide Attempter Status

Model and predictor	Outcome				
	Hopelessness		Suicide Attempt		
1 - GTS Dimensions	Unique Effect	<i>t</i>	Indirect Effect	<i>t</i>	Direct effect
Negative Temperament	.42	5.95***	.27	5.11***	.13
Positive Temperament	-.33	-4.17***	-.21	-3.23**	.04
Disinhibition	.02	.23	.01	.23	.10
Hopelessness (MV)	n/a	n/a	n/a	n/a	.64
2- GTS Subscales					8.06***
Negative Temperament	.37	4.90***	.23	4.31***	.17
Positive Affectivity ^a	-.42	-4.26***	-.26	-3.36**	.00
Energy ^a	.09	.93	.06	.95	.10
Carefree Orientation ^b	.12	1.26	.08	1.26	.18
Antisocial Behavior ^b	-.07	-.74	-.04	-.73	-.10
Hopelessness (MV)	n/a	n/a	n/a	n/a	.62

Note. Completely standardized effects (i.e., regression coefficients) are presented. Age and sex were adjusted for in both models. GTS = general temperament survey; MV = mediating variable;

^a positive temperament subscale;

^b disinhibition subscale.

* p<.05,

** p<.01,

*** p<.001