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Understanding Suicide Risk within the Research Domain Criteria (RDoC) Framework: A Meta-Analytic Review

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Abstract

Background—The field is in need of novel and transdiagnostic risk factors for suicide. The National Institute of Mental Health's Research Domain Criteria (RDoC) provides a framework that may help advance research on suicidal behavior.

Method—We conducted a meta-analytic review of existing prospective risk and protective factors for suicidal thoughts and behaviors (ideation, attempts, and deaths) that fall within one of the five RDoC domains or relate to a prominent suicide theory. Predictors were selected from a database of 4,082 prospective risk and protective factors for suicide outcomes.

Results—A total of 460 predictors met inclusion criteria for this meta-analytic review and most examined risk (vs. protective) factors for suicidal behavior. The overall effect of risk factors was statistically significant, but relatively small, in predicting suicide ideation (weighted mean odds ratio: *wOR*=1.72; 95% *CI*: 1.59–1.87), suicide attempt (*wOR*=1.66 [1.57–1.76), and suicide death (*wOR*=1.41 [1.24–1.60]). Across all suicide outcomes, most risk factors related to the *Negative Valence Systems* domain, although effect sizes were of similar magnitude across RDoC domains.

Conclusions—This study demonstrated that the RDoC framework provides a novel and promising approach to suicide research; however, relatively few studies of suicidal behavior fit within this framework. Future studies must go beyond the 'usual suspects' of suicide risk factors (e.g., mental disorders, sociodemographics) to understand the processes that combine to lead to this deadly outcome.

Keywords

suicide; suicide attempts; risk factor; Research Domain Criteria; meta-analysis

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Introduction

Suicide continues to be one of the leading causes of death worldwide (World Health Organization, 2014). In addition to suicide deaths, a substantial number of people will make non-fatal suicide attempts (2.7%), and even more will seriously consider suicide (9.2%) each year (Nock et al., 2008). Suicidal thoughts and behaviors are associated with significant impairment and financial costs (Shepard, Gurewich, Lwin, Reed, & Silverman, 2016; World Health Organization, 2014).

Despite over five decades of research aimed at identifying risk factors for suicide, little progress has been made in the field's ability to understand, predict (Franklin et al., 2017), or prevent suicide (Zalsman et al., 2016). Prior research has been hampered in at least two key ways. First, studies have continued to examine the same risk factors–most prominently the presence of mental disorders–that have aided little in the accurate prediction of suicidal behavior. For instance, a recent meta-analysis of 365 studies of risk factors for suicidal behavior revealed a consistent focus over the past five decades on mental disorders and related constructs (Franklin et al., 2017). Beyond failing to accurately predict suicidal behavior, focusing on mental disorders provides little explanatory power regarding the processes that lead to suicidal behavior (Nock, 2009). Second, most studies on this topic have focused on cross-sectional examinations of correlates of suicidal behavior, rather than longitudinal studies of actual risk factors that precede and predict the subsequent occurrence of suicidal behavior (Franklin et al., 2017; Glenn & Nock, 2014; O'Connor & Nock, 2014).

Shifting away from a focus on mental disorders as the primary predictive and explanatory variables of interest, the National Institute of Mental Health's Research Domain Criteria (RDoC) provides a framework that may help advance research on suicidal behavior. The RDoC framework may be particularly useful for suicide research because of its: (a) emphasis on transdiagnostic dimensions, (b) suggestion for *novel* predictors of suicide outcomes, (c) focus on facilitating the integration of information across the RDoC "units of analysis" (i.e., genes, molecules, cells, circuits, physiology, behavior, self-report).

The primary goal of this study was to use the RDoC framework as a novel lens to conceptualize what is currently known about prospective predictors for suicidal thoughts and behaviors—beyond frequently examined mental disorders and related risk factors (Franklin et al., 2017). We conducted a meta-analytic review of all existing prospective risk factors for suicidal thoughts and behaviors (i.e., ideation, attempts, deaths) that fall within one of the five RDoC domains (i.e., *Arousal and Regulatory Systems, Cognitive Systems, Negative Valence Systems, Positive Valence Systems, and Systems for Social Processes*), as well as predictors that related to prominent suicide theories but did not fit within any of the existing RDoC domains. We focused on prospective studies to identify *risk* (i.e., factors that are prospectively and positively associated with a specific suicide outcome) and *protective* (i.e., factors that are prospectively and negatively associated with a specific suicide outcome) factors,[1] rather than correlates, of suicidal thoughts and behaviors (Kraemer et al., 1997).

[1]"Protective factor" is a term that has been used to refer to a factor in the population that decreases risk for a negative outcome (i.e., inverse of a risk factor), as well as a factor that decreases risk for a negative outcome among a high-risk group (Kazdin et al., 1997; Rutter, 1987). In the current study, the term "protective factor" adheres more closely to the former definition.

Given that risk factors for suicidal thoughts and behaviors are distinct (Kessler, Borges, & Walters, 1999; Nock et al., 2009), we specifically examined how predictors related independently to suicide ideation, attempts, and deaths.

This study is distinct from previous meta-analytic reviews of suicide risk factors that focused on factors that predominate the extant suicide literature: sociodemographics (Franklin et al., 2017), mental disorders (Bentley et al., 2016; Franklin et al., 2017), and prior self-injurious and suicidal thoughts and behaviors (Franklin et al., 2017; Ribeiro et al., 2016). In this meta-analysis, we took a different perspective by moving beyond these broad and commonly examined risk factor categories to focus on transdiagnostic dimensions—many of which have received less consideration in prior research. This meta-analytic review is also distinct from our recent conceptual overview of suicide research within the RDoC matrix. Whereas in the conceptual overview, we highlight insights that RDoC can provide for suicide research, discuss major challenges for suicide research within this framework, and make suggestions for future research (Glenn, Cha, Kleiman, & Nock, 2017), here we quantify the magnitude of effects in each domain of the RDoC framework.

Method

Search Strategy for Larger Prospective Study Database

Data for this meta-analysis were drawn from a database created for a general study of all prospective studies of suicide risk and protective factors published prior to January 1, 2015 (Franklin et al., 2017). This parent meta-analytic database contained all relevant effect sizes within studies in which a risk or protective factor was used to longitudinally predict a specific suicide outcome (i.e., ideation, attempts, deaths). The parent database contained 4,082 effect sizes across 365 studies (see Franklin et al., 2017 for details).

Selection Criteria for the Current Meta-Analysis

The selection criteria for this meta-analysis were more specific than for the larger project. First, this review focused specifically on predictors of suicide ideation, attempts, and deaths (see Figure 1). We excluded effect sizes of suicide-related outcomes that did not feature suicidal intent (i.e., suicide gesture: Nock, 2010) or have a standard definition (i.e., suicide plan).

Second, the current review focused on predictors that could be linked to one of the five major RDoC domains—either at the broader domain level, the construct level, or the specific subconstruct level (for additional details about coding within each domain, see Appendix A: Coding Guidelines). Consistent with RDoC guidelines (Cuthbert & Kozak, 2013), predictors needed to be continuous, transdiagnostic, and granular enough to be tied to an RDoC domain. The following categories of predictors did not meet these guidelines: sociodemographics (e.g., gender), environmental predictors (e.g., negative life events), mental disorders or health-risk behaviors (e.g., psychiatric disorders, cigarette smoking), prior history of self-injurious or suicidal behaviors, treatment-related factors (e.g., type/dose of treatment), family history of psychopathology, and physical health factors (e.g., chronic

health conditions) (see Figure 1; a full list of excluded variables and studies is available upon request).

The additional category "*Suicide Theory-Relevant Risk Factors*" was created for constructs that could not be adequately categorized within an existing RDoC domain. We were able to categorize many suicide theory-related factors, such as loneliness (Social Processes) and hopelessness (Negative Valence Systems) within the RDoC matrix. However, for others this was not possible (e.g., psychache, or unbearable psychological pain [Shneidman, 1993], cannot be accounted for within a single RDoC domain). As the current RDoC matrix is a work in progress (Morris & Cuthbert, 2012), it is important for researchers to propose additional domains and constructs where they may exist. The inclusion of suicide theory-relevant factors could help to advance our understanding of this outcome, and of RDoC constructs more generally.

Finally, we created a separate category for risk factors at genetic, molecular, and physiological units of analysis (*Biological Factors*; there were no predictors at the cellular or circuit level). This decision was made because these biological risk factors could not be classified under a single RDoC domain (e.g., serotonin, or 5-HT, could be tied to constructs across the full matrix) and categorization under multiple domains would have prevented our examination of findings across domains for this project (i.e., due to non-independence of predictors across domains). A prior meta-analysis organized these biomarkers by overall category (or unit of analysis; Chang et al., 2016). Given our goal of integrating these biological predictors across units of analysis (e.g., genes, molecules), we created subgroups within the overarching biological category based on the underlying biological systems: serotonergic function, dopaminergic function, and neuroendocrine system function (see Appendix A: Coding Guidelines).

Classification of Predictors within RDoC Matrix

Coding procedure—A major challenge was deciding whether a predictor could be linked to the RDoC matrix. To make these decisions, our coding team (consisting of four PhD clinical psychologists: CC, CG, EK, MN; and one advanced doctoral student in clinical psychology: CD): (a) reviewed the NIMH RDoC workshop proceedings for each domain, (b) developed the Appendix A: Coding Guidelines to be used across the following domains and categories: five RDoC domains, *Suicide Theory-Relevant Risk Factors*, and *Biological Risk Factors*, (c) excluded predictors that were not related to suicide ideation, attempts, or deaths (see Figure 1: PRISMA diagram, Step 1), (d) excluded predictors that were outside the scope of the RDoC matrix (see Figure 1: PRISMA diagram, Step 2), and (e) excluded predictors that were non-independent or redundant (e.g., a subscale and total score from the same measure; see Figure 1: PRISMA diagram, Step 3).[2]

Data extraction—For each predictor included, the following information was extracted and is provided in Table 1: RDoC domain, RDoC construct, suicide outcome predicted, and effect size. Details about statistics extracted are provided below.

[2]Additional details about the coding procedure are available upon request.

Meta-Analytic Technique

This project followed accepted guidelines for conducting meta-analyses of observational studies (Stroup et al., 2000) and reporting for meta-analytic results (Moher, Liberati, Tetzlaff, & Altman, 2009). Random-effects meta-analyses were performed using Comprehensive Meta-Analysis, 2.0. We included studies that reported either: (a) odds ratios (*OR*s), (b) a statistic that could be converted to odds ratios (e.g., correlations), or (c) hazard ratios (*HR*s). These analyses produced estimates of effect size (i.e., weighted odds ratios [*wOR*s] or weighted hazard ratios [*wHRs*]) with 95% confidence intervals. Analyses were conducted for: each of the major suicide outcomes (i.e., ideation, attempts, deaths), each RDoC domain within each outcome, and subdomains within outcomes when >2 cases were in any given subdomain. We conducted separate analyses for *ORs* and *HRs* (because these statistics cannot be pooled) and for risk and protective factors (because these effects would cancel each other out if pooled). To account for effect size dependence (i.e., multiple effects within studies), we conducted analyses both with and without effect sizes averaged/pooled within studies.[3] When *ORs* or *HRs* for overall effects were significant and there were >3 studies in the analysis, we conducted tests of publication bias (i.e., Duval and Tweedie's trim and fill analysis and fail-safe *N* analysis). 'Trim and fill' analyses estimate how many studies are missing from the analysis and accounting for the funnel plot asymmetry (see '# of studies trimmed'; when this number is 0, there is no publication bias) and adjusts effect sizes after accounting for these studies (see 'Adjusted estimate' and 'Adjusted 95% CI'). Fail-safe *N* analysis indicates how many non-significant studies would be needed to bring a significant finding to non-significance; larger numbers indicate more robust effects (see '# of studies for $p > .05$'; when this number is 0, the original effect was non-significant). To measure heterogeneity between cases, we used I^2, which indicates the proportion of between case-variance with cutoffs of 0–25% (low), 26–50% (moderate), and 51–100% (high). Because most studies in this meta-analysis had moderate to high heterogeneity (see Tables 2–4), we adjusted for heterogeneity among cases by using random-effects models for all analyses.

Results

Descriptive Characteristics of Risk Factors Related to RDoC and Suicide Outcomes

The selection criteria for this meta-analysis resulted in 460 prediction cases (referred to as "effect sizes" from this point forward) across 134 studies (see Table 1 for a list of studies/predictors; references provided in Appendix B). Risk factors were presented as *ORs* (n=378; Tables 2a–c) more often than *HRs* (n=33; Table 3). Results are presented in separate tables for *ORs* and *HRs* but integrated conceptually in the text. Few studies examined protective factors for suicidal thoughts and behaviors (n=49).[4] Because most predictors were conceptualized as risk factors, these findings are presented in Tables 2–3 with protective

[3]Comparing results when effect sizes were combined within studies or not, there were no significant differences in the pattern of findings (some of the clustered effects were same up to the hundredths place) or interpretation of results, consistent with findings in the parent meta-analysis of this database (Franklin et al., 2017).

[4]Only one protective factor with a *HR* met inclusion criteria for our review (Tanji et al., 2014; see Appendix B), which was not enough to summarize separately so this study was excluded from the major analyses.

factors available in Table 4. Of note, some analyses included a small number of effect sizes; the number of cases (see Tables 2–4) should be taken into account when interpreting results.

In terms of breakdown by suicide outcome, 97 effect sizes (across 35 studies) examined risk factors for suicide ideation, 172 (63 studies) for suicide attempts, and 142 (48 studies) for suicide death. Protective factors were relatively split across suicide ideation (*n*=15; across 9 studies), attempts (*n*=23; 15 studies), and death (*n*=11; 7 studies).

Effect sizes varied widely by domain. Collapsed across all suicide outcomes, most risk factors were classified under the *Negative Valence Systems* domain (*n*=173). Far fewer were categorized under (*Systems for) Social Processes* (*n*=73), *Arousal and Regulatory Systems* (*n* = 58), *Biological Factors* (*n*=52), and *Cognitive Systems* (*n*=39). The smallest number of effect sizes fell within *Positive Valence Systems* (*n*=6) and our *Suicide Theory-Related Risk Factors* category (*n*=10). For protective factors, most were examined within *Systems for Social Processes* (*n*=24), followed by *Cognitive Systems* (*n*=10), *Positive Valence Systems* (*n*=9),[3] *Negative Valence Systems* (*n*=5), and *Arousal and Regulatory Systems* (*n*=1).

Prediction of Suicide Outcomes

Suicide ideation (SI)

Risk factors: The risk factors for SI had high heterogeneity (see I^2 in Tables 2a, 3). The overall *wOR* (1.72) was significant. 'Trim and fill' analysis indicated a symmetrical funnel plot, indicating little to no publication bias (Figure 2a; Table 2a). There were three *HR*s for SI (all in *Social Processes*); the overall *wHR* was not significant.

When examining individual domains (accounting for publication bias), significant effects were found for *Arousal and Regulatory Systems* (*wOR*=1.69; e.g., insomnia, nightmares, blunted affect), *Negative Valence Systems* (*wOR*=1.72; e.g., hopelessness, rumination, aggression), *Social Processes* (*wOR*=1.68; e.g., loneliness), and *Suicide Theory-Related Risk Factors* (*wOR*=4.92; e.g., burdensomeness, implicit identification with self-injury). Nonsignificant effects were found for *Biological Factors* and *Cognitive Systems*. No risk factors for SI fell within *Positive Valence Systems*.

Protective factors: The SI protective factor findings had high heterogeneity (Table 4). The overall *wOR* (0.79) was significant. 'Trim and fill' analysis indicated no publication bias. In terms of specific domains, significant effects were found only for *Negative Valence Systems* (*wOR*=0.40; e.g., positive attributional style); however, these findings should be interpreted with caution as only three predictors fell within this domain. Protective factors within *Positive Valence Systems* and *Social Processes* were nonsignificant.

Suicide attempt (SA)

Risk factors: The suicide attempt findings also had high heterogeneity (Tables 2b, 3). The overall *wOR* (1.66) and *wHR* (1.09) were significant; however, 'trim and fill' analysis indicated an asymmetrical funnel plot (Figure 2b) as 51 studies below the mean were missing (Tables 2b, 3). Had these findings been published and included in the meta-analysis, the overall effects (*wOR*=1.41; *wHR*=1.05) would be slightly attenuated but still significant.

When examining individual domains (accounting for publication bias), effects were like those for SI: Significant effects were found for *Arousal and Regulatory Systems* (*wOR*=2.13), *Biological Factors* (*wOR*=1.72; e.g., low "serotonergic function", dexamethasone non-suppression), *Cognitive Systems* (*wOR*=1.43; e.g., impulsiveness, attention problems), *Negative Valence Systems* (*wOR*=1.31; *w*HR = 1.10), *Social Processes* (*wOR*=1.30; e.g., rejection sensitivity, self-consciousness), and *Suicide Theory-Related Risk Factors* (*wOR*=3.43). Nonsignificant overall effects were found for *Positive Valence Systems*.

Protective factors: The SA protective factor findings had high heterogeneity (Table 4). The overall *wOR* (0.86) was significant. 'Trim and fill' analysis indicated some publication bias and an asymmetrical funnel plot. Based on the reported effect sizes, five studies above the mean were estimated to be missing. Had these findings been published and included in the meta-analysis, the overall effect would be weakened but still significant (0.92). No specific category of predictors was statistically significant.

Suicide death (SD)

Risk factors: The suicide death findings had moderate to high heterogeneity (Table 2c, 3). The overall *wOR* (1.41) and *wHR* (1.16) were significant; however, the 'trim and fill' analysis indicated a fairly asymmetrical funnel plot (Figure 2c) as 35 studies below the mean were missing (Table 2c, 3). Had these findings been published and included in the meta-analysis, the overall effect would be slightly attenuated but still significant (*wOR*=1.16; *wHR*=1.12). When examining individual domains (accounting for publication bias), significant effects were found for *Arousal and Regulatory Systems* (*wOR*=1.29; *wHR*=1.59), *Biological Factors* (*wOR* = 1.80), and *Negative Valence Systems* (*wOR*=1.47). Nonsignificant effects were found for *Cognitive Systems*, *Positive Valence Systems*, and *Social Processes* domains. No risk factors for SD fell within the *Suicide Theory-Relevant Risk Factors* category.

Protective factors: The SD protective factor findings had low heterogeneity (Table 4). The overall *wOR* was nonsignificant, as was the largest category of predictors in the *Social Processes* domain.

Discussion

This meta-analytic review examined the extant suicide risk and protective factor literature within the lens of the RDoC framework. There are six notable findings. First, as noted in prior reviews (Franklin et al., 2017), most existing suicide research has focused on psychiatric and related risk factors that do not fit within the transdiagnostic, dimensional RDoC matrix. Of the approximately 4,082 prospective predictors that have been examined in relation to a suicide outcome, only 11% could be related to the RDoC matrix (and included in our review). For instance, numerous studies have examined negative life events that relate to suicide outcomes (e.g., 346 predictors excluded from our review examined "Environmental" factors), but far fewer have examined the mechanisms by which these factors confer risk for suicide (e.g., disruptions in *Social Processes: affiliation and*

attachment). Second, most prospective research that could be linked to RDoC has focused on predictors that fall within the *Negative Valence Systems* domain (e.g., hopelessness, rumination) and have been linked to several suicide theories (Abramson et al., 2002; Joiner, 2005; Wenzel & Beck, 2008), whereas much less research has focused on the *Positive Valence Systems* domain (e.g., reward learning). Third, several promising domains have been the focus of only a small amount of research. Constructs in the *Arousal and Regulatory Systems* domain (e.g., insomnia, nightmares) were significantly related to all suicide outcomes and had the least publication bias, but this has been one of the domains with the least amount of research (and number of predictors) to date. There also were several promising predictors related to prominent suicide theories (e.g., burdensomeness; Joiner, 2005; defeat/entrapment; O'Connor, 2011; psychache; Shneidman, 1993; implicit self-identification with suicide; Nock et al., 2010) that have received less prospective research. Although some *Suicide Theory-Relevant Risk Factors* did not fit neatly into a single RDoC domain, they were more robustly related to suicide ideation and attempts than almost all other predictors examined in this review (see Glenn et al., 2017 for a discussion of issues conceptualizing suicide theory-relevant constructs within RDoC).[5] Fourth, few RDoC-related protective factors have been examined and none have been significantly related to suicide attempts or deaths. Future research is needed to specifically examine factors that buffer risk among high-risk individuals (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997; Rutter, 1987). Fifth, in line with findings from prior meta-analyses (Franklin et al., 2017; Ribeiro et al., 2016), this review found that the effect size for any single predictor (or domain) was relatively small, especially after accounting for publication bias. This highlights the need for research to identify novel risk factors for suicide (e.g., factors related to understudied RDoC domains, like *Positive Valence Systems*), as well as empirically informed ways to *combine* factors to improve risk prediction (Barak-Corren et al., 2016; Kessler et al., 2015; Mann et al., 2008; Walsh, Ribeiro, & Franklin, 2017).

Some limitations of this meta-analysis warrant discussion. First, the focus of this meta-analysis was on prospective studies of suicide outcomes and therefore only a subset of the existing suicide literature was considered. This strategy may have overlooked promising risk factors that have not yet been examined prospectively. Second, reflecting the available literature, this meta-analysis focused heavily on the self-report unit of analysis, which has been examined most commonly in prospective suicide research. This resulted in a lack of integration of findings across multiple units of analysis, which is a major focus of the RDoC initiative (Insel et al., 2010; Sanislow et al., 2010). Third, as discussed earlier, biological factors spanned multiple RDoC domains and were analyzed as a separate category to ensure independence of predictors within categories. Although this allowed us to compare the magnitude of predictors across domains, we were unable to integrate the biological factors with the other units of analysis included in our review (primarily self-report and behavior). Fourth, our coding guidelines and decisions were established during a series of consensus meetings but not subjected to blind coding procedures and inter-rater reliability testing–an important next step in this line of research. Fifth and finally, there continue to be many

[5]It is important to note that for many studies in the *Suicide Theory-Relevant* category, the theory developer was involved with the research.

challenges situating existing predictors within the RDoC framework (see Appendix A). Some predictors are more easily linked to the RDoC matrix than others, and some of our classification decisions may change as the RDoC matrix evolves.

In sum, this review highlights the potential utility of the RDoC framework for conceptualizing risk and protective factors for suicide. Findings indicate that limited prospective suicide research to date fits within this transdiagnostic and dimensional framework. This suggests that future research must go beyond the 'usual suspects' of suicide risk factors (e.g., mental disorders, sociodemographics) to make discoveries about the factors that lead people to suicidal behavior. Significant predictive associations with suicide outcomes were observed across nearly all of the RDoC domains, although many of the constructs within those parent domains have never been examined as potential risk factors for suicidal behavior (constructs within the *Arousal & Regulatory, Cognitive Systems,* and *Social Processes* domains are especially under-explored). In addition to examining novel risk factors for suicidal behavior suggested by the RDoC approach, future research needs to resolve key challenges that come with it, such as determining the best way to deal with: constructs that intersect with multiple domains (e.g., biological processes), interactions across domains and between domains and the environment (i.e., findings are consistent with the idea that there is no one primary class of risk factors; suicide results from a combination of factors), consideration of developmental factors, and incorporation of suicide specific processes (Glenn et al., 2017). Addressing these research gaps may lead us toward new directions in suicide research that can enhance not only our understanding of the processes that lead to suicidal behavior, but also our ability to predict and prevent it.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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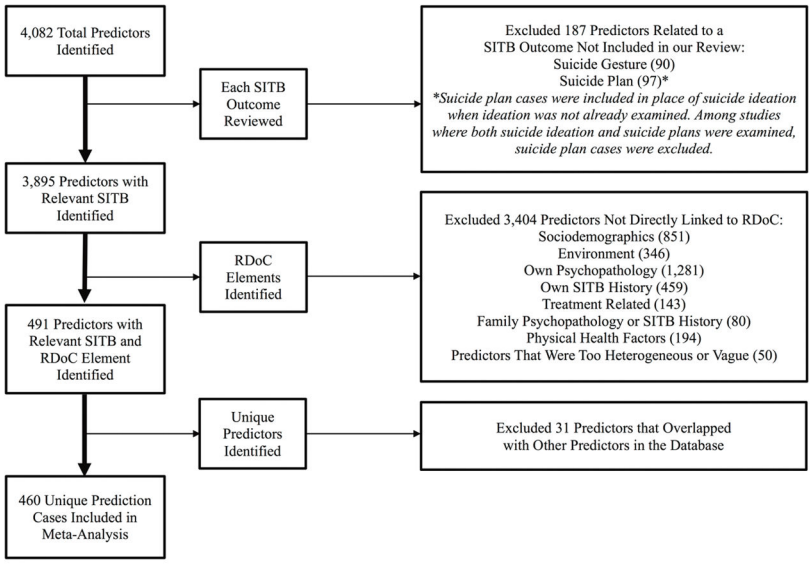

Figure 1.
PRISMA diagram for present meta-analysis. RDoC=Research Domain Criteria.

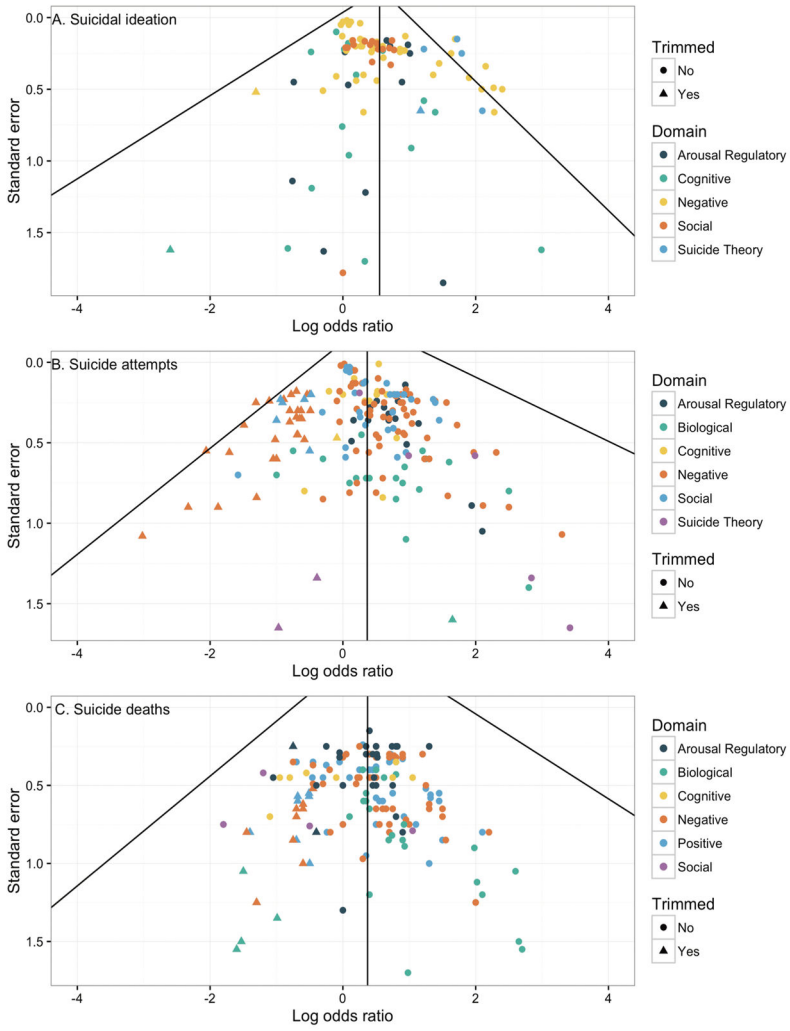

Figure 2.

Figures 2a–c. Funnel plots of standard error by log odds ratio.(Note. Funnel plots from each RDoC domain are overlaid here and thus funnel plot boundaries are overall lines of best fit for all points.).

Table 1

Studies included in meta-analysis.

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
Angst & Clayton (1998)	cognitive control (C)	inhibition^{P}	SD	7
	frustrative nonreward (N)	aggression	SD	
	frustrative nonreward (N)	reactive aggression	SD	
	frustrative nonreward (N)	spontaneous aggression	SD	
	potential threat (“anxiety”) (N)	nervousness	SD	
	positive valence (P)	extraversion^{P}	SD	
	affiliation and attachment (SP)	sociablility^{P}	SD	
Åsberg, Trăskman, & Thorēn (1976)	serotonergic function^{NC} (B)ND	lower 5-HIAA	SA	2
	serotonergic function^{NC} (B)ND	lower 5-HIAA	SD	
Beautrais (2004)	cognitive control (C)	impulsiveness	SA	8
	loss (N)	hopelessness	SA	
	neuroticism^{NC} (N)	neuroticism	SA	
	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SA	
	cognitive control (C)	impulsiveness	SD	
	loss (N)	hopelessness	SD	
	neuroticism^{NC} (N)	neuroticism	SD	
	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SD	
Beck, Steer, Kovacs, & Garrison (1985)	loss (N)	hopelessness	SD	1
Beck, Brown, & Steer (1989)	loss (N)	hopelessness	SD	1
Beck, Steer, & Trexler (1989)	loss (N)	hopelessness	SD	1
Berglund (1984)	arousal (A)	labile affect	SD	8
	sleep-wakefulness (A)	sleep problems	SD	
	frustrative nonreward (N)	aggressiveness, irritability	SD	
	neuroticism^{NC} (N)	perfectionism	SD	
	sustained threat (N)	strained, tense	SD	
	affiliation and attachment (SP)	cold, uninterested	SD	
	affiliation and attachment (SP)	dependent, immature	SD	
	affiliation and attachment (SP)	social poverty	SD	
Berglund & Nilsson (1987)	arousal (A)	psychomotor retardation (female only)	SD	10

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	arousal (A)	psychomotor retardation (male only)	SD	
	sleep-wakefulness (A)	sleep problems (female only)	SD	
	sleep-wakefulness (A)	sleep problems (male only)	SD	
	sustained threat (N)	agitation (female only)	SD	
	sustained threat (N)	agitation (male only)	SD	
	sustained threat (N)	strained, tense (female only)	SD	
	sustained threat (N)	strained, tense (male only)	SD	
	affiliation and attachment (SP)	social poverty (female only)	SD	
	affiliation and attachment (SP)	social poverty (male only)	SD	
Bernert, Turvey, Conwell, & Joiner (2014)	sleep-wakefulness (A)	daytime sleepiness	SD	5
	sleep-wakefulness (A)	difficulty falling asleep	SD	
	sleep-wakefulness (A)	difficulty staying asleep	SD	
	sleep-wakefulness (A)	early morning awakening	SD	
	sleep-wakefulness (A)	nonrestorative sleep	SD	
Black, Monahan, & Winokur (2002)	neuroendocrine function^{NC} (B)ND	DST (non-suppression)	SA	2
	neuroendocrine function^{NC} (B)ND	DST (non-suppression)	SD	
Blumenthal (1989)	sleep-wakefulness (A)	sleep problems	SD	7
	sleep-wakefulness (A)	tiredness	SD	
	loss (N)	depressive mood	SD	
	loss (N)	guilt	SD	
	loss (N)	hopelessness	SD	
	sustained threat (N)	agitation	SD	
	affiliation and attachment (SP)	social isolation	SD	
Bolton, Pargura, Enns, Grant, & Sareen (2010)	loss (N)	guilt	SA	3
	positive valence (P)	anhedonia	SA	
	perception and understanding of self: self-knowledge (SP)	worthlessness	SA	
Brown, Beck, Steer, & Grisham (2000)	loss (N)	hopelessness	SD	1
Bryan, Rudd, Wertenberger, Young-McCaughon, & Peterson (2015)	loss (N)	hopelessness	SA	1
Chatzittofis et al. (2013)	neuroendocrine function^{NC} (B)ND	higher CSF cortisol	SD	3
	neuroendocrine function^{NC} (B)ND	higher CSF DHEAS	SD	
	serotonergic function^{NC} (B)ND	lower CSF-5HIAA	SD	
Clark (2003)	serotonergic function^{NC} (B)ND	lower serum tryptophan ratio	SA	1

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
Coryell & Schlesser (2001)	loss (N)	hopelessness	SD	1
Coryell & Schlesser (2007)	serotonergic function^{NC} (B)ND	lower cholesterol	SD	1
Courtet et al. (2004)	serotonergic function^{NC} (B)ND	5-HTTLPR genotype (SS)	SA	3
	serotonergic function^{NC} (B)ND	TPH genotpye (AA)	SA	
	cognitive control (C)	impulsiveness	SA	
Cox et al. (2012)	frustrative nonreward (N)	aggression	SA	1
Czyz, Berona, & King (2015)	affiliation and attachment (SP)	thwarted belongingness	SA	2
	burdensomeness^{NC} (ST)ND	perceived burdensomeness	SA	
Dahlsgaard, Beck, & Brown (1998)	loss (N)	hopelessness	SD	3
	loss (N)	pessimism	SD	
	loss (N)	pessimism at therapy termination	SD	
Darke, Williamson, Ross, & Teeson (2005)	affiliation and attachment (SP)	social isolation	SA	1
Dieserud, Røsamb, Braverman, Dalgard, & Ekeberg (2003)	loss (N)	hopelessness	SA	3
	perception and understanding of self: self-knowledge (SP)	self-efficacy^{P}	SA	
	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SA	
Dugas et al. (2012)	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SI	1
Engström, Alling, Blennow, Regnll, & Träskman-Bendz (1999)	dopaminergic function^{NC} (B)ND	lower CSF HVA	SD	3
	neuroendocrine function^{NC} (B)ND	lower CSF MHPG/HMPG	SD	
	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SD	
Fenton, McGlashan, Victor, & Blyer (1997)	arousal (A)	blunted affect	SD	11
	cognitive control (C)	conceptual disorganization	SD	
	language (C)	abstract thinking^{P}	SD	
	language (C)	poverty of speech	SD	
	perception (C)	hallucinations	SD	
	frustrative nonreward (N)	hostility	SD	
	positive valence (P)	emotional withdrawal	SD	
	affiliation and attachment (SP)	social withdrawal	SD	
	perception and understanding of others: understanding mental states (SP)	suspiciousness	SD	
	perception and understanding of self: agency (SP)	grandiosity	SD	
	social processes (SP)	poor rapport	SD	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
Fiedorowicz & Coryell (2007)	serotonergic function^{NC} (B)ND	lower cholesterol	SA	1
Fiedorowicz, Leon, Keller, Solomon, Rice, & Coryell (2009)	loss (N)	hopelessness	SA	1
Flensborg-Madsen, Knop, Mortensen, Becker, Sher, & Grønbæk (2009)	arousal (A)	exercise less than 2 hours/week	SD	1
Fridell, Öjehagen, & Träskman-Bendz (1996)	affiliation and attachment (SP)	availability of attachment^{P}	SA	2
	affiliation and attachment (SP)	availability of social integration^{P}	SA	
Fujino, Mizoue, Tokui, & Yoshimura (2005)	sleep-wakefulness (A)	difficulty initiating sleep	SD	4
	sleep-wakefulness (A)	difficulty maintaining sleep	SD	
	sleep-wakefulness (A)	early final awakening	SD	
	sleep-wakefulness (A)	nonrestorative sleep	SD	
Gallagher, Prinstein, Simon, & Spirito (2014)	affiliation and attachment (SP)	loneliness	SI	1
Giltay et al. (2010)	neuroendocrine function^{NC} (B)ND	higher systolic blood pressure	SD	2
	serotonergic function^{NC} (B)ND	lower serum total cholesterol	SD	
Goldney, Winefield, Saebel, Winefield, & Tiggeman (1997)	frustrative nonreward (N)	anger with society (female only)	SI	4
	frustrative nonreward (N)	anger with society (male only)	SI	
	perception and understanding of self: self-knowledge (SP)	anger with self (female only)	SI	
	perception and understanding of self: self-knowledge (SP)	anger with self (male only)	SI	
Graves & Thomas (1991)	potential threat (“anxiety”) (N)	nervous tension: difficulty sleeping	SD	4
	potential threat (“anxiety”) (N)	nervous tension: loss of appetite	SD	
	potential threat (“anxiety”) (N)	nervous tension: urge to be alone	SD	
	sustained threat (N)	nervous tension: irritability	SD	
Grunebaum, Galfalvy, Mortenson, Burke, Orquendo, & Mann (2010)	affiliation and attachment (SP)	anxious attachment	SI	4
	affiliation and attachment (SP)	avoidant attachment	SI	
	affiliation and attachment (SP)	anxious attachment	SA	
	affiliation and attachment (SP)	avoidant attachment	SA	
Handley et al. (2014)	neuroendicrine system^{NC} (B)ND	higher systolic blood pressure	SI	1
Handley et al. (2012)	neuroticism^{NC} (N)	neuroticism	SI	1
Hayashi et al. (2012)	loss (N)	hopelessness	SA	1
Holma et al. (2014)	loss (N)	hopelessness	SI	4

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	neuroticism^{NC} (N)	neuroticism	SI	
	loss (N)	hopelessness	SA	
	neuroticism^{NC} (N)	neuroticism	SA	
Holma, Melartin, Haukka, Hola, Sokero, & Isometsä (2010)	loss (N)	hopelessness	SA	4
	neuroticism^{NC} (N)	neuroticism	SA	
	positive valence (P)	extraversion^{P}	SA	
	affiliation and attachment (SP)	perceived social support^{P}	SA	
Huth-Bocks, Kerr, Ivey, Kramer, & King (2007)	loss (N)	hopelessness	SA	1
Ialongo et al. (2004)	frustrative nonreward (N)	aggressive behavior	SA	3
	loss (N)	depressed mood	SA	
	loss (N)	hopelessness	SA	
Jokinen, Carlborg, Mårtensson, Foslund, Nordström, & Nordström (2007)	neuroendocrine function^{NC} (B)ND	DST (non-suppression)	SD	1
Jokinen, Chatzittofis, Hellström, Nordström, Uvnäs-Moberg, & Åsberg (2012)	neuroendocrine function^{NC} (B)ND	lower CSF oxytocin	SD	2
	neuroendocrine function^{NC} (B)ND	lower plasma oxytocin	SD	
Jokinen, Forslund, Ahnemark, Gustavsson, Nordström, & Åsberg (2010)	frustrative nonreward (N)	expressed violence	SD	1
Jokinen, Nordstöm, & Nordström (2009)	dopaminergic function^{NC} (B)ND	lower CSF HVA	SD	2
	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SD	
Jokinen & Nordstöm (2008)	neuroendocrine function^{NC} (B)ND	DST (non-suppression)	SD	1
Juon & Ensminger (1997)	frustrative nonreward (N)	aggressive behavior (female only)	SI	16
	frustrative nonreward (N)	aggressive behavior (male only)	SI	
	frustrative nonreward (N)	assault behaviors (female only)	SI	
	frustrative nonreward (N)	assault behaviors (male only)	SI	
	frustrative nonreward (N)	hostility (female only)	SI	
	frustrative nonreward (N)	hostility (male only)	SI	
	loss (N)	depressed mood (female only)	SI	
	loss (N)	depressed mood (male only)	SI	
	frustrative nonreward (N)	aggressive behavior (female only)	SA	
	frustrative nonreward (N)	aggressive behavior (male only)	SA	
	frustrative nonreward (N)	assault behaviors (female only)	SA	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	frustrative nonreward (N)	assault behaviors (male only)	SA	
	frustrative nonreward (N)	hostility (female only)	SA	
	frustrative nonreward (N)	hostility (male only)	SA	
	loss (N)	depressed mood (female only)	SA	
	loss (N)	depressed mood (male only)	SA	
Kaplan & Harrow (1999)	arousal (A)	flat affect (sample 1)	SI	10
	arousal (A)	flat affect (sample 2)	SI	
	arousal (A)	psychomotor retardation (sample 1)	SI	
	arousal (A)	psychomotor retardation (sample 2)	SI	
	language (C)	concreteness (sample 1)	SI	
	language (C)	concreteness (sample 2)	SI	
	language (C)	poverty of speech (sample 1)	SI	
	language (C)	poverty of speech (sample 2)	SI	
	perception (C)	hallucinations (sample 1)	SI	
	perception (C)	hallucinations (sample 2)	SI	
Keilp et al. (2010)	neuroendocrine function^{NC} (B)ND	lower peak change in plasma cortisol (post-serotonergic challenge)	SI	11
	neuroendocrine function^{NC} (B)ND	lower baseline plasma prolactin	SA	
	neuroendocrine function^{NC} (B)ND	lower AUC in plasma prolactin (post-serotonergic challenge)	SA	
	neuroendocrine function^{NC} (B)ND	lower peak change in plasma prolactin (post-serotonergic challenge)	SA	
	neuroendocrine function^{NC} (B)ND	higher baseline plasma cortisol	SA	
	neuroendocrine function^{NC} (B)ND	lower AUC in plasma cortisol (post-serotonergic challenge)	SA	
	neuroendocrine function^{NC} (B)ND	lower peak change in plasma cortisol (post-serotonergic challenge)	SA	
	cognitive control (C)	impulsiveness	SA	
	frustrative nonreward (N)	aggression	SA	
	frustrative nonreward (N)	hostility	SA	
	loss (N)	hopelessness	SA	
Keller & Wolfersdorf (1993)	loss (N)	hopelessness	SI	1
Kleiman, Liu, & Riskind (2014)	affiliation and attachment (SP)	thwarted belongingness	SI	2
	burdensomeness^{NC} (ST)ND	burdensomeness	SI	
Kuo, Gallo, & Eaton (2004)	loss (N)	hopelessness	SI	3

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	loss (N)	hopelessness	SA	
	loss (N)	hopelessness	SD	
Larsson & Sund (2008)	arousal (A)	lower physical activity	SA	5
	arousal (A)	lower physical activity due to psychiatric problem	SA	
	frustrative nonreward (N)	aggression	SA	
	affiliation and attachment (SP)	social withdrawal	SA	
	perception and understanding of self: self-knowledge (SP)	lower self-esteem	SA	
Lazelere, Smith, Batenhorst, & Kelly (1996)	frustrative nonreward (N)	hostility	SA	3
	loss (N)	hopelessness	SA	
	perception and understanding of self: self-knowledge (SP)	negative self-evaluation	SA	
Lasgaard, Goossens, & Elklit (2011)	affiliation and attachment (SP)	loneliness	SI	1
Lemogne et al. (2011)	frustrative nonreward (N)	behavioral hostility	SD	3
	frustrative nonreward (N)	cognitive hostility	SD	
	loss (N)	depressed mood	SD	
Lewinsohn, Rohde, Seeley, & Baldwin (2001)	arousal (A)	appetite problems (female only)	SA	16
	arousal (A)	appetite problems (male only)	SA	
	loss (N)	negative attributional style (female only)	SA	
	loss (N)	negative attributional style (male only)	SA	
	loss (N)	hopelessness (female only)	SA	
	loss (N)	hopelessness (male only)	SA	
	loss (N)	negative cognitions (female only)	SA	
	loss (N)	negative cognitions (male only)	SA	
	perception and understanding of self: self-knowledge (SP)	lower self-esteem (female only)	SA	
	perception and understanding of self: self-knowledge (SP)	lower self-esteem (male only)	SA	
	perception and understanding of self: self-knowledge (SP)	self-consciousness (female only)	SA	
	perception and understanding of self: self-knowledge (SP)	self-consciousness (male only)	SA	
	social processes (SP)	emotional reliance (female only)	SA	
	social processes (SP)	emotional reliance (male only)	SA	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	social processes (SP)	lower social competence (female only)	SA	
	social processes (SP)	lower social competence (male only)	SA	
Lewinsohn, Rohde, & Seeley (1994)	arousal (A)	problems with appetite	SA	8
	loss (N)	hopelessness	SA	
	loss (N)	negative attributional style	SA	
	loss (N)	negative cognitions	SA	
	perception and understanding of self: self-knowledge (SP)	lower self-esteem	SA	
	perception and understanding of self: self-knowledge (SP)	self-consciousness	SA	
	social processes (SP)	emotional reliance	SA	
	social processes (SP)	social self-competence[P]	SA	
Li, Lam, Yu, Zhang, & Wing (2010)	sleep-wakefulness (A)	frequent insomnia	SA	2
	sleep-wakefulness (A)	frequent nightmares	SA	
Loas, Azi, Noisette, Legrand, & Yon (2009)	positive valence (P)	physical anhedonia	SD	2
	affiliation and attachment (SP)	social withdrawal	SD	
Loas (2007)	positive valence (P)	physical anhedonia	SD	1
Maser et al. (2002)	cognitive control (C)	impulsiveness (measure 1)	SA	20
	cognitive control (C)	impulsiveness (measure 2)	SA	
	loss (N)	brooding	SA	
	loss (N)	sanguinity[P]	SA	
	approach motivation (P)	directed energy[P]	SA	
	affiliation and attachment (SP)	dependence	SA	
	affiliation and attachment (SP)	shyness	SA	
	affiliation and attachment (SP)	shyness with strangers	SA	
	social processes (SP)	assertiveness[P]	SA	
	social processes (SP)	rejection sensitivity	SA	
	cognitive control (C)	impulsiveness (measure 1)	SD	
	cognitive control (C)	impulsiveness (measure 2)	SD	
	loss (N)	brooding	SD	
	loss (N)	sanguinity[P]	SD	
	approach motivation (P)	directed energy[P]	SD	
	affiliation and attachment (SP)	dependence	SD	
	affiliation and attachment (SP)	shyness	SD	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	affiliation and attachment (SP)	shyness with strangers	SD	
	social processes (SP)	assertiveness^{P}	SD	
	social processes (SP)	rejection sensitivity	SD	
May, Klonsky, & Klein (2012)	loss (N)	hopelessness	SA	5
	neuroticism^{NC} (N)	neuroticism	SA	
	positive valence (P)	extraversion^{P}	SA	
	affiliation and attachment (SP)	dependency	SA	
	perception and understanding of self: self-knowledge (SP)	self-criticism	SA	
McKeown, Garrison, Cuffe, Waller, Jackson, & Addy (1998)	cognitive control (C)	impulsiveness	SI	2
	cognitive control (C)	impulsiveness	SA	
Miller, Adams, Esposito-Smythers, Thompson, & Proctor (2014)	affiliation and attachment (SP)	companionship^{P}	SI	1
Miranda, Gallagher, Bauchner, Vaysman, & Marroquín (2012)	cognitive control (C)	behavioral task perseverative errors	SI	2
	loss (N)	hopelessness	SI	
Miranda & Nolen-Hoeksema (2007)	loss (N)	brooding	SI	2
	loss (N)	reflective pondering	SI	
Morrison & O'Connor (2008)	loss (N)	change in negative attentional bias	SI	5
	loss (N)	dysphoria	SI	
	loss (N)	hopelessness	SI	
	loss (N)	rumination	SI	
	approach motivation (P)	change in positive attentional bias^{P}	SI	
Mustanski & Liu (2013)	cognitive control (C)	impulsiveness	SA	2
	loss (N)	hopelessness	SA	
Niméus, Träskman-Bendz, & Alsén (1997)	loss (N)	hopelessness	SD	1
Niméus, Alsen, & Träskman-Bendz (2000)	loss (N)	hopelessness	SD	1
Nkansah-Amankra, Diedhiou, Agbanu, Agbanu, Opoku-Adomako, & Twumasi-Ankrah (2012)	perception and understanding of self: self-knowledge (SP)	lower self-esteem	SI	2
	perception and understanding of self: self-knowledge (SP)	lower self-esteem	SA	
Nock & Banaji (2007)	implicit self-identification with self-injury/suicide^{NC} (ST)ND	implicit identification with self-injury	SI	2
	implicit self-identification with self-injury/suicide^{NC} (ST)ND	implicit identification with self-injury	SA	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
Nock, Park, Finn, Deliberto, Dour, & Banaji (2010)	implicit self-identification with self-injury/suicide^{NC} (ST)ND	implicit identification with death/suicide	SA	1
Nordström, Åsberg, Träskman-Bendz, Åberg-Wistedt, Nordin, & Bertilsson (1994)	dopaminergic function^{NC} (B)ND	lower CSF HVA	SD	3
	neuroendocrine function^{NC} (B)ND	lower CSF HMPG/MHPG	SD	
	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SD	
Nordström, Gustavsson, Edman, & Åsberg (1996)	arousal (A)	psychastenia	SD	13
	cognitive control (C)	impulsiveness	SD	
	frustrative nonreward (N)	indirect aggression	SD	
	frustrative nonreward (N)	verbal aggression	SD	
	loss (N)	guilt	SD	
	potential threat (“anxiety”) (N)	psychic anxiety	SD	
	potential threat (“anxiety”) (N)	somatic anxiety	SD	
	sustained threat (N)	irritability	SD	
	sustained threat (N)	muscular tension	SD	
	positive valence (P)	monotony avoidance	SD	
	affiliation and attachment (SP)	detachment	SD	
	perception and understanding of others: understanding mental states (SP)	suspicion	SD	
	social processes (SP)	assertiveness^{P}	SD	
O’Connor & Noyce (2008)	loss (N)	brooding	SI	3
	loss (N)	reflection	SI	
	perception and understanding of self: self-knowledge (SP)	self-criticism	SI	
O’Connor, Smyth, Ferguson, Ryan, & Williams (2013)	loss (N)	hopelessness	SA	3
	defeat and entrapment^{NC} (ST)ND	defeat	SA	
	defeat and entrapment^{NC} (ST)ND	entrapment	SA	
Oquendo et al. (2007)	cognitive control (C)	impulsiveness (female only)	SA	8
	cognitive control (C)	impulsiveness (male only)	SA	
	frustrative nonreward (N)	aggression (female only)	SA	
	frustrative nonreward (N)	aggression (male only)	SA	
	frustrative nonreward (N)	hostility (female only)	SA	
	frustrative nonreward (N)	hostility (male only)	SA	
	loss (N)	hopelessness (female only)	SA	
	loss (N)	hopelessness (male only)	SA	
Priester & Clum (1992)	loss (N)	negative global attributions	SI	6
	loss (N)	negative internal attributions	SI	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	loss (N)	negative stable attributions	SI	
	loss (N)	positive global attributions[P]	SI	
	loss (N)	positive internal attribution[P]	SI	
	loss (N)	positive stable attributions[P]	SI	
Priester & Clum (1993a)	cognitive control (C)	problem solving - approach-avoidance[P]	SI	3
	cognitive control (C)	problem solving - personal control[P]	SI	
	perception and understanding of self: self-knowledge (SP)	problem solving - confidence[P]	SI	
Priester & Clum (1993b)	cognitive control (C)	problem solving - ability to generate appropriate alternative solutions[P]	SI	4
	cognitive control (C)	problem solving - inability to generate appropriate alternative solutions	SI	
	cognitive control (C)	problem solving - negative consequences of identified solutions[P]	SI	
	cognitive control (C)	problem solving - positive consequences of identified solutions[P]	SI	
Rabinovitch, Kerr, Leve, & Chamberlian (2015)	frustrative nonreward (N)	aggressive behavior	SA	1
Reinherz et al. (1995)	attention (C)	attention problems (female only)	SI	20
	attention (C)	attention problems (male only)	SI	
	perception (C)	failed hearing test (female only)	SI	
	perception (C)	failed hearing test (male only)	SI	
	frustrative nonreward (N)	aggression (female only)	SI	
	frustrative nonreward (N)	aggression (male only)	SI	
	frustrative nonreward (N)	hostility (female only)	SI	
	frustrative nonreward (N)	hostility (male only)	SI	
	loss (N)	unhappiness (female only)	SI	
	loss (N)	unhappiness (male only)	SI	
	potential threat (“anxiety”) (N)	self-reported anxiety at age 9 (female only)	SI	
	potential threat (“anxiety”) (N)	self-reported anxiety at age 9 (male only)	SI	
	affiliation and attachment (SP)	dependency at age 5 (female only)	SI	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	affiliation and attachment (SP)	dependency at age 5 (male only)	SI	
	affiliation and attachment (SP)	dependency at age 9 (female only)	SI	
	affiliation and attachment (SP)	dependency at age 9 (male only)	SI	
	affiliation and attachment (SP)	shyness (female only)	SI	
	affiliation and attachment (SP)	shyness (male only)	SI	
	affiliation and attachment (SP)	withdrawal (female only)	SI	
	affiliation and attachment (SP)	withdrawal (male only)	SI	
Ribeiro et al. (2012)	sleep-wakefulness (A)	insomnia and fatigue	SI	6
	loss (N)	hopelessness	SI	
	potential threat (“anxiety”) (N)	anxiety symptoms	SI	
	sleep-wakefulness (A)	insomnia and fatigue	SA	
	loss (N)	hopelessness	SA	
	potential threat (“anxiety”) (N)	anxiety symptoms	SA	
Riihimäki, Vuorilehto, Melartin, Haukka, & Isometsä (2014)	loss (N)	hopelessness	SA	2
	affiliation and attachment (SP)	perceived social support^{P}	SA	
Roane & Taylor (2008)	sleep-wakefulness (A)	insomnia	SI	2
	sleep-wakefulness (A)	insomnia	SA	
Robinson et al. (2010)	loss (N)	depressed mood	SA	4
	loss (N)	hopelessness	SA	
	affiliation and attachment (SP)	social isolation	SA	
	perception and understanding of self: self-knowledge (SP)	poor insight	SA	
Roy (1992)	neuroendocrine function^{NC} (B)ND	lower CSF CRH	SA	3
	neuroendocrine function^{NC} (B)ND	higher maximum post-DST plasma cortisol (i.e., DST non-suppression)	SA	
	neuroendocrine function^{NC} (B)ND	lower urinary-free cortisol	SA	
Roy et al. (1986)	dopaminergic function^{NC} (B)ND	lower CSF HVA	SD	2
	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SD	
Sadeh & McNiel (2013)	frustrative nonreward (N)	anger arousal	SA	3
	frustrative nonreward (N)	anger behavior	SA	
	frustrative nonreward (N)	anger cognitive	SA	
Samuelsson, Jokinen, Nordström, & Nordström (2006)	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SD	2
	loss (N)	hopelessness	SD	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
Sanchez-Gistau et al. (2013)	perception and understanding of self: self-knowledge (SP)	poor insight	SA	1
Sani et al. (2011)	potential threat (“anxiety”) (N)	anxious temperament	SD	1
Schneider, Lukaschek, Baumert, Meisinger, Erazo, & Ladwig (2014)	arousal (A)	physically inactivity	SD	4
	sleep-wakefulness (A)	severe sleeping problems	SD	
	loss (N)	depressed mood	SD	
	neuroticism^{NC} (N)	type A (vs. B) personality	SD	
Schneider, Philipp, & Müller (2001)	arousal (A)	psychomotor agitation	SD	9
	arousal (A)	psychomotor retardation	SD	
	sleep-wakefulness (A)	delayed insomnia	SD	
	sleep-wakefulness (A)	initial insomnia	SD	
	sleep-wakefulness (A)	middle insomnia	SD	
	loss (N)	guilt	SD	
	potential threat (“anxiety”) (N)	psychic anxiety	SD	
	potential threat (“anxiety”) (N)	somatic anxiety	SD	
	perception and understanding of self: self-knowledge (SP)	poor insight	SD	
Seo & Lee (2012)	cognitive control (C)	impulsiveness (female only)	SI	2
	cognitive control (C)	impulsiveness (male only)	SI	
Sher et al. (2006)	dopaminergic function^{NC} (B)ND	lower CSF HVA	SA	7
	neuroendocrine function^{NC} (B)ND	lower CSF MHPG/HMPG	SA	
	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SA	
	cognitive control (C)	impulsiveness	SA	
	loss (N)	hopelessness	SA	
	frustrative nonreward (N)	aggression	SA	
	frustrative nonreward (N)	hostility	SA	
Sjöström, Hetta, & Waern (2009)	sleep-wakefulness (A)	difficulties initiating sleep	SA	4
	sleep-wakefulness (A)	difficulties maintaining sleep	SA	
	sleep-wakefulness (A)	early morning waking	SA	
	sleep-wakefulness (A)	frequent nightmares	SA	
Sokero, Melartin, Rytsälä, Leskelä, Lestelä-Mielonen, & Isometsä (2005)	loss (N)	hopelessness	SA	2
	affiliation and attachment (SP)	perceived social support^{P}	SA	
Suh, Kim, Yang, Cho, Lee, & Shin (2013)	sleep-wakefulness (A)	persistent insomnia	SI	2
	sleep-wakefulness (A)	single-episode insomnia	SI	
Tanji et al. (2015)	neuroticism^{NC} (N)	neuroticism	SD	2

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	positive valence (P)	extraversion^{P}	SD	
Tanskanen, Tuomilehto, Viinamäki, Vartiainen, Lehtonen, & Puska (2001)	sleep-wakefulness (A)	frequent nightmares	SD	2
	sleep-wakefulness (A)	occasional nightmares	SD	
Targum, Rosen, & Capodanno (1983)	neuroendocrine function^{NC} (B)ND	DST (non-suppression)	SA	1
Thompson & Light (2011)	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SA	1
Thompson, Ho, & Kingree (2007)	cognitive control (C)	impulsiveness	SI	4
	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SI	
	cognitive control (C)	impulsiveness	SA	
	perception and understanding of self: self-knowledge (SP)	self-esteem^{P}	SA	
Träskman, Åsberg, Bertilsson, & Sjüstrand (1981)	serotonergic function^{NC} (B)ND	lower CSF 5-HIAA	SD	1
Troister, Davis, Lowndes, & Holden (2013)	loss (N)	hopelessness (sample 1)	SI	4
	loss (N)	hopelessness (sample 2)	SI	
	psychache^{NC} (ST)ND	psychache (sample 1)	SI	
	psychache^{NC} (ST)ND	psychache (sample 2)	SI	
Turvey et al. (2002)	sleep-wakefulness (A)	sleep quality^{P}	SD	1
Tyssen, Vaglum, Grønvold, & Ekeberg (2001)	neuroticism^{NC} (N)	compulsiveness	SI	3
	neuroticism^{NC} (N)	neuroticism	SI	
	positive valence (P)	extraversion^{P}	SI	
Valtonen et al. (2008)	loss (N)	hopelessness	SA	1
Valtonen, Suominen, Mantere, Leppämäki, Arvilommi, & Isometsä (2006)	loss (N)	hopelessness	SA	2
	affiliation and attachment (SP)	perceived social support^{P}	SA	
Verkes et al. (1997)	monoaminergic function^{NC} (B)ND	lower platelet MAO activity	SA	5
	serotonergic function^{NC} (B)ND	higher B_{max} paroxetine binding	SA	
	serotonergic function^{NC} (B)ND	higher K_d paroxetine binding	SA	
	serotonergic function^{NC} (B)ND	higher platelet 5-HT	SA	
	loss (N)	hopelessness	SA	
Viner, Patten, Berzins, Bulloch, & Fiest (2014)	perception and understanding of self: self-knowledge (SP)	lower self-efficacy	SI	1
Wedig, Silverman, Frankenburg, Reich, Fitzmaurice, & Zanarini (2012)	arousal (A)	affective instability	SA	6
	cognitive control (C)	conscientiousness^{P}	SA	
	cognitive control (C)	impulsiveness	SA	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
	neuroticism^{NC} (N)	neuroticism	SA	
	positive valence (P)	extraversion^{P}	SA	
	social processes (SP)	agreeableness^{P}	SA	
Wenzel, Berchick, Tenhave, Halberstadt, Brown, & Beck (2011)	affiliation and attachment (SP)	social isolation	SD	1
Whitlock et al. (2013)	loss (N)	pessimistic cognitive style	SA	2
	affiliation and attachment (SP)	perceived peer isolation	SA	
Wichstrøm (2000)	arousal (A)	eating problems	SA	5
	loss (N)	depressed mood	SA	
	affiliation and attachment (SP)	loneliness	SA	
	perception and understanding of self: self-knowledge (SP)	global self-worth^{P}	SA	
	perception and understanding of self: self-knowledge (SP)	unstable self-concept	SA	
Wilcox, Arria, Caldeira, Vincent, Pinchevsky, & O'Grady (2010)	arousal (A)	affect dysregulation	SI	2
	affiliation and attachment (SP)	lower perceived social support	SI	
Wilkinson, Kelvin, Roberts, Dubicka, & Goodyer (2011)	loss (N)	hopelessness	SA	1
Wong, Brower, & Zucker (2011)	sleep-wakefulness (A)	nightmares	SI	4
	sleep-wakefulness (A)	overtired	SI	
	sleep-wakefulness (A)	trouble sleeping	SI	
	frustrative nonreward (N)	aggressive behavior	SI	
Wong & Brower (2012)	sleep-wakefulness (A)	trouble falling asleep	SI	2
	sleep-wakefulness (A)	trouble falling asleep	SA	
Yaseen, Chartrand, Mojtabai, Bolton, & Galynker (2013)	acute threat ("fear") (N)	panic attack	SI	2
	acute threat ("fear") (N)	panic attack	SA	
Yen, Lee, Tang, Yen, Ko, & Chen (2009)	perception and understanding of self: self-knowledge (SP)	insight into mood disorder^{P}	SI	1
Yen et al. (2009)	cognitive control (C)	deliberation^{P}	SA	8
	cognitive control (C)	disinhibition	SA	
	cognitive control (C)	impulsiveness (measure 1)	SA	
	cognitive control (C)	impulsiveness (measure 2)	SA	
	cognitive control (C)	self-discipline^{P}	SA	
	frustrative nonreward (N)	aggression	SA	
	neuroticism^{NC} (N)	negative temperament	SA	
	positive valence (P)	excitement seeking	SA	

Reference	Construct (Domain): Arousal & Regulatory Systems (A) Biology (B) Cognitive Systems (C) Negative Valence Systems (N) Positive Valence Systems (P) Social Processes (SP) Suicide Theory (ST)	Predictor(s)[1,2]	Suicide Outcomes: Suicide Ideation (SI) Suicide Attempts (SA) Suicide Deaths (SD)	Total # of Cases
Yen et al. (2011)	neuroticism[NC] (N)	negative temperament	SA	2
	perception and understanding of self: self-knowledge (SP)	lower self-esteem	SA	
Yen & Siegler (2003)	cognitive control (C)	impulsiveness	SD	4
	frustrative nonreward (N)	hostility	SD	
	perception and understanding of self: self-knowledge (SP)	self-blame	SD	
	social processes (SP)	social introversion	SD	
Yerevanian, Feusner, Koek, & Mintz (2004)	neuroendocrine function[NC] (B)[ND]	DST (non-suppression)	SA	2
	neuroendocrine function[NC] (B)[ND]	DST (non-suppression)	SD	
Yerevanian et al. (1983)	neuroendocrine function[NC] (B)[ND]	DST (non-suppression)	SD	1
Young, Fogg, Scheftner, Fawcett, Akiskal, & Maser (1996)	loss (N)	hopelessness	SA	1
Zweig & Hinrichsen (1993)	burdensomeness[NC] (ST)[ND]	burden on family	SA	1

[P] All predictors should be assumed to function as risk factors, unless marked with P in which case predictors function as protective factors.

[NC] Indicates a construct created specifically for this project, that is a non-RDoC official construct.

[ND] Indicates a domain created specifically for this project, that is a non-RDoC official domain.

[1] With regard to Predictor(s): Presence of (sample 1) or (sample 2) indicates that there were two samples within a study and provides reference to data from only one of the samples. Presence of (female only) or (male only) indicates that were independent male and female subsamples within a study and provides reference to data from only one of the subsamples. Presence of (measure 1) or (measure 2) indicates that there were two different measures of the same construct within a study and provides reference to data from only one of the measures.

[2] Biological predictor abbreviations explained:

5-HIAA = 5-hydroxyindoleacetic acid; 5-HT = blood serotonin; 5-HTTLPR = serotonin transporter; B_{max} = maximum number of binding sites; CRH = corticotropin-releasing hormone; CSF = cerebrospinal fluid; DHEAS = dehydroepiandrosterone; DST = dexamethasone suppression test; K_d = affinity constant; HMPG/MHPG = 4-hydroxy-3-methoxyphenyl glycol; HVA = homovanillic acid; MAO = monoamine oxidase; MHPG/HMPG = 3-methoxy-4-hydroxyphenyl glycol; SS = short/short; TPH = tryptophan hydroxylase

Table 2a

Predicting suicide ideation (odds ratios).[1]

Domain[2]	# of Cases	Effect	95% *CI*	I^2	# Studies Trimmed	Adjusted Estimate	Adjusted 95% *CI*	# Studies for $p > .05$
Overall	94	**1.72**	**1.59 – 1.87**	91.01	0	--	--	7816
Arousal & Regulatory Systems	13	**1.69**	**1.29 – 2.02**	54.94	0	--	--	96
Arousal	4	0.99	0.26 – 3.80	0.00	1	0.77	0.22 – 2.72	--
Sleep-wakefulness	8	**1.59**	**1.18 – 2.16**	64.38	0	--	--	50
Biological Risk Factors	2	1.78	0.40 – 7.92	72.83	--	--	--	--
Cognitive Systems	16	1.24	0.98 – 1.57	48.73	1	1.22	0.96 – 1.56	13
Cognitive control	6	1.14	0.83 – 1.56	67.54	1	1.07	0.77 – 1.48	0
Language	3	0.98	0.26 – 3.74	0.00	--	--	--	--
Perception	3	2.37	0.60 – 9.42	32.30	--	--	--	--
Negative Valence Systems	43	**1.75**	**1.59 – 1.96**	90.06	1	**1.72**	**1.54 – 1.93**	3704
Frustrative nonreward	13	**1.06**	**1.00 – 1.12**	5.00	3	1.05	0.98 – 1.12	13
Loss: Depressed mood	5	**3.11**	**1.57 – 6.13**	85.62	2	1.84	0.93 – 3.64	65
Loss: Hopelessness	8	**3.20**	**1.60 – 6.41**	95.74	0	--	--	314
Loss: Negative attributional style	3	**2.45**	**1.89 – 3.18**	0.00	--	--	--	--
Loss: Rumination	5	**3.73**	**1.86 – 7.49**	87.86	1	**3.05**	**1.59 – 5.85**	108
Neuroticism	4	**1.35**	**1.06 – 1.72**	87.86	0	--	--	65
Systems for Social Processes	16	**1.68**	**1.36 – 2.06**	78.04	0	--	--	411
Affiliation and attachment	12	**1.63**	**1.29 – 2.06**	77.20	0	--	--	218
Perception and understanding of self	4	**1.88**	**1.12 – 3.16**	84.82	0	--	--	27
Suicide Theory-Relevant Risk Factors	4	**5.01**	**3.75 – 6.70**	31.74	1	**4.92**	**3.80 – 6.38**	185

[1] Significant effects are bolded.

[2] Results indicate dysfunction/dysregulation within each domain/category (e.g., sleep-wakefulness problems; problems with cognitive control) that relate to heightened risk for suicide ideation. See Table 1 for a complete list of predictors in each domain/category and suggested directionality.

Table 2b

Predicting suicide attempt (odds ratios).[1]

Domain[2]	# of Cases	Effect	95% *CI*	I^2	# Studies Trimmed	Adjusted Estimate	Adjusted 95% *CI*	# Studies for $p > .05$
Overall	151	**1.66**	**1.57 – 1.76**	82.52	37	**1.45**	**1.37 – 1.53**	25626
Arousal & Regulatory Systems	16	**2.13**	**1.83 – 2.48**	0.00	0	--	--	362
Arousal	4	**2.05**	**1.48 – 2.85**	32.49	0	--	--	23
Sleep-wakefulness	9	**1.93**	**1.50 – 2.49**	7.64	2	**1.85**	**1.39 – 2.46**	68
Biological Risk Factors	20	**1.72**	**1.12 – 2.64**	**45.20**	0	--	--	41
Neuroendocrine function	13	1.71	0.96 – 3.05	41.37	2	1.33	0.70 – 2.54	--
Serotonergic function	6	**2.14**	**1.07 – 4.29**	56.60	0	--	--	11
Cognitive Systems	13	**1.45**	**1.22 – 1.73**	68.91	1	**1.43**	**1.21 – 1.70**	172
Negative Valence Systems	64	**1.75**	**1.59 – 1.92**	85.35	26	**1.31**	**1.20 – 1.43**	8466
Frustrative nonreward	19	**1.37**	**1.19 – 1.59**	69.79	9	1.14	0.98 – 1.35	382
Loss: Depressed mood	5	**3.62**	**1.81 – 7.24**	72.01	1	**3.05**	**1.50 – 6.23**	58
Loss: Hopelessness	23	**1.95**	**1.59 – 2.38**	78.58	1	**1.89**	**1.55 – 2.30**	674
Loss: Negative attributional style	3	**2.20**	**1.27 – 3.84**	63.89	--	--	--	--
Loss: Rumination	5	**2.41**	**1.64 – 3.55**	74.74	0	--	--	102
Neuroticism	6	**1.34**	**1.12 – 1.60**	87.31	3	1.08	0.89 – 1.31	64
Positive Valence Systems	2	1.08	0.78 – 1.50	0.00	--	--	--	--
Systems for Social Processes	30	**1.50**	**1.35 – 1.67**	84.05	6	**1.30**	**1.67 – 1.45**	1156
Affiliation and attachment	10	**1.88**	**1.52 – 2.32**	61.43	0	--	--	221
Perception and understanding of self	14	**1.41**	**1.18 – 1.68**	82.55	0	--	--	127
Suicide Theory-Relevant Risk Factors	6	**4.66**	**1.73 – 12.52**	78.55	2	**3.43**	**1.42 – 8.31**	48

[1] Significant effects are bolded.

[2] Results indicate dysfunction/dysregulation within each domain/category (e.g., sleep-wakefulness problems; problems with cognitive control) that relate to heightened risk for a suicide attempt. See Table 1 for a complete list of predictors in each domain/category and suggested directionality.

Table 2c

Predicting suicide death (odds ratios).[1]

Domain[2]	# of Cases	Effect	95% *CI*	I^2	# Studies Trimmed	Adjusted Estimate	Adjusted 95% *CI*	# Studies for $p > .05$
Overall	133	**1.41**	**1.24 – 1.60**	61.89	32	**1.16**	**1.02 – 1.32**	3835
Arousal & Regulatory Systems	24	**1.38**	**1.12 – 1.70**	55.30	2	**1.29**	**1.03 – 1.61**	108
Arousal	6	0.91	0.54 – 1.53	62.53	1	0.83	0.50 – 1.38	0
Sleep-wakefulness	16	**1.55**	**1.33 – 1.80**	0.00	0	--	--	98
Biological Risk Factors	24	**1.96**	**1.50 – 2.55**	0.00	4	**1.80**	**1.39 – 2.34**	232
Dopaminergic function	4	1.03	0.43 – 2.46	25.71	0	--	--	0
Neuroendocrine function	11	**1.76**	**1.17 – 2.66**	0.00	3	**1.61**	**1.08 – 2.40**	27
Serotonergic function	9	1.10	0.53 – 2.25	61.92	1	0.94	0.45 – 1.96	0
Cognitive Systems	8	0.96	0.53 – 1.74	76.19	0	--	--	0
Cognitive control	6	0.98	0.49 – 1.95	76.15	0	--	--	0
Negative Valence Systems	52	**1.61**	**1.40 – 1.86**	19.81	9	**1.47**	**1.26 – 1.70**	759
Frustrative nonreward	11	**1.89**	**1.51 – 2.38**	0.00	2	**1.84**	**1.47 – 2.30**	74
Loss: Depressed mood	3	**2.16**	**1.19 – 3.93**	35.85	--	--	--	--
Loss: Guilt	3	1.39	0.61 – 3.17	12.28	--	--	--	--
Loss: Hopelessness	11	**2.15**	**1.53 – 3.02**	0.00	3	**1.77**	**1.21 – 2.59**	52
Loss: Rumination	3	**2.16**	**1.28 – 3.66**	0.00	--	--	--	--
Neuroticism	3	1.42	0.92 – 2.20	8.76	--	--	--	--
Potential threat	9	1.08	0.72 – 1.60	27.79	4	0.73	0.46 – 1.16	0
Sustained threat	9	1.24	0.91 – 1.68	18.18	2	1.12	0.80 – 1.58	0
Positive Valence Systems	4	0.50	0.17 – 1.46	64.20	0	--	--	0
Systems for Social Processes	21	1.06	0.68 – 1.65	85.76	7	0.69	0.44 – 1.06	0
Affiliation and attachment	13	1.10	0.77 – 1.57	68.02	3	0.92	0.63 – 1.33	0
Perception and understanding of self	3	0.34	0.01 – 9.20	97.61	--	--	--	--

[1] Significant effects are bolded.

[2] Results indicate dysfunction/dysregulation within each domain/category (e.g., sleep-wakefulness problems; problems with cognitive control) that relate to heightened risk for suicide death. See Table 1 for a complete list of predictors in each domain/category and suggested directionality.

Table 3

Predicting suicide ideation, attempt, and death (hazard ratios).[1]

Outcome	Domain[2]	# of Cases	Effect	95% *CI*	I^2	# Studies Trimmed	Adjusted Estimate	Adjusted 95% CI	# Studies for $p > .05$
Suicide Ideation	Overall (all in Systems for Social Processes domain)	3	1.11	0.97 – 1.26	83.97	0	--	--	0
Suicide Attempt	Overall	21	**1.09**	**1.05 – 1.12**	83.07	7	**1.05**	**1.02 – 1.09**	483
	Biological Risk Factors	4	1.01	0.98 – 1.03	73.33	1	1.01	0.98 – 1.03	0
	Negative Valence Systems	12	**1.15**	**1.06 – 1.25**	77.04	3	**1.10**	**1.01 – 1.20**	179
	Systems for Social Processes	3	1.13	0.98 – 1.31	87.80	--	--	--	--
Suicide Death	Overall	9	**1.16**	**1.07 – 1.27**	29.51	3	**1.12**	**1.00 – 1.27**	81
	Arousal & Regulatory Systems	5	**1.59**	**1.20 – 2.11**	3.36	0	--	--	13

[1] Significant effects are bolded.

[2] Results indicate dysfunction/dysregulation within each domain/category (e.g., problems with social processes) that relate to heightened risk for a suicide outcome. See Table 1 for a complete list of predictors in each domain/category and suggested directionality.

Table 4

Protective factors of suicide ideation, attempts, and deaths (odds ratios).[1]

Outcome	Domain[2]	# of Cases	Effect	95% *CI*	I^2	# Studies Trimmed	Adjusted Estimate	Adjusted 95% CI	# Studies for $p > .05$
Suicidal Ideation	Overall	15	**0.79**	**0.64 – 0.98**	84.87	0	--	--	48
	Cognitive Systems	5	0.93	0.59 – 1.48	83.00	0	--	--	0
	Negative Valence Systems	3	**0.40**	**0.26 – 0.61**	61.98	--	--	--	--
	Systems for Social Processes	5	0.95	0.69 – 1.31	81.38	0	--	--	0
Suicide Attempt	Overall	23	**0.86**	**0.80 – 0.92**	81.37	5	**0.92**	**0.86 – 0.99**	199
	Cognitive Systems	3	0.67	0.40 – 1.13	92.42	--	--	--	--
	Positive Valence Systems	4	0.68	0.39 – 1.18	85.26	0	--	--	0
	Systems for Social Processes	15	0.90	0.78 – 1.04	86.16	0	--	--	0
Suicide Death[3]	Overall	10	0.81	0.65 – 1.02	24.91	0	--	--	0
	Systems for Social Processes	4	1.19	0.80 – 1.77	0.00	0	--	--	0

[1] Significant effects are bolded.

[2] Results indicate dysfunction/dysregulation within each domain/category (e.g., problems with social processes) that relate to heightened risk for a suicide outcome. See Table 1 for a complete list of predictors in each domain/category and suggested directionality.

[3] Only one protective predictor with a hazard ratio met inclusion criteria for our review (Tanji et al., 2014; see Appendix B), which was not enough to summarize separately so this study was excluded from the major analyses.