
Behavioral Forecasts Do Not Improve the Prediction of Future Behavior: A Prospective Study of Self-Injury



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Clinicians are routinely encouraged to use multimodal assessments incorporating information from multiple sources when determining an individual's risk of dangerous or self-injurious behavior; however, some sources of information may not improve prediction models and so should not be relied on in such assessments. The authors examined whether individuals' prediction of their own future behavior improves prediction over using history of self-injurious thoughts and behaviors (SITB) alone. Sixty-four adolescents with a history of SITB were interviewed regarding their past year history of SITB, asked about the likelihood that they would engage in future SITB, and followed over a 6-month period. Individuals' forecasts of their future behavior were related to subsequent SITB, but did not improve prediction beyond the use of SITB history. In contrast, history of SITB improved prediction of subsequent SITB beyond individuals' behavioral forecasts. Clinicians should rely more on past history of a behavior than individuals' forecasts of future behavior in predicting SITB. © 2008 Wiley Periodicals, Inc. *J Clin Psychol* 64:1-11, 2008.

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Among the most difficult tasks facing clinicians are those of anticipating and predicting patients' behavior. For example, if a patient with a history of one suicide attempt says to his or her clinician, "I am thinking about suicide but I know I will not make an attempt," should the clinician look to history or the patient's forecast (or both) in deciding whether or not to hospitalize this patient? If a patient with a long history of alcohol dependence and several periods of abstinence followed by

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repeated relapses says to her therapist, “This time it will be different. I am never drinking again,” should the clinician anticipate another relapse based on the patient’s history or believe the patient’s predictions about her own future? Understanding the prediction of future behavior is one of the most important aspects of a clinician’s job.

Self-injurious thoughts and behaviors (SITB), which we use to refer to both suicidal and nonsuicidal self-injury, are prevalent, dangerous, and difficult to predict. Suicide is the 11th leading cause of death in the United States and the third leading cause of death among adolescents (Kochanek & Smith, 2004), and nonlethal forms of SITB, such as suicide ideation, suicide attempts, and nonsuicidal self-injury (NSSI) are common and have a lifetime prevalence of 2%–15% in the general population (Briere & Gil, 1998; Kessler, Borges, & Walters, 1999; Klonsky, Oltmanns, & Turkheimer, 2003; Nock & Kessler, 2006; Yates, 2004). History of suicidal ideation, suicide planning, and NSSI are associated with elevated risk of making a suicide attempt (Kessler et al., 1999; Nock, Joiner, Gordon, Lloyd-Richardson, & Prinstein, 2006). Despite this overlap, among adolescents who engage in NSSI, there are differences between those who have and have not made a suicide attempt in self-reported suicidal ideation, reasons for living, and depression (Muehlenkamp, 2007).

Despite the prevalence and dangerousness of SITB, researchers and clinicians continue to have difficulty predicting and treating these behaviors (Klonsky & Muehlenkamp, 2007; Nock, Teper & Hollander, 2007). The low base rate of suicide completions and the limited empirical evidence on the predictors and correlates of NSSI further complicate the prediction and prevention of SITB. In light of the low base rate of completed suicide (Kochanek & Smith, 2004), clinicians are advised to focus on predicting the immediate precursors to suicide, such as suicidal thoughts, suicide plans, suicide attempts, and NSSI, which all have higher base rates than suicide death. However, the fact that most of those who engage in these thoughts and behaviors will not die by suicide further complicates the picture. Overall, these limitations make the existing research on suicide prediction not entirely useful in day-to-day clinical care.

Another major limitation of SITB prediction is the reliance on clinical judgment or a patient’s self-report over statistical prediction. Relying on a patient’s introspection often seems to be the most direct means to access his or her inner thoughts and anticipate future behavior. However, the evidence supporting people’s ability to accurately predict their own future emotions or behavior is limited. In addition, extensive evidence suggests that actuarial judgments (i.e., decision-making that relies exclusively on the empirically based relation between specific input data and the outcome of interest) are more useful than clinical judgments for diagnosing and predicting human behavior (Dawes, Faust, & Meehl, 1989; Meehl, 1954). Actuarial judgments have been demonstrated to be superior to clinical judgments for predicting progressive brain dysfunction (Leli & Filskov, 1984), differentially diagnosing neurosis and psychosis (Goldberg, 1965, 1970), predicting violent behavior (Werner, Ross, & Yesavage, 1983), decision-making in the juvenile justice system (Schwalbe, Fraser, & Day, 2007), detecting psychosis (Keller et al., 2006), and indexing suicide risk (Borges et al., 2006). Predicting a patient’s future behavior is especially important when a clinician is dealing with a suicidal or self-injurious patient. Despite evidence that past suicidal behavior is a strong predictor of suicide attempts and suicide death (Borges et al., 2006; Joiner et al., 2005; Leon, Friedman, Sweeney, Brown, & Mann, 1990), the known limitations of clinical judgment (Dawes

et al., 1989), and evidence that people are biased and inaccurate in their predictions of nonclinical thoughts and behaviors (Diekmann, Tenbrunsel, & Galinsky, 2003; Epley & Dunning, 2000; Wilson & Gilbert, 2003), clinicians commonly assess and rely on patients' predictions of their likelihood of engaging in SITB to make clinical decisions. An extensive body of research in social and clinical psychology has demonstrated that past behavior is the best predictor of future behavior (Gibbons, Gerrard, Ouellette, & Burzette, 1998; Ouellette & Wood, 1998; Webb & Sheeran, 2006; Wood, Quinn, & Kashy, 2002). The distance between the research evidence and reality of clinical practice often makes clinical judgment seem to be the most useful predictor of future behavior. The usefulness of individuals' own prediction of their future SITB and whether it improves prediction over using SITB history (the best known predictor of such behavior; Suominen et al., 2004) has not previously been examined empirically.

In addition to demonstrating that past behavior is the best predictor of future behavior (Gibbons et al., 1998; Ouellette & Wood, 1998; Webb & Sheeran, 2006; Wood et al., 2002), social psychology researchers have demonstrated in various studies that people are limited and often inaccurate in their ability to predict future emotions and behavior (Diekmann et al., 2003; Epley & Dunning, 2000; Wilson & Gilbert, 2003). One of the classic studies in this area assessed the subjective well-being of lottery winners and serious accident victims relative to the general population (Brickman, Coates, & Janoff-Bulman, 1978). Although most people predict that they would be very happy to win the lottery and very unhappy to become a paraplegic, lottery winners are not particularly happy nor are accident victims particularly unhappy relative to control participants. People tend to mispredict their own adaptation to extremely positive and extremely negative events (Brickman et al., 1978). Similarly, people mispredict the duration of their affective responses to more mundane positive and negative events. In another set of studies, participants consistently overestimated the duration of their emotional response to the breakup of a romantic relationship, the failure to achieve academic tenure, the defeat of their preferred candidate in a political election, negative personality feedback, hearing about the death of a young child, and rejection by a prospective employer (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998). With regard to predicting their own future behavior, people are similarly biased and inaccurate. In a laboratory-based negotiation study, participants mispredicted their responses to competitive and noncompetitive negotiation partners (Diekmann et al., 2003). In another behavioral forecasting study, participants overpredicted their own generosity and underpredicted the generosity of others (Epley & Dunning, 2000). The social psychological literature on the biases and inaccuracies inherent in affective and behavioral forecasting may provide clinically useful information when asking patients to predict their own emotional and behavioral futures in the context of clinical practice.

In summary, past studies have demonstrated that history of SITB is a strong predictor of future SITB, that actuarial judgments are superior to clinical judgments, and that people are poor affective and behavioral forecasters. However, clinicians routinely rely on a person's behavioral forecast regarding whether he or she will engage in SITB. To our knowledge, the relative, incremental predictive value of these behavioral forecasts has not been tested empirically. Although clinicians are trained to ask patients if they will engage in suicidal or nonsuicidal self-injury in the future, no data exist demonstrating the usefulness of this assessment strategy.

In this study, we examined the extent to which individuals' behavioral forecasts of their own likelihood of engaging in SITB in the future improved prediction over using SITB history alone. Our goal was to understand whether asking patients directly whether they imagine they will engage in SITB in the future is a useful method for assessing the likelihood of future SITB. The job of a clinician working with suicidal or self-injurious patients is complex and difficult. Understanding exactly what methods of assessment are most efficient, effective, and accurate can streamline the process of suicide assessment for these clinicians. The ultimate goal of this study is to enhance our understanding of the best predictors of future SITB, and therefore improve the ability of professional psychologists to predict, prevent, and treat SITB.

Method

Participants

Sixty-four (51 female) adolescents and young adults with a lifetime history of SITB participated in this study. Demographic characteristics of the sample are presented in Table 1. We focused on adolescence and young adulthood given the significantly increased risk of SITB during this developmental period (Kessler et al., 1999; Nock & Kazdin, 2002). Participants were recruited via announcements posted in local psychiatric clinics, newspapers, community bulletin boards, and the Internet. All procedures were approved by the Harvard University Institutional Review Board. After complete description of the study to the participants, written informed consent was obtained, with parental consent obtained for those less than 18 years old.

Follow-up data were obtained for 50 (78%) participants. Seven participants could not be located, two did not respond to repeated requests for an interview, and five refused to participate in the follow-up interview. There were no significant

Table 1
Demographic Characteristics of Participants

Age in years: Range, <i>M</i> (<i>SD</i>)	12–19, 17.4 (1.8)
Sex (% female)	79.7
Race/ethnicity (%)	
European American	75.0
African American	3.1
Hispanic	7.8
Asian	4.7
Biracial	9.4
Lifetime history of suicide thoughts (%)	93.8
Lifetime history of suicide plans (%)	53.1
Lifetime history of suicide attempts (%)	42.2
Lifetime history of NSSI (%)	100.0
At least 1 current mental disorder (%)	76.6
Current major depressive disorder (%)	40.6
Current anxiety disorder (%)	56.3
Current substance use disorder (%)	18.8
Current impulse control disorder (%)	14.1
Current eating disorder (%)	9.4
Currently receiving psychotherapy (%)	48.2
Currently receiving psychopharmacology (%)	46.3

Note. NSSI = Nonsuicidal self-injury.

differences between those who participated in follow-up interviews and those who did not on any of the study variables collected at initial assessment: age, sex, ethnicity; presence of any psychiatric disorders; forecasts of self-injurious thoughts (SIT) or self-injurious behavior (SIB), initial frequency of SIT or SIB.

Assessment of Demographic Factors

Demographic factors including age, sex, and ethnicity were assessed in face-to-face interviews.

Assessment of Psychiatric Disorders

Psychiatric disorders were assessed using the Schedule for Affective Disorders and Schizophrenia for School Aged Children–Present and Lifetime Version (K-SADS-PL; Kaufman, Birmaher, Brent, Rao, & Ryan, 1997). The K-SADS-PL is a semistructured diagnostic interview that assesses current and past episodes of 33 different psychiatric disorders according to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition-Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000). In this study, we focus specifically on major depression, anxiety (panic, separation anxiety, phobias, generalized anxiety, and obsessive–compulsive), impulse-control (oppositional defiant, conduct, attention-deficit/hyperactivity), eating (bulimia, anorexia), and substance use (alcohol, drugs) disorders.

Self-Injurious Thoughts and Behaviors and Forecasts

All SITB were assessed using the Self-Injurious Thoughts and Behaviors Interview (SITBI), a structured clinical interview that assesses the presence, frequency, severity, age-of-onset, and other characteristics of a broad range of self-injurious and suicidal thoughts and behaviors (Nock, Holmberg, Photos, & Michel, 2007). In the current sample, the SITBI has shown strong interrater reliability (average $\kappa = .99$), test-retest reliability over a 6-month period (average $\kappa = .70$), and construct validity as demonstrated by strong relations with other measures of suicidal ideation (average $\kappa = .54$) and suicide attempt ($\kappa = .65$; Nock et al., 2007). Several variables for the current study were derived from responses to the SITBI. For this study, past year history of suicidal thoughts and plans, suicide attempts, and nonsuicidal self-injury were assessed based on responses to the items regarding past year history of these thoughts or behaviors (i.e., “How many times in the past year have you had thoughts of killing yourself?”, “How many times in the past year have you made a plan to kill yourself?”, “How many times in the past year have you made an actual attempt to kill yourself in which you had at least some intent to die?”, “How many times in the past year have you purposely hurt yourself without wanting to die?”). Forecasts were assessed based on response to items regarding likelihood of engaging in these behaviors in the future (e.g., “On a scale of 0 to 4, with 0 being *not at all* and 4 being *very much*, what do you think the likelihood is that you will make a suicide plan in the future?”). Participants were contacted by telephone 6-months after the initial assessment and readministered the SITBI over the telephone. For this study, future behavior was assessed based on responses to the SITBI items at the 6-month follow-up assessment regarding the frequency of each specified behavior in the last 6 months (e.g., “How many times in the past 6 months have you had thoughts of killing yourself?”).

Given the relatively small sample size, the wide range of SITB examined, and the importance of distinguishing between self-injurious thoughts and actual behaviors, we collapsed across all self-injurious thoughts (SIT) and all self-injurious behaviors (SIB) in the analyses. The SIT variables were based on the summed frequencies of suicide thoughts and plans, whereas SIB was based on the summed frequencies of suicide attempts and NSSI. Forecast of SIT was based on the highest rating for predicted likelihood of having suicide thoughts or suicide plans in the future. Forecast of SIB was based on the highest rating for predicted likelihood of making a suicide attempt or engaging in NSSI in the future. The frequencies of SIT and SIB in the past year (used for SITB history) and prospective 6-month period (used for SITB at 6-month follow-up) were not normally distributed so these data were logarithmically transformed (Howell, 2007; Tabachnick & Fidell, 2001). In addition, missing data (8.1% of all data points) were replaced with the mean (Tabachnick & Fidell, 2001).

Data Analysis

Preliminary analyses (independent samples *t* tests) were conducted to test whether the dependent variables differed based on age (grouped into 12–17 years and 18–19 years), sex, or ethnicity (comparing European Americans to all other ethnic categories). These groupings were made to maximize the statistical power of these preliminary analyses.

To test the hypothesis that past history and forecasts of future thoughts and behaviors would be strongly associated, we calculated a series of Pearson correlation coefficients. To test the hypothesis that behavioral forecasts would not improve prediction above and beyond the use of past behavior, we conducted hierarchical linear regression equations in which we entered each person's history of self-injurious thoughts in a first step and each person's forecast (i.e., prediction) of the likelihood that they would have self-injurious thoughts in a second step, with subsequent (i.e., over the next 6 months) self-injurious thoughts as the dependent variable. We then switched the two steps to test whether history of self-injurious thoughts still predicted subsequent self-injurious thoughts after controlling for behavioral forecast in a separate regression analysis. This same strategy was used for self-injurious behaviors as well, resulting in the conduction of four regression analyses (i.e., two for self-injurious thoughts and two for self-injurious behaviors). All tests were two-tailed with alpha set at .05.

Results

Preliminary analyses (independent samples *t* tests) revealed that neither age, nor sex, nor ethnicity was significantly related to the dependent variables (SIT or SIB at 6-month follow-up). Therefore, we did not include these demographic variables in our analyses.

Pearson correlation coefficients were calculated to examine the relation between past year history of SIT and forecasts of future SIT, and the relation between past year history of SIB and forecasts of future SIB. Past SIT and forecasts of future SIT were significantly correlated ($r = .71, p < .001$). Similarly, past SIB and forecasts of future SIB were significantly correlated ($r = .49, p < .001$). Thus, people seem to be basing forecasts, at least in part, on their past behavior.

In the main study analyses, we evaluated the relative predictive power of past SITB and behavioral forecasts in predicting sixth-month SITB using a series of

Table 2
 Regression Statistics for Predicting Self-Injurious Thoughts and Behaviors (SITB)

	SIT at 6-month follow-up				
	β	ΔF	df	R	ΔR^2
Equation 1					
Step 1: History of SIT	.54	25.64***	1, 62	.54	.29
Step 2: Forecast of future SIT	-.03	0.04	1, 61	.54	.00
Equation 2					
Step 1: Forecast of future SIT	.37	9.71**	1, 62	.37	.14
Step 2: History of SIT	.56	13.60***	1, 61	.54	.16
	SIB at 6-month follow-up				
	β	ΔF	df	R	ΔR^2
Equation 1					
Step 1: History of SIB	.40	11.88**	1, 62	.40	.16
Step 2: Forecast of future SIB	.21	2.39	1, 61	.44	.03
Equation 2					
Step 1: Forecast of future SIB	.35	8.81**	1, 62	.35	.12
Step 2: History of SIB	.30	5.14*	1, 61	.44	.07

Note. SIB = Self-injurious behaviors; SIT = Self-injurious thoughts.

* $p < .05$; ** $p < .01$; *** $p < .001$.

regression equations. For each hierarchical linear regression analysis presented in Table 2, the first listed variable has been entered in the first step of the model and the second listed variable has been entered in the second step of the model. The first variable is the variable for which we were controlling, and the second variable is the variable which we were testing. As presented in Table 2, for both SIT and SIB, after controlling for past history, behavioral forecasts of future behavior did not add to the prediction model. However, after controlling for behavioral forecasts, past behavior significantly statistically predicted future behavior.

Discussion

This study suggests that although people's forecasts of their future behavior are correlated with their actual future SITB, these forecasts did not improve prediction above what is possible based on past behavior alone. Clinicians are routinely encouraged to adopt a multimethod approach to the assessment of high-risk behaviors such as suicide and NSSI (e.g., combining past history, current thoughts, self-reported prediction of future behaviors, and reports from significant others). However, reports from multiple sources are often not in complete agreement and the best strategies for synthesizing information are not always clear (e.g., De Los Reyes & Kazdin, 2005; Prinstein, Nock, Spirito, & Grapentine, 2001). Although intuitively sensible, these data suggest that rather than asking people about their future likelihood of engaging in SITB, clinicians and researchers should look to past behavior without adding future forecasts to predict future behavior. The combination of clinical judgment and a patient's own introspection may often intuitively seem to be the best way to forecast the future of a patient; however, these data suggest that this may not be the case. Focusing on past history may be the best way to accurately anticipate how a person will behave in the future.

Social psychology research has demonstrated that individuals' forecasts of their future affect and behavior are often biased and inaccurate (Diekmann et al., 2003; Epley & Dunning, 2000; Wilson & Gilbert, 2003). Such findings have important implications for clinical assessment and decision-making; however, this work has rarely been applied to clinical research or practice. This study provides one relevant example of how this established body of social psychology research may be translated to inform clinical practice.

With these data, we can begin to answer the clinical questions raised at the beginning of this article. When a patient's history indicates that a relapse to drinking is likely, but the patient predicts his or her drinking is finished, history may be a better predictor of the future than his or her own introspection. Similarly, when a patient with a history of suicidal thoughts and behaviors says she will not make another attempt, the clinician involved should look to the past rather than the individual's forecast about her future to make clinical decisions regarding hospitalization and in risk assessment. This study in combination with previous research demonstrating the overwhelming predictive power of past suicidal behavior in predicting current suicidal symptoms (Joiner et al., 2005) strongly support the use of past history rather than multimethod assessment in predicting SITB.

Future studies in this area and clinical applications of this work should be guided by several important limitations of these results. We used a relatively small sample and combined suicidal and nonsuicidal self-injury in this initial study of the usefulness of forecasting SITB. These findings require replication in a larger, more representative sample. In this study we lacked the statistical power necessary to test whether the use of behavioral forecasts is more or less accurate than history. We looked only at the associations among these variables. In addition, it would be instructive to examine whether results differ based on intent or lethality of SITB. For example, forecasts of future SIB may be particularly relevant in cases in which intent to die is high, and past suicidal behavior may be particularly predictive when the past behavior is very lethal in nature. Additional limitations of this and any repeated measures design are the threats to validity including testing, attrition, sample characteristics, timing of measurement, and test sensitization. These are inherent characteristics of any repeated measures design that we could not avoid. Last, but perhaps most important, this study was conceived as a secondary analysis of an existing dataset. We sought to test the hypothesis that forecasts would not add predictive power to the clinician's toolkit for predicting self-injurious thoughts and behaviors. This study is clearly only a preliminary clinical examination of the well-studied social psychological phenomenon of behavioral forecasting errors. Notably, the pattern of results was consistent across both SIT and SIB, increasing our confidence in the reliability of these findings.

Despite these limitations, this study provides an important empirical examination of the limited usefulness of asking people to predict their future SITB. In this study, we demonstrated that asking about the future may not be a useful or efficient means for assessing future SITB. This work has an immediate implication for clinicians in practice. Although intuition may guide us to think that patient introspection will help us understand future risk for SITB, patients' behavioral forecasts, in fact, may not add to the prediction of future behavior. Clinicians who routinely ask their patients if they will engage in future SITB may not add to their predictive power by relying on these reports over past history alone. These findings should guide us towards a focus on looking to the past to predict the future.

Future improvements in the prediction of self-injurious and suicidal behaviors will likely come from using methods not reliant on self-report to predict such outcomes, such as behavioral (Nock & Banaji, 2007a, 2007b) and biological tests (Mann et al., 2006). Until such measures are available to practicing mental health professionals, however, clinicians and researchers should consider the current findings when attempting to predict SITB.

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