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Research paper

Characteristics of interpretation bias and relationship with suicidality in a psychiatric hospital sample

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ABSTRACT

Background: Interpretation bias, the tendency to interpret ambiguous situations negatively (or to lack a positive bias), is a cognitive vulnerability associated with psychopathology. However, there is a lack of research characterizing this bias in psychiatric samples, including whether it is also a risk factor for suicidality. This study characterized interpretation bias in a psychiatric sample at risk for suicide and examined the relationship between interpretation bias and suicidality cross-sectionally and prospectively.

Methods: Patients (*N*=65) attending a partial hospital program completed the Word-Sentence Association Paradigm (WSAP), which results in four variables reflecting different types of interpretation bias: endorsement rates and reaction time bias scores for negative and benign interpretations. We conducted logistic regression models to predict high suicidality (ideation, plans, attempts, etc. assessed via a structured interview at admission) and suicidal ideation (assessed via self-report at admission and discharge).

Results: Logistic regression models predicting suicide outcomes upon admission and discharge indicated that benign interpretation endorsement was the most robust predictor of suicidality concurrently and prospectively, controlling for baseline suicidal ideation.

Limitations: Lack of gold standard self-report suicide assessment. Unable to assess additional constructs such as hopelessness or perfectionism, which may better elucidate how lacking a benign bias influences suicidality. Modest sample size.

Conclusions: A lower endorsement of positive interpretations was the strongest predictor of prospective suicidal ideation, even after controlling for baseline suicidal ideation. Future research should examine how targeting interpretation bias influences suicidality.

1. Introduction

Many situations encountered in daily life are ambiguous. For example, a friend not responding to a text message can be resolved in benign (friend is busy) or negative (friend is angry) ways. Cognitive theories suggest that a tendency to resolve ambiguity in a negative manner maintains depression and anxiety symptoms (e.g. Beck, 1976). Correlational, prospective, and experimental evidence suggests that biased interpretation is indeed linked to poor emotion regulation (e.g., Wilson et al., 2006) and a range of clinical symptoms (for a review see Hirsch et al., 2016), such as depression (Foland-Ross and Gotlib, 2012; Hindash and Amir, 2012; Lawson et al., 2002; Mogg et al., 2006) and social anxiety (Moser et al., 2008; 2012).

As noted by Beevers and Miller (2004), cognitive theories of depression suggest that a tendency to interpret situations in an unrealistically negative manner leads to negative expectancies about the future. Thus, an interpretation bias may underlie hopelessness and suicidal ideation. Indeed, Beevers and Miller (2004) found that interpretation bias predicted suicidal ideation six months following discharge from the hospital via its effect on hopelessness. Although this initial finding is compelling, this study was limited by its reliance on an outdated self-report measure of interpretation bias from 1979. As the authors noted, future studies "using more sophisticated measures are needed (p. 134)". Specifically, researchers should employ measures that do not exclusively rely on self-report and strategic processing.

In addition, measures that differentiate the presence of a negative bias from the lack of a benign bias are needed. Prior work has supported the distinction of these two types of biases (Beard and Amir, 2009; Huppert et al., 2003). Moreover, studies of social anxiety and depression have found that a lack of a benign interpretation bias is more important than the presence of a negative bias (e.g., Moser et al., 2008). For example, clinical samples of individuals with social anxiety disorder or major depressive disorder did not differ from controls in their EEG response to ambiguous sentences resolved in a negative

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manner. However, the clinical groups did have larger EEG responses to ambiguous sentences that ended positively compared to controls, suggesting that they were not expecting this positive resolution and may lack a positive bias compared to healthy individuals.

The current study sought to extend prior work in several ways. First, much of the research examining interpretation bias and psychopathology has utilized homogenous diagnostic groups or undergraduate, subclinical samples. It is crucial to characterize interpretation bias and examine its associations with clinical constructs and suicidality for individuals with serious mental illness, a transdiagnostic population **at risk** for suicide (i.e., receiving psychiatric hospitalization; Bostwick and Pankratz, 2000). Additionally, we aimed to improve the measurement of interpretation bias by developing a Word-Sentence Association Paradigm (WSAP; Beard and Amir, 2008, 2009) appropriate for a transdiagnostic sample. The WSAP has been used extensively to study interpretation bias in psychopathology because it assesses for the presence of a negative interpretation bias and the lack of a benign bias separately and includes indices of relatively more strategic (endorsement rates of benign and negative interpretations) and automatic (reaction time to endorse or reject interpretations) responding.

The current study had two specific aims. First, to characterize interpretation bias in a psychiatric sample, we examined the range of interpretation endorsement rates and relationships among different indices of interpretation bias. Based on prior studies that utilized the WSAP in different populations (Beard and Amir, 2009), we expected that the four interpretation indices would be related, but distinct measures, and correlated with clinical constructs established in prior studies (e.g., depression severity). We also explored relationships between interpretation bias and clinical constructs that have not been frequently studied, but were available in this partial hospital clinical dataset (e.g., psychotic symptoms). Second, although interpretation bias is theoretically linked to suicidality, this relationship has only been examined in one prior study using limited measures. We expected interpretation bias to be associated with high suicidality (ideation, plans, attempts) both concurrently (admission to partial hospital) and prospectively (discharge).

2. Method

2.1. Participants and treatment setting

Participants (*N*=65) were patients receiving treatment at the Behavioral Health Partial Hospital Program at McLean Hospital. Approximately one-half of patients are referred directly from inpatient hospitalization, while the other half are stepping up their outpatient care to prevent hospitalization. The partial hospital delivers brief CBT (one to two weeks) to patients with a range of psychiatric disorders. Patients attend up to five 50-min groups each weekday and two to three individual sessions per week. Participants completed assessments as part of standard clinical care and provided written consent for their clinical data to be used for research purposes. Participants completed the WSAP as part of a randomized controlled trial examining an adjunctive treatment to the partial hospital. Inclusion criteria included: patient at the partial hospital; current depressive symptoms upon admission based on the Patient Health Questionnaire-9 (PHQ-9; total score ≥10); and no active psychosis or mania. Participants were primarily single, White, and middle-aged. The most common diagnosis was Major Depressive Disorder (see Table 1).

2.2. Measures

2.2.1. Interpretation bias

In the Word-Sentence Association Paradigm (WSAP; Beard and Amir, 2009), a trial began with a fixation cross that appeared on the computer screen for 500 ms. Second, a word representing either the negative ("embarrassing") or benign ("funny") interpretation of an ambiguous sentence ("people laugh after something you said") appeared for 500 ms. Third, the ambiguous sentence appeared. Participants were instructed to press one key if the word and sentence were related or a different key if the word and sentence were not related. Participants completed 70 trials (35 negative; 35 benign). Stimuli for the WSAP task were adapted from previous studies (Beard et al., 2011; Beard and Amir, 2009). We developed new word-sentence pairs that were relevant to depression and failure experiences (see Appendix A for examples).

We measured participants' endorsement rates separately for benign and negative interpretations and their reaction time to decide the relatedness of the word-sentence pairs. This results in four types of reaction times: (1) endorsement of negative interpretations, (2) rejection of negative interpretations, (3) endorsement of benign interpretations, and (4) rejection of benign interpretations. To eliminate outliers at the individual trial level, we followed recommendations for other reaction time based cognitive tasks and applied a Winsor approach (Price et al., 2015). Consistent with prior studies (Beard and Amir, 2009), we calculated negative and benign interpretation bias scores. Positive reaction time bias scores represent more negatively biased interpretations and negative scores represent more benign interpretations.

Table 1
Demographic and clinical characteristics (n=65).

Demographic characteristics	N	(%)
Female	37	(56.9%)
Age (M, SD)	32.98	(11.33)
Ethnicity		
Non-Latino/a	63	(96.9%)
Latino/a	2	(3.10%)
Race		
White	57	(87.7%)
Black/African American	2	(3.1%)
Asian	3	(4.6%)
American Indian/Alaskan native	1	(1.5%)
Multiracial	2	(3.1%)
Marital status		
Single	39	(60.0%)
Married/Living with partner	19	(29.3%)
Separated/Divorced	7	(10.8%)
Highest level of education		
High school/GED	1	(1.5%)
Some college	25	(38.5%)
4-year college graduate	16	(24.6)
Post-college education	23	(35.4%)
Clinical characteristics [a]	N	(%)
Major depressive disorder	45	(73.8%)
With psychotic features	5	(8.2%)
Bipolar disorder I	5	(8.2%)
Bipolar disorder II	5	(8.2%)
Social anxiety disorder	21	(34.4%)
Generalized anxiety disorder	22	(36.1%)
Panic disorder	17	(27.9%)
Agoraphobia	11	(18.0%)
Post traumatic stress disorder	9	(14.8%)
Obsessive compulsive disorder	6	(9.8%)
Psychotic disorder	2	(3.3%)
Alcohol use disorder	14	(23.0%)
Body dysmorphic disorder	6	(9.8%)
Clinical characteristics continued	M	(SD)
Number of inpatient hospitalizations	1.92	(3.71)
Depression symptoms (PHQ-9)	19.45	(3.63)
Anxiety symptoms (GAD-7)	12.48	(5.01)
Well-being (SOS-10)	14.86	(7.28)
Psychosis (BASIS-24)	0.34	(0.69)
Substance abuse (BASIS-24)	0.61	(0.80)

Note. Diagnostic percentages exceed 100% due to comorbidity.

[a] Four patients did not complete a MINI diagnostic interview for various reasons (e.g., too acute, transferred to inpatient, scheduling difficulties). We include these patients in the total sample analyses that do not involve diagnostic groups.