Deciding to Die: the Relations of Decision-making Styles to Suicide Ideation and Attempts

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Abstract

Research has struggled to distinguish individuals who have attempted suicide from individuals with suicidal thoughts but no history of suicide attempts. Cognitive attributes such as decision-making mediate thought-behavior relationships; we therefore examined whether different decision-making styles distinguished those who had made suicide attempts from those with suicidal ideation only. Six hundred participants were recruited using Amazon's Mechanical Turk. Measures assessed five decision-making styles, histories of suicide ideation and attempts, and several commonly cited correlates of suicide. Consistent with previous work, depression, anxiety, hopelessness, psychological pain, and belongingness were associated with suicidal ideation, but similar in individuals who made suicide attempts compared to individuals with suicidal ideation but no history of attempts. In contrast, a spontaneous decision-making style was moderately higher in individuals who made suicide attempts compared to individuals with suicidal ideation. To a lesser extent, borderline personality traits, some aspects of impulsivity, and a rational decision-making style also distinguished individuals who made suicide attempts from those with suicidal ideation. Findings can help inform suicide theory and prevention.

Keywords Suicide · Suicidal ideation · Suicide Attempt · Decision-making

Introduction

Suicide is a leading cause of death worldwide (World Health Organization [WHO] 2019) and our ability to understand, predict, and prevent suicide remains insufficient (Klonsky et al. 2016). A key reason for limited understanding and prevention is that most identified risk factors for suicide—including depression, hopelessness,

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impulsivity, and the presence of mental disorders—predict suicidal thoughts, but not attempts (Dhingra et al. 2019; Klonsky and May 2014; May and Klonsky 2013). As such, the current literature affords no effective way of identifying or characterizing those at greatest risk for acting upon suicidal thoughts (Klonsky et al. 2018). Given that only one out of three individuals who considered suicide will attempt (Nock et al. 2008), a pressing task for suicide researchers and preventionists is to better understand when and why suicidal thoughts progress to suicidal attempts.

Neurocognitive abilities may help explain the transition from suicide ideation to attempts. These abilities play a pervasive role in mediating thought-action relationships (Bredemeier and Miller 2015) and thus may predispose some individuals with suicidal ideation to act on their thoughts and make a suicide attempt. Of particular interest is decision-making, defined as the neurocognitive abilities that enable people to select a belief or a course of action among several alternative possibilities (Holyoak, and Morrison, R. G. (Eds.). 2012). As suicidal acts involve a decision favoring the act, it has been argued that a propensity for poor decision-making may increase risk for suicide attempts (Dombrovski et al., 2013).

Indeed, a number of studies have examined the role of decision-making in suicide attempts. Most of these studies utilize a "deficit" account. From this perspective, those who attempt suicide are assumed to have decision-making impairments or deficits, and research focuses on identifying those impairments. For example, people who attempted suicide may misestimate future outcomes and see suicide as unrealistically attractive relative to other options (Dombrovski et al., 2013).

Evidence for such a view, however, is mixed. For example, many studies investigating decision-making in suicide utilized the Iowa Gambling Task (IGT) (Bechara et al., 1994), a task designed to assess bio-cognitive mechanisms that underlie real-world high-risk decision-making (Bechara et al. 2005). While a number of studies reported an association between impaired performance on the IGT and suicide attempts (Bridge et al., 2012; Jollant et al. 2005, 2007, 2011, 2013; Loyo et al., 2013; Malloy-Diniz et al., 2009; Martino et al., 2011; Richard-Devantoy et al. 2014), others failed to find such a relationship (Gilbert et al., 2011; Gorlyn et al., 2013; Homaifar et al., 2012; Legris et al., 2012; Oldershaw). Similarly, a meta-analysis of studies that investigated performance on IGT and suicide revealed a mixed picture (Richard-Devantoy et al. 2014). The meta-analysis reported moderately impaired decision-making (indexed by IGT) in individuals with unipolar or bipolar disorder who had attempted suicide compared to those with unipolar or bipolar disorder without suicide attempts ($g = -.39$), and compared to healthy controls ($g = -.52$)—a pattern seemingly consistent with the deficit account of decision-making in suicide. However, a much larger effect size ($g = -1.39$) was found comparing unipolar and bipolar non-attempters to healthy controls. This pattern renders it difficult to determine if IGT performance is impaired in suicide attempters above and beyond impairments associated with mood-related psychopathology.

While the mixed findings do not necessarily invalidate the deficit account, they nevertheless highlight the possibility that the deficit account may not fully account for decision-making processes that lead to suicide attempts. Indeed, there is increasing evidence to suggest that not all decision-making styles implicated in suicide pathways are maladaptive. For example, using behavioral decision tests, Szanto et al. (2015) found that individuals who had made suicide attempts tended to rely on intuitive decision-making—as indicated by a greater susceptibility to the framing effect and

the sunk cost—to a greater extent than individuals with suicidal ideation only, non-suicidal depressed controls, and healthy participants. Importantly, intuitive decision-making in itself is *not* considered indicative of deficits/impairments. Instead, it exists in parallel to rational decision-making processes as part of the normal decision-making system (Evans & Stanovich, 2013). A critical task for future research, therefore, is to move beyond the current focus on deficits/impairments in decision-making and consider how individual differences in decision-making may be implicated in suicide.

One way to conceptualize individual differences in decision-making characteristics is through decision-making styles, defined as habitual patterns individuals use in decision-making (Driver 1979). This construct was developed and operationalized by Scott and Bruce (General Decision-Making Style Inventory; 1995), subsuming five decision-making styles: (1) the rational style, which emphasizes a thorough search for and logical evaluation of alternatives, (2) the avoidant style, or a tendency to postpone and avoid decisions, (3) the dependent style, which is characterized by a search for advice and direction from others, (4) the intuitive style, which relies on hunches and feelings, and (5) the spontaneous style, characterized by a sense of immediacy and a desire to get through the decision-making process as soon as possible. The five decision-making styles are considered distinct but not mutually exclusive. For example, Loo (2000) found modest (r=.3) to negligible (r=.08) correlations among the five decision-making styles. In other words, individuals do not rely on a single decision-making style, but draw on a combination of decision-making styles (Scott and Bruce 1995).

Very little is known about how decision-making styles may relate to suicide specifically or psychopathology generally. Most research on decision-making styles has been conducted in the domains of social and occupational psychology, in the context of topics such as locus of control (Baiocco et al. 2009), leadership ability (Russ et al. 1996), and career choices (Gati et al. 2010). There is some evidence that decision-making styles may have clinical relevance. Thunholm (2008) found that the avoidant decision-making style was correlated with cortisol responses indicative of higher stress. However, the relevance of decision-making styles for clinical outcomes such as suicide ideation and attempts is unknown.

The present study addresses this knowledge gap by investigating how different decision-making styles relate to lifetime histories of suicide ideation and attempts. Specifically, we administered measures of five distinct decision-making styles (rational, avoidant, dependent, intuitive, and spontaneous), suicide ideation, attempts, and several other potentially relevant variables (e.g., depression, hopelessness, impulsivity) to a large online sample of US adults, oversampled for histories of suicide ideation and attempts. Specifically, we are interested in examining whether individuals with suicide attempts versus those with suicidal ideation but no attempts would be distinguished on the five decision-making styles. As this is the first study of its kind, no specific hypotheses were offered and we take an explicitly exploratory approach.

Methods

Procedure

Participants were recruited from the USA using Amazon's Mechanical Turk (MTurk) online platform. For the initial screening study, participants completed a brief online

survey which included the Youth Risk Behaviour Survey Suicide Screening Question-naire (YRBS; Grunbaum et al. 2002; Kolbe et al. 1993), which assessed lifetime suicidal ideation and suicide attempts. Participants' responses to the YRBS suicide items determined their membership into one of three groups: (1) participants who reported no lifetime history of suicidal ideation or suicide attempts were classified into the non-suicidal group; (2) participants who endorsed a lifetime history of suicidal ideation but no history of suicide attempts were classified into the ideator group; and (3) participants with a history of suicidal ideation and suicide attempts were categorized into the attempter group. We used the screening with the aim of recruiting 200 participants in each of three conditions: attempter, ideator, and non-suicidal groups.

Upon successfully completion of the screening questionnaire, participants were invited to participant in a longer 30-minute survey. Participants who agreed to partic-ipate in the longer survey completed a demographics questionnaire alongside several clinical measures (see Measures section below). At the study's end, all participants were provided with an extensive list of mental health resource and then provided with their unique code for completing the survey.

Precautionary measures were implemented to ensure the quality of the data collected. Participation in both surveys was limited to one response per I.P. address and one response per MTurk participant to limit the same participant from completing either survey more than once (Peer et al., 2012). Furthermore, prior to beginning the surveys, participants had to complete a "captcha" to verify that participants were human and not automated programs. Finally, attention-checking questions that instructed the participants to select a particular answer ("Please select *Sometimes*") were interspersed to ensure that participants were paying attention when they were answering the questions. All participants who failed to select the appropriate answers were excluded from the analyses.

Participants were paid $0.15 for completing the screening survey (1 to 3 minutes), and an additional $2.00 for participating in a longer 1-hour survey.

Participants

2825 participants were assessed by our screening survey. Of those, 1 participant did not consent, and 38 did not complete the screening. Once we filled a group (e.g., complete data on 200 non-suicidal controls), additional participants fitting that group were not invited to participate in the larger study. Because participants were recruited in batches, the number of participants screened slightly exceeded the target of 200 per condition and 600 total. Specifically, of the 2786 participants who completed the screening questionnaires, 618 participants were offered to further participate in the longer 30-minute study. Of these, 2 declined to participate and 16 failed one or more attention-checking questions, leaving a total of 600 participants who completed the full survey (191 in the attempter group, 201 in the ideator group, and 208 in the non-suicidal group).

Measures

Demographics

Demographic information was obtained with 12 questions asking participants to report date of birth, gender, race/ethnicity, sexual orientation, current marital status, highest

level of education, yearly household income, occupation, weekly working hours, and number of people residing in the household.

Decision-making Styles

Decision-making styles were assessed using the General Decision-making Style (GDMS; Scott and Bruce 1995). The GDMS is a validated 25-item measure designed to assess how individuals approach decision situations. It assesses 5 decision-making styles: rational (e.g., "I make decisions in a logical and systematic way"), avoidant (e.g., "I postpone decision-making whenever possible"), dependent (e.g., "I use the advice of other people in making important decisions"), intuitive (e.g., "When making decisions, I rely upon my instincts"), and spontaneous (e.g., "I generally make snap decisions"). For each of the 25 items, participants use a 5-point Likert-type scale to indicate their responses, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The GDMS has shown good reliability and validity (Loo, 2002). Cronbach's alphas in the current sample were .88 (for Intuitive style), .85 (for Dependent style), .86 (for Spontaneous style), .92 (for Avoidant style), and .84 (for Rational style).

Suicide Ideation and Attempt

Lifetime suicidal ideation and attempt were measured by Youth Risk Behavior Survey Suicide Screening (Brener et al. 2002; Kolbe et al. 1993). These 10 items were taken from the Youth Risk Behavior Survey, a longstanding measure used by the Centers for Disease Control to track health behaviors among American adolescents. For example, a history of suicide attempt is assessed by the item: "Have you ever tried to kill yourself?"; suicidal ideation is determined by the item: "Have you ever seriously thought about killing yourself?". The YRBS items have been shown to demonstrate good reliability and good convergent and discriminant validity (Brener et al. 2002; May and Klonsky 2011).

Executive Functioning

Executive Functioning was assessed by the Frontal Systems Behaviour Scale (FrSBe; Grace and Malloy 2001). The FrSBe is a 46-item measure of three frontal systems behavioral syndromes: apathy, disinhibition, and executive dysfunction. For each of the 46 items, participants use a 5-point Likert-type scale to indicate their responses, ranging from 1 (almost never) to 5 (almost always). The FrsBe have demonstrated high internal consistency and excellent convergent and discriminant validity (Grace, 2011). Cronbach's alpha in the current sample was .93.

Impulsivity

Impulsivity was assessed using the UPPS-SF Impulsive Behaviour Scale (Whiteside and Lynam 2001). The UPPS-SF is a shortened 16-item version of the factor-analytically derived UPPS 45-item self-report scale (UPPS; Whiteside and Lynam 2001). The UPPS-SF retains the four-factor structure of the UPPS, measuring the following four facets of impulsivity: Urgency, (Lack of) Perseverance, (Lack of)

Premeditation, and Sensation seeking. For each statement, participants select an answer using a 4-point scale ranging from 1 (agree strongly) to 4 (disagree strongly). The UPPS has been shown to have good internal consistency reliability (Cyders 2011) and has been validated for use in both non-clinical and clinical samples (Cyders et al. 2007). Cronbach's alphas in the current sample were .81 (for Lack of Premeditation subscale), .80 (for Urgency subscale), .85 (for Sensation Seeking subscale), and .81 (for Lack of Perseverance subscale).

Depression and Anxiety

Depression and anxiety were measured using the depression and anxiety subscales of the Depression and Anxiety Stress Scale (DASS; Lovibond and Lovibond 1995). The DASS is a 42-item self-report instrument designed to measure the three related negative emotional states of depression, anxiety, and tension/stress. Specifically, participants indicate the degree to which each symptom applied to them on a scale from 0 (did not apply to me at all) to 3 (applied to me very much, or most of the time). The DASS has been shown to have good reliability and validity compared with Structured Clinical Interview for DSM-IV (SCID) diagnoses of anxiety and mood disorders (Dahm et al. 2013). Cronbach's alpha in the current sample was .85 for anxiety and .90 for depression.

Borderline Personality Traits

Borderline personality traits were measured using the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003), a 10-item yes/no self-report measure of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) BPD criteria. The MSI-BPD exhibited sensitivity and specificity above .90 in young adults when compared to a validated structured interview (Zanarini et al. 2003). To avoid confounding the relationship of BPD with histories of suicide ideation and attempts, we removed the suicide/self-harm item from the MSI-BPD for the purposes of analyses in this study. Cronbach's alpha in the current sample was .84.

Psychological Pain

Psychological pain was measured using the Unbearable Psychache Scale (UP3; Pachkowski et al. 2019), a 3-item measure derived from the original 13-item Psychache Scale (Holden et al. 2001). For each of the 3 items, participants use a 5-point Likert-type scale to indicate their responses, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The UP3 has been shown to have excellent internal reliability and convergent and predictive validity (Pachkowsk et al., 2019). Cronbach's alpha in the current sample was .93.

Hopelessness

Hopelessness was assessed using the Beck Hopelessness Scale-Short Form (BHS; Beck et al. 1974). This 4-item measure is a shortened version of the 20-item BHS designed to measure feelings of hopelessness. Participants rate each item as true or false with total scores ranging from 0 to 4. The BHS has demonstrated sound reliability and validity (Beck et al. 1989; Beck et al. 1988). Cronbach's alpha in the current sample was .88.

Belongingness and Burdensomeness

Belongingness and burdensomeness were measured using the Interpersonal Needs Questionnaire (INQ; Van Orden et al. 2012), a 15-item validated measure for levels of belongingness and perceived burdensomeness. Each of these 15 items is rated on a 7-point Likert-type scale, ranging from 1 (not at all true for me) to 7 (very true for me). The INQ has been shown to have good internal consistency reliability and convergent validity (Gutierrez et al. 2016). Cronbach's alpha in the current sample was .89 for burdensomeness and .85 for belongingness.

Power Analysis

The primary study analyses involve comparing groups on decision-making styles. (As we were not interested in the analyses for non-suicidal vs. attempter groups, we did not use a single omnibus model for all possible group comparisons, because this model would include analyses that were not of theoretical interest). For each group comparison, our smallest group sample size is $n = 191$ (i.e., attempter group). A very conservative estimation of power, assuming a sample size of just $n = 191$ for all three groups, yields .99 power to detect a moderate effect size ($d = .5$) at an alpha of .01.

Results

Demographics

Demographic information for lifetime non-suicidal, ideator, and attempter groups is presented in Table 1. There was no significant age difference across these groups, as indicated by ANOVA, $F (600) = 1.12$, $p = .26$. Due to the low endorsement rate of specific sub-demographic categories, demographic categories were merged for inferential analyses; specifically, gender (male vs. female), race/ethnicity (European/Caucasian vs. Non-European/Caucasian), sexual orientation (heterosexual vs. non-heterosexual), marital status (married vs. single), and yearly household income (below $39,999, above $40,000) were transformed into dichotomous categories. Highest level of education was converted into a three-category variable (no college/university degree, college/university degree, postgraduate degree). No differences in race/ethnicity, $\chi^2(2) = 1.31$, $p = .52$, and marital status, $\chi^2(2) = 3.78$, $p = .15$, were observed between the three groups. However, chi-square tests found significant differences in suicidality history based on gender, sexual orientation, education level, and household income. Regarding gender, the attempter group had a greater proportion of female participants (56.9%) than ideator (49.7%) and non-suicidal (43.3%) groups, $\chi^2(2) = 7.36$, $p = .03$. In terms of sexual orientation, the attempter group has a lesser proportion of heterosexual participants (67.5%) than ideator (78.6%) and non-suicidal (87.5%) groups, $\chi^2(2) = 23.28$, $p < .001$. As for education level, attempter group tended to fall into lower educational categories, with 52.9% without a college/university degree and 37.2% with college/university degree, compared to ideator (37.8% and 44.8%, respectively) and non-suicidal (34.1% and 44.2% respectively) groups. Finally, regarding income, the attempter group tended to fall into the lower income category (i.e.,

Table 1 Demographic information for lifetime non-suicidal, ideator, and attempter groups ($n = 600$)

	Non-suicidal group ($n = 208$)		Ideator group ($n = 201$)		Attempter group ($n = 191$)	
	Mean	SD	Mean	SD	Mean	SD
Age	36.0	12.4	32.7	9.7	32.3	9.6
	N	%	N	%	N	%
Gender						
Male	118	46.7	100	49.8	81	42.4
Female	90	43.3	99	49.3	107	56.0
Other	0	.0	2	1.0	3	1.6
Race/ethnicity						
African	10	4.8	10	5.0	12	6.3
East-Asian	12	5.8	10	5.0	15	7.9
European/Caucasian	141	67.8	146	72.6	137	71.7
Indian/South Asian	20	9.6	13	6.5	12	6.3
Latin-American/Hispanic	14	6.7	11	5.5	8	4.2
Middle Eastern	2	1.0	1	.5	1	.5
Native American	2	1.0	4	2.0	3	1.6
Other	7	3.4	6	3.0	3	1.6
Sexual orientation						
Bisexual	17	8.2	24	11.9	42	22.0
Homosexual	5	2.4	10	5.0	11	5.8
Questioning	1	.5	3	1.5	3	1.6
Heterosexual	182	87.5	158	78.6	129	67.5
Other	3	1.4	6	3.0	6	3.1
Marital status						
Single	107	51.4	116	57.7	111	57.7
Married/common-law	84	40.4	65	32.3	60	32.3
Divorced/separated	11	5.3	17	8.5	15	8.5
Widowed	3	1.4	1	.5	0	.0
Highest level of education						
Some high school	3	1.4	1	.5	4	2.1
High school graduate/GED	16	7.7	16	8.0	29	15.2
Some college or university	52	25.0	59	29.4	68	35.6
College or university graduate	81	38.9	76	37.8	62	32.5
Some graduate or professional school after college	11	5.3	14	7.0	9	4.7
Master's degree	37	17.8	27	13.4	14	7.3
Doctoral degree	8	3.8	8	4.0	5	2.6
Yearly household income						
Less than $5000	15	7.2	6	3.0	13	6.8
$5000–$9999	10	4.8	8	4.0	11	5.8
$10,000–$19,999	18	8.7	25	12.4	33	17.3
$20,000–$29,999	24	11.5	30	14.9	34	17.8

Table 1 (continued)

	Non-suicidal group (n = 208)		Ideator group (n = 201)		Attempter group (n = 191)	
	Mean	SD	Mean	SD	Mean	SD
$30,000–$39,999	32	15.4	27	13.4	23	12.0
$40,000–$49,999	18	8.7	23	11.4	22	11.5
$50,000–$59,999	15	7.2	21	10.4	11	5.8
$60,000–$74,999	25	12.0	18	9.0	18	9.4
More than $75,000	46	22.1	36	17.9	20	10.5
Do not wish to answer	5	2.4	7	3.5	6	3.1

below $39,999; 59.7%) compared to ideator (47.8%) and non-suicidal (47.6%) groups, $\chi^2(2) = 7.52, p = .02$.

Traditional Correlates

Several commonly cited predictors of suicidal ideation and attempt were included in the analyses, as they may potentially influence or account for the relationships between decision-making styles and suicide. These factors include depression, anxiety, hopelessness, belongingness, burdensomeness, borderline personality symptoms, gender, psychological pain, executive functioning, and impulsivity (premeditation, perseverance, urgency, sensation seeking). These variables were examined here as correlates, and in later analyses as covariates.

Non-Suicidal vs. Ideator Groups

As outlined in Table 2, non-suicidal and ideator groups significantly differed on almost all the common predictors, with moderate to strong effect sizes. These included borderline personality traits ($d = .98$), depression ($d = .83$), burdensomeness ($d = .83$), hopelessness ($d = .76$), anxiety ($d = .72$), psychological pain ($d = .66$), executive functioning ($d = .55$), belongingness ($d = .47$), impulsivity (urgency) ($d = .40$), and impulsivity (perseverance) ($d = .36$). Each of these effect sizes was statistically reliable ($ps < .001$).

Ideator vs. Attempter Groups

As outlined in Table 2, when ideator group were compared with attempter group, the differences in common predictors ranged from modest to negligible. The largest effect sizes were for the following: borderline personality traits ($d = .35\ p < .001$) and impulsivity, specifically the premeditation ($d = .38, p < .001$), urgency ($d = .31, p < .01$), and sensation seeking ($d = .24, p < .05$) subscales. Small effect sizes were found for burdensomeness ($d = .29, p < .01$), executive functioning ($d = .23, p < .05$), and anxiety ($d = .16, p < .05$), each of which was slightly higher in attempter compared to ideator group.

Decision-making Styles

Below we examine differences in five decision-making styles between (1) non-suicidal vs. lifetime ideator groups, and between (2) lifetime ideator vs. attempter groups. As a second step, for each of these two comparisons, the five decision-making styles were entered simultaneously into logistic regressions to examine the unique contributions of each over and above each other. Finally, decision-making styles that were shown to substantially discriminate ideator from non-suicidal groups, or attempter from ideator groups, were entered into separate logistic regressions to examine their unique contributions over and above common predictors.

Non-suicidal vs. Ideator Groups

As indicated in Table 3, none of the decision-making styles strongly distinguished non-suicidal vs ideator groups. Moderate and reliable difference was observed for the avoidant style ($d = .44$, $p < .001$), with individuals with higher avoidant style more likely to be in ideator group than in non-suicidal group. The rest of the decision-making styles—the spontaneous ($d = .03$, $p = .73$), intuitive ($d = .10$, $p = .33$), rational ($d = .20$, $p = .06$), and dependent ($d = .08$, $p = .43$) styles—were negligibly different between ideator and non-suicidal groups.

When all the five decision-making styles were simultaneously entered into a binary logistic regression, they together explained 5% of the variance in non-suicidal vs. ideator group status. One decision-making style—the avoidant style (odds ratio = 1.09, 95% CI [1.04–1.14])—accounted for unique variance in differentiating ideator from non-suicidal group status above and beyond other styles.

Next, the contribution of the avoidant decision-making style was examined over and above traditional predictors shown to distinguish the ideator from non-suicidal groups (i.e., traditional predictors from Table 2 that distinguished ideator versus non-suicidal groups with a minimum effect size of $d = .3$ and a maximum p-value of .01). Traditional predictors meeting this threshold included depression, anxiety, hopelessness, belongingness, burdensomeness, borderline personality traits, psychological pain, executive functioning, and two impulsivity subscales (Lack of Perseverance and Urgency). These traditional predictors were entered as covariates simultaneously in step 1 of logistic regression, with avoidant decision-making style entered in step 2. Results indicated that the avoidant decision-making style did not account for significant variance in non-suicidal versus ideator group status over and above traditional predictors ($\Delta R^2 = 0.0$ %, $p = .68$).

Ideator vs. Attempter Groups

As indicated in Table 3, the two decision-making styles that most strongly distinguished attempter vs. ideator groups were spontaneous style ($d = .47$, $p < .001$) and rational style ($d = .33$, $p = .001$). Specifically, individuals with higher spontaneous decision-making tendency and lower rational decision-

Table 2 Means, standard deviations, and effect size differences between non-suicidal versus ideator groups, and ideator versus attempter groups, on commonly cited predictors of suicide (effect sizes are Cohen's *d*)

| | Means (SD) | | | Group comparisons | |
	Non-suicidal group	Ideator group	Attempter group	Non-suicidal vs. ideator groups	Ideator vs. attempter groups
Depression	4.27 (4.54)	8.51 (5.45)	9.37 (5.45)	.83	.23
Anxiety	3.13 (3.81)	6.31 (5.00)	7.48 (5.29)	.72	.16
Hopelessness	.63 (1.20)	1.76 (1.70)	1.75 (1.66)	.76	−.01
(Lack of) Belongingness	35.84 (3.91)	37.60 (3.63)	37.07 (3.57)	.47	−.15
Burdensomeness	10.57 (7.82)	15.65 (9.36)	18.67 (11.47)	.83	.29
Psychological Pain	5.00 (2.75)	7.00 (3.27)	7.67 (3.55)	.66	.19
Borderline Personality Traits	2.24 (2.50)	4.75 (2.61)	5.65 (2.46)	.98	.35
EF Dysfunction	96.32 (24.23)	108.92 (21.48)	114.39 (25.84)	.55	.23
Impulsivity (Lack of Premeditation)	5.29 (1.80)	5.44 (2.04)	6.38 (2.81)	.08	.38
Impulsivity (Lack of Perseverance)	5.81 (2.24)	6.71 (2.71)	7.03 (3.09)	.36	.11
Impulsivity (Urgency)	9.56 (3.11)	10.83 (3.19)	11.83 (3.16)	.40	.31
Impulsivity (Sensation Seeking)	9.75 (3.70)	9.67 (3.80)	10.61 (3.94)	−.02	.24

Notes. Effect sizes of magnitudes larger than .24, .29, and .35 were statistically significant at alphas of .05, .01, and .001, respectively. *EF*, executive functioning

making tendency were more likely to be in attempter group than in ideator group. Avoidant ($d = .15$, $p = .14$), intuitive ($d = .15$, $p = .16$), and dependent ($d = .14$, $p = .18$) styles were negligibly different between ideator and attempter groups.

When all the five decision-making styles were entered into a binary logistic regression at the same time, they together explained 8% of the variance in attempter vs. ideator group status. Two decision-making styles accounted for unique variance in differentiating attempter from ideator group status above and beyond other styles: spontaneous (odds ratio = 1.16, 95% CI [1.08–1.24]) and avoidant (odds ratio = .94, 95% CI [.90–.99]).

Next, the contributions of these two decision-making styles—spontaneous and rational styles—were examined over and above traditional predictors shown to distinguish the ideator from attempter groups (i.e., traditional predictors from Table 2 that distinguished ideator versus attempter groups with a minimum effect size of $d = .3$ and a maximum p-value of .01). Traditional predictors meeting this threshold included burdensomeness, borderline personality traits, gender, and two impulsivity subscales (Lack of Premeditation and Urgency), which were entered as covariates simultaneously in the step 1 of two logistic regressions. Results indicated that the spontaneous decision-making style ($\Delta R^2 = 1.8$ %, $p = .02$) accounted for statistically significant variance above and beyond common predictors. In contrast, rational decision-making style was not shown to explain unique variance above and beyond common predictors ($\Delta R^2 = 0.0$ %, $p = .96$).

Discussion

This study examined the relationship of self-reported decision-making styles to histories of suicidal ideation and suicide attempts using a large online sample. While previous studies have focused on impairments or deficits in decision-making, to our knowledge this is the first study to examine whether decision-

Table 3 Differences between non-suicidal versus ideator groups, and between ideator versus attempter groups, in decision-making styles (effect sizes are Cohen's d)

	Non-suicidal group	Ideator group	Attempter group	Non-suicidal vs. ideator groups	Ideator vs. attempter groups
Avoidant	12.90 (5.07)	15.17 (5.31)	14.36 (5.62)	−.44	.15
Spontaneous	12.33 (3.95)	12.47 (4.05)	14.55 (4.71)	−.03	−.47
Intuitive	16.47 (4.34)	16.88 (3.88)	17.45 (4.11)	−.10	−.15
Dependent	16.43 (3.94)	16.75 (4.32)	16.15 (4.53)	−.08	.14
Rational	20.55 (2.79)	19.99 (2.76)	18.81 (3.76)	.20	.33

Note. Effect sizes of magnitudes larger than .25, .27, and .41 were statistically significant at alphas of .05, .01, and .001, respectively

making styles may be related to the transition from suicidal ideation to suicide attempts.

Results suggest there are differences in decision-making styles both between non-suicidal individuals and individuals with suicidal ideation and between individuals with suicidal ideation and those who made suicide attempts. However, when common predictors of suicidality were taken into consideration, only a spontaneous decision-making style distinguished individuals who made suicide attempts from individuals with suicidal ideation, and no differences in decision-making styles were observed between individuals with suicidal ideation and non-suicidal individuals.

In addition, unlike spontaneous decision-making style, a measure of executive functioning did not distinguish individuals who made suicide attempts from individuals with suicidal ideation. Taken together, findings suggest that the spontaneous decision-making style has a potentially unique and specific relationship to suicide attempts.

There are a few possible explanations why a spontaneous decision-making style distinguished individuals who made suicide attempts from individuals with suicidal ideation. One possibility is that, among individuals with suicidal ideation, those who tend to make decisions by hasty, instantaneous selection from immediately available alternatives may be more likely or quickly to favor suicide as an immediate solution to overwhelming emotions or circumstances. This is not inconsistent with the literature on cognitive constriction (narrowed attention which reduces perceived potential solutions to a dichotomy—immediate solution or suicide; Shneidman, 1985), which has been frequently observed prior to a suicide attempt (e.g., O'Connor et al. 1999). These results are also in line with studies reporting exaggerated preference for immediate rewards (or high delay discounting) in individuals who had made suicide attempts (Dombrovski et al. 2011; Dombrovski et al. 2012). Alternatively, it is also possible that spontaneous decision-making styles may influence the capability for suicide and the transition from ideation to attempts. For example, research has documented relationships between spontaneous cognition and impulsivity traits and risk-taking behaviors (Wiers and Stacy 2006; Satchell et al. 2018). This suggests that a spontaneous style of thinking may increase the likelihood of engaging in painful experiences, and/or the familiarity with means to attempt suicide, thereby contributing to higher suicide capability.

Additionally, our results indicated that individuals with suicidal ideation who have rational decision-making tendencies were less likely to have acted on their thoughts and made a suicide attempt. One potential explanation for this pattern is that, among individuals with suicidal ideation, those who tend to make decisions by systematically and thoroughly searching for alternatives and evaluating pros and cons may be less likely to foreclose their decision-making processes and settle on suicide as an optimal choice. These results are not inconsistent with the broader literature on decision-making and suicide, which has documented a greater susceptibility to affect- and/or heuristic-based decision-making in individuals who made suicide attempts compared to individuals with suicidal ideation only (Szanto et al. 2015; Dombrovski et al. 2011). These results also fit with the suicide treatment literature supporting the utility of

problem-solving therapy and cognitive-behavioral treatments (e.g., cognitive-behavioral therapy, dialectical behavioral therapy) in reducing suicidality, as these treatments include elements that may enhance rational decision-making, such as cognitive restructuring and problem-solving skills training (for reviews, see Tarrier et al. 2008; Hawton et al. 2016). Alternatively, research has documented a relationship between risk-taking behaviors and the ability to rationally calculate long-term consequences (Reyna and Farley 2006). As such, it is also possible that lower rational decision-making style may increase one's exposure to experiences that elevate suicide capability.

One might consider that findings of higher spontaneous decision-making and lower rational decision-making in those with suicide attempt histories reflect the same pattern: that those who attempt suicide make quicker decisions with less thought. However, spontaneous and rational decision-making styles each uniquely accounted for variance in suicide attempt history over and above each other (and other decision-making styles). This pattern suggests that it is also useful to consider each finding separately, and that one can potentially have a spontaneous style, a rational style, or both—and that the presence of both styles indicates even higher risk for attempts among those with ideation.

The overall pattern of results highlights the need to examine differences in nuanced aspects of decision-making styles, in addition to global impairments of decision-making in suicide. For example, some prior studies suggest that impairments in decision-making and related domains (e.g., executive functioning) can facilitate progression from suicidal thoughts to attempts (Saffer & Klonsky, 2018). While this work is undoubtedly useful, findings from the current study suggest that individual differences in decision-making styles may also matter. For example, while the rational decision-making style was found to protect against suicide attempts, this association ceased to be statistically significant when other common risk factors for suicide attempters were controlled for. By contrast, the largest effect was found for the spontaneous decision-making style, which remained robust even when controlling for other decision-making styles and commonly cited risk factors for suicide.

Three decision-making styles—avoidant, dependent, and intuitive decision-making styles—were not shown to be different in individuals who made suicide attempts compared to individuals with suicidal ideation, even though they share similarities with the spontaneous style. All four styles differ from the rational decision-making style in that they draw on less cognitively demanding processes of decision-making, rather than rigorously searching and comparing different alternatives (Scott and Bruce 1995). However, they exhibited different relationships to suicide attempts, which further emphasizes the importance of treating decision-making as having multiple facets that may have different relevance for suicide.

Taken together, our findings suggest that it is important for future research on suicide risk to consider and assess differences in decision-making tendencies, in addition to global decision-making competency or impairment. It is possible that mixed findings regarding decision-making deficits among individuals who made suicide attempts (e.g., Richard-Devantoy et al. 2014) may be due in part to a failure to account for relevant differences in decision-making

style. Future work is needed to examine whether individual differences in decision-making may interact with each other or with cognitive deficits to better explain and predict suicide attempts.

When interpreting findings, it is important to note that the correlational nature of this study precludes inferences of causality. While decision-making styles may constitute a risk factor for suicide, it is also possible that making a suicide attempt can influence an individual's perception of their own decision-making style. For example, Self-Perception Theory posits that people acquire self-knowledge by observing and making inferences about internal processes based on their own behaviors (Bem 1972). Following this, suicide attempts may lead individuals to perceive and describe themselves as more spontaneous and less rational. By contrast, experiencing suicidal thoughts without acting upon them may contribute to a greater perception of rational decision-making. Future studies are needed to clarify these causal directions.

It is also noteworthy that most commonly cited predictors of suicide—including depression, anxiety, hopelessness, psychological pain, and belongingness—were higher in individuals with suicidal ideation compared to non-suicidal participants, but similar in individuals who made suicide attempts compared to individuals with suicidal ideation. This pattern is consistent with previous empirical work (May & Klonsky, 2016). Interestingly, the impulsivity facet Lack of Premeditation and Borderline Personality traits were moderately elevated among individuals who made suicide attempts compared to individuals with suicidal ideation—a pattern consistent with the finding in adolescents that Lack of Premeditation was modestly higher in among individuals who made suicide attempts compared to individuals with suicidal ideation (Klonsky and May 2010). It should be noted, however, contrary findings also exist, with some studies indicating a lack of difference in impulsivity between individuals with suicidal ideation and those who made suicide attempts (for a review, see Klonsky & May, 2015; for a meta-analysis, see Anestis et al. 2014). Others suggest that the relationships between impulsivity and suicide attempts may be context-dependent (e.g., present when in a negative emotional state; Millner et al. 2020). It will be important, therefore, for future work to continue to clarify which variables best distinguish individuals who make suicide attempts (Klonsky and May 2014).

Findings from this study have potential clinical implications. A central aim of suicide risk assessment is to identify which individuals with suicidal ideation are most likely to act on their thoughts. Current suicide risk assessment protocols largely focus on assessing variables such as depression, anxiety, and emotional dysregulation, which are more predictive of suicidal thoughts than suicidal attempts (Kessler et al. 1999; Klonsky & May, 2016; Nock et al. 2013; Nock et al. 2012). These findings were replicated in the current study: common predictors distinguished individuals with suicidal ideation from non-suicidal individuals, often with very large effect sizes, but struggled to distinguish individuals who made suicide attempts from individuals with suicidal ideation. In contrast, our findings suggest that a spontaneous decision-making style is a stronger and more unique predictor of attempts among individuals with suicidal ideation than common predictors. Risk assessment of suicidality might therefore benefit from moving beyond questions about commonly cited risk factors such

as depression and hopelessness, and target domains likely to be relevant to the progression from ideation to attempts, such as capability for suicide (Klonsky et al. 2017) and decision-making style. Furthermore, our finding that individuals who made suicide attempts exhibited a stronger spontaneous decision-making style may have treatment implications. If replicated, these results would suggest that interventions designed to help clients utilize a more thoughtful decision-making process—for example, decisional balance, identifying pros and cons—may help prevent the progression from suicidal ideation to attempts.

Findings also inform suicide theory in at least two ways. First, contemporary theories of suicide recognize that (a) the development of suicidal ideation and (b) the progression from ideation to attempts are separate processes with separate explanations and predictors (Klonsky et al. 2016); however, the field lacks knowledge about the explanations and predictors for the latter (Klonsky and May 2014; Klonsky et al. 2016; but see Klonsky et al. 2017). Thus, our findings contribute new knowledge to help further clarify factors that facilitate or impede progression from ideation to attempts. Second, while many theories and models of suicide embrace a deficit account, our findings suggest that other kinds of factors can also be important in understanding and characterizing suicide risk, and that variation in normal and adaptive characteristics can also be relevant to the attempt-ideation distinction.

There are several limitations to this study. First, this study is of exploratory nature. Thus, study results need to be taken with caution until replicated by future studies. Second, this study examined the relationships between decision-making styles and a history of lifetime suicide ideation and attempt. As such, analyses did not address the more recent or concurrent relationships between decision-making styles and suicidality. Future studies may consider extending the results of this study by examining if similar patterns also hold for decision-making styles and recent histories of suicide ideation and attempts—including shorter time frames over weeks, days, or hours. Third, this study utilized a cross-sectional design. As such, it was not able to tease apart the temporal relationships or causal directions between the measured variables of interest and the onset of suicidal ideation and attempts. This study cannot determine whether the observed differences in decision-making styles among individuals who made suicide attempts, individuals with suicidal ideation, and non-suicidal individuals constituted predisposing factors for suicidal ideation and attempts, or the consequences of having engaged in suicidal thoughts or attempted suicide, or both. Prospective longitudinal research is needed to elucidate whether individual differences in decision-making styles may predict future suicidal ideation and attempts. Finally, all study variables were assessed by self-report questionnaires. While we used measures with good psychometric properties, self-report methods can be susceptible to social desirability bias and other self-presentation and memory biases. Furthermore, the use of self-reported decision-making styles also limits the comparisons that can be drawn between this study and the wider literature, which primarily utilizes behavioral measures to assess decision-making in relation to suicide. Future studies will benefit from a multi-method approach that includes both self-report and behavioral measures of decision-making to more comprehensively assess the relationships of decision-making to suicidal ideation vs. suicide attempts.

Intercorrelations among study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Avoidant Decision-making																
2. Spontaneous	.27															
3. Intuitive	.13	.56														
4. Dependent	.31	−.03	.03													
5. Rational	−.24	−.54	−.27	.18												
6. Depression	.45	.24	.10	.07	−.25											
7. Anxiety	.36	.29	.15	.06	−.22	.84										
8. Hopelessness	.37	.06	−.06	.05	−.17	.64	.51									
9. (Lack of) Belongingness	.14	−.04	−.05	−.06	−.10	.30	.27	.31								
10. Burdensomeness	.35	.27	.10	.04	−.22	.69	.66	.58	.22							
11. Psychological Pain	.33	.19	.12	.05	−.19	.72	.67	.60	.21	.67						
12. Borderline Personality Traits	.32	.30	.15	.08	−.24	.65	.60	.40	.21	.51	.50					
13. EF Dysfunction	.59	.41	.12	.08	−.43	.67	.59	.48	.22	.58	.52	.53				
14. Impulsivity (Lack of Premeditation)	.20	.57	.27	−.19	−.68	.23	.25	.15	.05	.23	.16	.21	.42			
15. Impulsivity (Lack of Perseverance)	.44	.24	.04	−.08	−.40	.30	.23	.33	.16	.25	.20	.22	.53	.49		
16. Impulsivity (Urgency)	.43	.56	.35	.14	−.42	.41	.36	.19	.06	.34	.31	.47	.55	.33	.26	
17. Impulsivity (Sensation Seeking)	.02	.28	.13	−.06	−.04	−.00	.04	−.09	−.07	.02	.00	.09	.09	.16	−.01	.22

Notes. Correlation coefficients larger than .08 and .14 were statistically significant at alphas of .05, and .01, respectively. *EF,* executive functioning

Declarations

Conflict of Interest   The authors declare no competing interests.

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