

RUNNING HEAD: **Preferences in Information Processing**

Making the Case for a Preferences in Information Processing Model of Suicide

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Abstract

Background: In recent years, practice friendly models of suicidal behavior have emerged in the form of “ideation-to-action” frameworks. These frameworks focus on processes influencing both the formation of suicidal ideation and the translation of that ideation to suicide attempt and death. In this paper, we proffer an emerging model of suicide, Preferences in Information Processing (PIP), to augment contemporary suicide theories. First, we provide a primer on dual-process models of information processing theory and research as the foundation for the PIP. Next, drawing on a number of initial cross-sectional studies, we outline a rationale and examples of how preferences in motivated affect (i.e., Need for Affect) and cognition (i.e., Need for Cognition) may be integrated into existing ideation-to-action frameworks. Methods: We conducted secondary analysis of our pooled community sample PIP data. Results: We present new findings suggesting Need for Affect avoidance and Need for Cognition may be clinically relevant for persons at escalated risk for suicide. Conclusion: The PIP offers new testable propositions within ideation-to-action suicide frameworks. We end with recommendations for a research agenda to further investigate the potential validation and utility of a PIP approach to suicidology.

Key words: Suicide; Need for Affect; Need for Cognition; Ideation-to-Action; Information Processing

The study of suicide has advanced to “ideation-to-action” (Klonsky & May, 2014) frameworks aimed at understanding pathways to formation of suicidal ideation, and what takes ideation to behavioral attempts and death. Joiner’s (2005) Interpersonal Theory articulated the concepts of perceived burdensomeness and thwarted belongingness, two thinking patterns which, when highly present, form the desire to die (Van Orden et al., 2010). That desire progresses to a suicide attempt or death via the acquired capability for suicide, or a combination of habituation to pain and fearlessness of death (Van Orden et al., 2010). An alternative model is O’Connor’s (2011) Integrated Motivational-Volitional (IMV) Model of Suicidal Behavior. Grounded in a person-by-environment predisposition, a pathway from feeling defeated and humiliated leads to a sense of entrapment (the inability to escape one’s own thoughts and/or circumstances), which, in turn, leads to ideation. At each step of this chain, the presence of moderators impact on the movement towards suicidal ideation. For example, threat to self-moderators (e.g., rumination) are relevant to the movement from defeat to entrapment, whilst motivational moderators (e.g., resilience) are relevant to the transition from entrapment to ideation. Similarly, the extent to which ideation is translated into behavior is impacted by the presence of volitional moderators (e.g., access to means). Finally, the three-step theory of suicide (3ST; Klonsky & May, 2015) posits that psychological pain and hopelessness contribute to the development of ideation, with connectedness buffering the development of ideation in the presence of psychological pain and hopelessness. A combination of dispositional (e.g., genetic), acquired (e.g., increased pain tolerance), and practical (e.g., access to means) factors drive the progression from ideation to attempt.

Recent reviews (e.g., Chu et al., 2017; Klonsky et al., 2018) demonstrate some promise of ideation-to-action findings, including their translational value. For instance, measures of

thwarted belongingness and perceived burdensomeness show promising application in suicide risk screening and assessment (e.g., Mitchell et al., 2020). Further, ideation-to-action frameworks have informed training content, risk assessment, and clinical documentation recommendations in emerging suicide prevention training for mental health professionals and trainees (Cramer, Long, et al., 2019). Despite these theory-informed suicide prevention advancements, further work is needed in order to design or tailor public health and clinical interventions. The Preferences in Information Processing (PIP; Cramer et al., 2016) model is one approach that we posit can help advance such efforts. In the following sections, we review the dual-process model of information processing as a groundwork for PIP development. We follow this overview with a summary of existing PIP studies and secondary analysis of pooled PIP cross-sectional community and student samples. We end the paper with discussion of recommendations to move the PIP model of suicide forward.

[The need for further conceptual development in suicide prevention: Preference in Information Processing](#)

Despite the value of current models, there have been additional calls in the suicide literature for the study of novel risk factors and theory development to account for limitations of current models (Cramer & Kapusta, 2017; Department of Veterans Affairs & Department of Defense, 2019; Standley, 2020). Two notable limitations within ideation-to-action frameworks pertain to predisposing factors and a lack of cross-disciplinary thinking. First, theories are underdeveloped with respect to articulation of the predisposing factors that may influence formation or exacerbation of suicide-specific pathways (e.g., entrapment, perceived burdensomeness). Moreover, an interdisciplinary angle yet to be thoroughly tapped in suicidology, with one noted exception discussed below (Olson et al., in press), concerns dual-process models of information processing (e.g., Kirkpatrick & Epstein, 1992; Petty & Briñol,

2015), a theoretical perspective grounded in marketing and cognitive sciences, applied broadly across social, behavioral, and health sciences.

Dual-process models of information processing (e.g., Kirkpatrick & Epstein, 1992; Petty & Briñol, 2015) vary in their terminology and nuance; however, they share several commonalities. The first pathway (system one) is heuristic in nature, meaning mental shortcuts are used to process data and make decisions in ways that are efficient, experience-based, and often unconscious. The second pathway (system two), on the other hand, is effortful and controlled. Dual-process models have been widely applied to questions within legal decision-making (e.g., McAuliff et al., 2009), health communication messaging (e.g., Williams-Piehot et al., 2003), and marketing (e.g., Buttner et al., 2014), among others. Only recently have dual-process models found their way into the suicide literature. In addition to the model we propose in this paper, Olson and colleagues (in press) recently promulgated the Automatic and Controlled Antecedents of Suicidal Ideation and Action (ACASIA) model. Building on other models of suicide (e.g., Joiner, 2005; O'Connor, 2011), the ACASIA approach to suicide is grounded in dual-process model principles, allowing for simultaneous consideration of both effortful and automatic influences on information processing. Automatic associations (e.g., negative self-evaluations) and suicide-relevant motives (e.g., need to belong) are determined to be controlled or automatic based on a number of opportunity factors defining how much cognitive and other resources impact suicidality. The authors offered a number of testable predictions based on controlled and automatic processes across the following components of suicide: views about the self, close others, and future, as well as aspects of suicide capability. The ACASIA approach does not account for individual differences in motivated affect and cognition, however.

The robust utility of dual-process models prompted the lead author of the present manuscript to speculate that they may also inform the study of suicide. Specifically, varying dimensions or levels of individual differences in Need for Cognition (NFC; Petty & Cacioppo, 1982) and Need for Affect (NFA; Appel et al., 2012; Maio & Esses, 2001) may bear directly or as moderating influences on suicidal behavior. Need for Cognition (NFC; Petty & Cacioppo, 1982) is an individual difference defined as an approach to preferring and exhibiting effortful thinking and decision-making. It comprises elements such as a preference for complex information and understanding, exertion of cognitive effort, and strong desire to understand details and underlying causes (Lord & Putrevu, 2006). In essence, higher NFC features elements consistent with system 2 processing in that it can be effortful and controlled, whereas lower NFC is associated with automatic processes (system 1).

Need for Affect (NFA; Appel et al., 2012; Maio & Esses, 2001) is described as an orientation toward the processing and experiencing of emotion. Comprising both avoidance and approach components (Appel et al., 2012; Cramer, Wevodau, et al., 2017; Maio & Esses, 2001), NFA has been shown to correlate with personality traits (e.g., extraversion), affective states (e.g., negative affect), cognitive characteristics (e.g., need for closure), and mental health symptoms (e.g., alexithymia). A greater tendency toward experiencing emotions has also been linked to more positive views of emotions overall (Appel & Richter, 2010; Bartsch et al., 2010), as well as emotionally-focused messages (Haddock et al., 2008). NFA contains elements of both controlled effort to experience emotion, as well as automatic responses to affective messaging and stimuli.

When applied in combination, we refer to the joint analysis of NFA and NFC as Preferences in Information Processing (PIP; Cramer et al., 2016). Affective and cognitive PIP have been examined across disciplines and subject matter, raising the question as to whether

there may be value in applying this framework to the study of suicide. PIP have been applied to political identity and decisions (e.g., Arceneaux & Vander Wielen, 2013), neuroscience of persuasive messaging (e.g., Aquino et al., 2020), perceptions of TV and film (e.g., Johnson & Rosenbaum, 2018), stereotyped decision-making (e.g., Wolf et al., 2017), and consumer behaviors (e.g., Diamantopoulos et al., 2020). The lead author's own work has applied PIP to a variety of legal subject matter, such as decisions made in response to victim impact statements (e.g., Wevodau et al., 2014), perceptions of hate crime victims and offenders (Cramer et al., 2013), and violence risk judgments (Cramer, Wevodau, et al., 2017). For example, in providing judgments on hate crime scenarios, persons higher in NFC blamed a hate crime offender more after jury instruction compared to those lower in NFC (Cramer et al., 2013). Further, higher NFA approach was associated with favorable perceptions of hate crime victims.

Preferences in Information Processing and suicide: Evidence to date

The PIP literature provides grounding for testable questions when applied to suicide. For instance, literature repeatedly demonstrates that extremes in both NFA approach and NFA avoidance are associated with affective states and decisions (e.g., Cramer, Wevodau, et al., 2017; Maio & Esses, 2001). This provides conceptual grounding to hypothesize that both NFA approach and NFA avoidance may be directly associated with suicidal thinking and behavior, potentially through the experiencing or suppressing of affective suicide risk factors, respectively. Further, high affective engagement (Wevodau et al., 2014) and low affective avoidance (Cramer, Wevodau, et al., 2017) have been shown to worsen punitive decision-making toward others in the face of emotionally difficult information. Consistent with a Depression-Amplification Suicide Model (Capron et al., 2014; Pennington et al., 2015), and informed by this PIP literature, NFA approach and NFA avoidance can be examined as potential moderators of known affective suicide risk factors. Specifically, avoidance may worsen the influence of known risk factors

through suppressing the experience of emotion (Maio & Esses, 2001), whereas the potential role of NFA approach is less clear, as it could serve to facilitate or buffer affective risk. Regarding NFC, the Elaboration Likelihood Model (Petty & Briñol, 2015) suggests that NFC may moderate affective and other factors impacting thinking and decisions. Where preference for cognitive effort is low, emotional factors may drive thinking and behaviors (e.g., suicidal ideation and attempt; Cramer, Rasmussen, et al., 2019). The opposite may also be true: higher preference for motivated cognition may lessen affective risk factors, showing buffering patterns.

This literature provided rationale for a series of exploratory cross-sectional studies collectively examining direct and moderating roles of PIP individual differences on suicidal behavior. In doing so, we have begun to integrate aspects of ideation-to-action frameworks (e.g., thwarted belonging and perceived burdensomeness). Specifically, NFA avoidance and approach, and to a lesser extent NFC, have been evaluated for two basic PIP premises: (1) PIP may be directly associated with suicide-related outcomes (e.g., ideation, behavior), and (2) PIP may amplify or dampen effects of other known suicide risk factors, namely depression and anxiety (Bryson et al., 2019; Cramer et al., 2016; Cramer, Franks, et al., 2020; Cramer, Langhinrichsen-Rohling, et al., 2020; Cramer, Mandracchia, et al., 2017). Exploring these PIP propositions has two goals. First, we seek to understand where PIP may fit in existing clinical (Bryan & Rudd, 2006) and ideation-to-action (Klonsky et al., 2018) frameworks of suicide in order to improve suicide theory and design prospective research. Second, if PIP effects emerge, translational impacts (e.g., tailoring clinical interventions and health messaging) can utilize motivated cognition and affect findings.

Table 1 contains a summary of major findings in the PIP suicide literature to date. Non-clinical samples were of primary interest in these studies because: (a) NFA and NFC are

common characteristics important for all persons, (b) theory development often starts in general population or student samples, and (c) we have been concerned by the general pattern of over pathologizing the topic of suicide by linking it only to mental illness (Sudak et al., 2008). One study (Cramer, Franks, et al., 2020) employed a clinical sample of active duty military personnel as a step toward evaluating PIP in higher risk samples. The studies to date are limited, and therefore we draw on them only as a starting point for a PIP model of suicide. This review and model proposal are intended to be preliminary and iterative in order to galvanize further study of PIP and suicide. Several initial patterns emerged from the literature. First, across studies, NFA avoidance, and to a lesser extent NFA approach, is directly associated with more severe suicide outcomes. Second, NFA approach may buffer the influence of depression on suicide outcomes. Third, NFA avoidance may contribute to, or interact with, Interpersonal Theory (Joiner, 2005) cognitions in influencing suicide. Finally, where NFC was included in studies, it moderated NFA and anxiety effects, although the influence of NFC may be population dependent.

Figure 1 depicts an integration of hypothesized PIP effects with known ideation-to-action pathways to suicidal ideation and behavior. Hypothesized PIP effects are only offered for those with preliminary support from cross-sectional studies. Specifically, as indicated by the dashed lines in Figure 1, we expect the following pathways to replicate in future studies: (1) NFC buffering the anxiety-suicide attempt link; (2) NFC worsening the NFA avoidance-suicide attempt link; (3) NFA approach lessening the negative influence of depression on suicidal ideation and attempt; and (4) NFA avoidance directly influencing interpersonal cognitions, suicidal ideation, and suicide attempt. This does not mean, however, that other pathways should not be investigated. Indeed, we posit that further direct and moderating influences of PIP will be uncovered for untested suicide factors or pathways such as entrapment, defeat, hopelessness, and

connectedness. As such, we encourage use of our preliminary PIP-Ideation-to-Action model for further theory development, research, and program development.

Aggregating PIP associations with lifetime suicidal behavior across studies

In order to further refine what is known about PIP and suicide, we pooled data from community cross-sectional studies (Cramer et al., 2016; Cramer, Langhinrichsen-Rohling, et al., 2020; Cramer, Mandracchia, et al., 2017; Cramer, Rasmussen et al., 2019). All prior study methodologies and procedures were approved by University ethics/human subjects review boards and conducted in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. Participants in each study provided informed consent. All datasets share the Need for Affect Scale-Short Form (NAQ-SF; Appel et al., 2012) and Suicidal Behaviors Questionnaire-Revised (SBQ-R; Osman et al., 2001). Several of the datasets further include the Need for Cognition Scale (Petty & Cacioppo, 1982). Pooling samples bolsters sample size (total N=3,119) and statistical power toward the goal of identifying potential nuance in the overall bivariate associations of NFA avoidance, NFA approach, and NFC with lifetime suicidal behavior. We had no a-priori hypotheses; rather, pooled analyses were exploratory in nature. Since no prior information (e.g., effect sizes) was available about the novel associations explored between PIP and lifetime suicidal behavior, and no pre-established precision or significance was needed for the analyses, a sample size calculation was not performed. Given the somewhat inconsistent findings of main effects of PIP with suicide outcomes, we explored whether the pooled bivariate associations of the SBQ-R total score (i.e., total lifetime suicidal behavior) with NFC, NFA approach, and NFA avoidance may not be linear. Consistent with use of the NAQ-SF (Appel et al., 2012), we also tabulated an NFA total score by subtracting Avoidance from Approach (i.e., higher scores reflect greater preference for affective engagement), and examined it with lifetime suicidal behavior.

A nonparametric, assumption-free locally estimated scatterplot smoothing (LOESS; Gareth et al., 2013) approach was performed to estimate and visualize these associations. This approach is sufficiently flexible to approximate both locally linear and highly nonlinear curves. Generalized cross-validation (Golub et al., 1979) was used to select the optimal smoothing parameters and penalize overfitting. Figures 2a through 2d portray bubble plots of the observed counts for the SBQ-R total score by each PIP factor (NFA total, NFA approach, NFA avoidance, and NFC) for the pooled dataset. Bubble sizes are proportional to the observed counts. LOESS-fitted (dashed) lines are superimposed with corresponding 95% confidence intervals. Confidence intervals are wider around the edges due to fewer observations at extreme values, as well as lower levels of information borrowing.

Several PIP-suicide conclusions can be drawn from the empirical LOESS fit in Figure 2a. When SBQ-R total is fitted against NFA Total, local slope differences are found. For SBQ-R values above seven, there is a sharp negative association between NFA total and lifetime suicidal behavior, suggesting engagement with emotion is negatively associated with suicidal behavior for those in the clinically elevated suicide risk category (i.e., SBQ-R total score ≥ 7 ; Osman et al., 2001). For the non-elevated suicide risk range of SBQ-R values below seven, a relatively flat line depicts the association between NFA total and SBQ-R total. This indicates that when NFA total is negative, further reductions in its value are associated with larger increases in SBQ-R than when NFA total is positive. When examining the association by NFA approach (Figure 2b) and NFA avoidance (Figure 2c), NFA avoidance is the core driver of the non-linear pattern between NFA total and lifetime suicidal behavior. The estimated slope of the association between NFA approach and SBQ-R total remains relatively constant across all values of each variable (see Figure 2b), indicating a mostly linear and flat association. However, as seen in

Figure 2c, a noticeable increase in the NFA avoidance-SBQ-R total association slope is evident for persons with positive NFA avoidance scores (i.e., prefer to avoid affect). Importantly, this pattern sharply increases at SBQ-R values of between six and seven (i.e., the SBQ-R clinical cut-score), again suggesting that NFA avoidance is particularly associated with lifetime suicidal behavior for persons at elevated risk for suicide. Finally, the association of NFC total and SBQ-R total (Figure 2d) also appears to be relatively linear and negative, with the line of best fit suggesting NFC is associated with lifetime suicidal behavior in a range of clinically elevated SBQ-R scores. However, a restricted range in NFC observations around the center-right of the corresponding plot in Figure 2d, compounded with fewer overall observations for NFC, translates to wider confidence intervals and less robust findings than for NFA findings.

Two major clinically relevant takeaways come from pooled sample analyses. First, NFA avoidance may be particularly problematic for those already at elevated risk for suicide. We term this SBQ-R scoring range a zone of escalated suicide risk for which the assessment of NFA avoidance should be included with other standard risk assessment categories and strategies articulated in the literature (e.g., Bryan & Rudd, 2006; Cramer, Long, et al., 2019). Second, NFC may be clinically relevant when screening for lifetime suicidal behavior, especially for those falling in the zone of escalated risk. While prior studies suggest it is a moderator of other risk factors (see Table 1), pooled analyses show a possible main effect, potentially informing clinical formulation and risk assessment practice.

Moving the PIP approach to suicidology forward

Our first goal of this work was to summarize existing PIP cross-sectional studies as a step toward theory development and integration. As such, we proffer the integrated PIP-ideation-to-action framework to guide future suicide research, theory development, and ultimately, clinical and public health programming development. As this model is a tentative guide in need of

investigation, validation, and refinement, we suggest the following next steps. First, PIP direct and moderating associations should be extended to other suicide-relevant factors. As indicated by the integrated model, these may begin with factors defining predisposition beyond mental health symptoms, such as stress, personality traits, and physical environmental influences. Likewise, in order to be comprehensive, examination of NFA and NFC should include other theory-grounded cognitions (e.g., defeat) and emotions (e.g., hopelessness), as well as suicide protective factors (e.g., connectedness). As the PIP suicide model is investigated, prospective and qualitative interview methods should be employed to complement the initial cross-sectional survey PIP studies.

A second intention of this paper was to assess the overall patterns of PIP characteristics with suicidal behavior. Through pooled analyses of community samples, we found clinically-relevant patterns suggesting that NFA avoidance and NFC may be relevant for those at elevated risk for suicide (as determined through use of the SBQ-R clinical cut-score; Osman et al., 2001). These findings are tempered by the exploratory nature of the investigation and resulting lack of a-priori power analysis and hypotheses. Study of PIP findings should therefore attend to these high-risk groups while correcting for limitations of our exploratory analyses moving forward. Such high-risk groups may include military active duty personnel and veterans, those with suicide lived experience, or persons recently discharged from psychiatric and correctional facilities.

An open area for exploration illuminated by our re-analysis and conceptual review can be seen in the clarification of NFC and NFA as they may or may not reflect dual process information processing systems. That is, we may explore whether NFC and NFA may be indicators of system 1 and system 2 processing. For instance, emotional reasoning and

stereotyping are two common examples of processes that may be dominated by system 1 of information processing (Petty & Cacioppo, 1984). In a similar vein, lower NFC is associated with a greater tendency toward automatic information processing and decisions such as stereotyping (e.g., Stanciu & Vos, 2017). Likewise, NFA may also be a marker of system 1 versus system 2 processing. For instance, those higher in the tendency to engage or experience emotions often make quick, emotion-driven decisions (e.g., Arceneaux & Vander Wielen, 2013), and engage in automatic stereotyping of some groups (Wolf et al., 2017). System 2 processing is characterized by well-paced consideration of facts, alternative arguments, and careful evaluation (Petty & Cacioppo, 1984). Supporting NFC as an indicator of system 2 processing, Dash and Davy (2012) surmised that high NFC may be associated with more concerted effort in information processing. Experimental evidence further supports the idea that high NFC is associated with more careful thinking and evaluation of affective states, cognitive messages, and emotional appeals (e.g., DeSteno et al., 2004; Wegener, Petty, & Klein, 1994). Similarly, NFA can be defined by an effortful approach to seeking and experiencing emotion (Maio & Esses, 2001), suggesting potential connection with system 2 processing.

The recently developed ACASIA model (Olson et al., in press) provides a conduit from which to explore NFA and NFC in a suicide-focused context. Namely, NFC and NFA may be investigated as opportunity factors that mitigate or exacerbate the roles of automatic associations and suicide-specific motives as drivers of suicidal ideation and behavior. To the degree that heuristic cognition or affective responding impact suicide outcomes, system 1 processes may be at work influencing suicide. To the extent that effortful cognition or seeking of affective experience/expression demonstrate influence, system 2 processes may be signaled by PIP. The

dual-process model grounding of the ACASIA model provides rich interdisciplinary theory from which to improve the PIP/Integrated Ideation-to-Action model of suicide (see Figure 1).

Only with advanced rigorous PIP-suicide research can we turn to use of NFA and NFC in clinical and public health practice. While promising, findings to date at best provide initial insight into where and how PIP characteristics may be useful in practice. Future clinical research may begin to integrate NFA and NFC into risk assessment and clinical intervention studies in order to establish clinically-relevant psychometric properties and explore whether these characteristics may serve as treatment process or moderator variables. At present, additional PIP-informed clinical and public health practice recommendations may be premature.

References

- Arceneaux, K., & Vander Wielen, R. J. (2013). The effects of need for cognition and need for affect on partisan evaluations. *Political Psychology, 34*, 23–42.
<https://doi.org/10.1111/j.1467-9221.2012.00925.x>
- Appel, M., Gnambs, T., & Maio, G. R. (2012). A short measure of the need for affect. *Journal of Personality Assessment, 94*(4), 418–426. <https://doi.org/10.1080/00223891.2012.666921>
- Appel, M. & Richter, T. (2010). Transportation and need for affect in narrative persuasion: A mediated moderation model. *Media Psychology, 13*, 101-135.
<http://dx.doi.org/10.1080/15213261003799847>
- Aquino, A., Alparone, F. R., Pagliaro, S., Haddock, G., Maio, G. R., Perrucci, M. G., & Ebisch, S. (2020). Sense or sensibility? The neuro-functional basis of the structural matching effect in persuasion. *Cognitive, Affective & Behavioral Neuroscience, 20*(3), 536–550.
<https://doi.org/10.3758/s13415-020-00784-7>
- Bartsch, A., Appel, M., & Storch, D. (2010). Predicting emotions and meta-emotions at the movies: The role of the need for affect in audiences' experience of horror and drama. *Communication Research, 37*, 167-190. <http://dx.doi.org/10.1177/0093650209356441>
- Bryan, C. J., & Rudd, M. D. (2006). Advances in the assessment of suicide risk. *Journal of Clinical Psychology, 62*(2), 185–200. <https://doi.org/10.1002/jclp.20222>
- Bryson, C. N., Cramer, R. J., & Schmidt, A. T. (2019). Need for affect, Interpersonal Psychological Theory of Suicide, and suicide proneness. *Archives of Suicide Research, 23*(4), 634–647. <https://doi.org/10.1080/13811118.2018.1494650>
- Cacioppo, J. T., & Petty, R. E. (1982). The need for cognition. *Journal of Personality and Social Psychology, 42*(1), 116–131. <https://doi.org/10.1037/0022-3514.42.1.116>

- Capron, D. W., Lamis, D. A., & Schmidt, N. B. (2014). Test of the depression amplification model in young adults with elevated risk of current suicidality. *Psychiatry Research, 219*, 531–535. <https://doi.org/10.1016/j.psychres.2014.07.005>
- Chu, C., Buchman-Schmitt, J. M., Stanley, I. H., Hom, M. A., Tucker, R. P., Hagan, C. R., Rogers, M. L., Podlogar, M. C., Chiurliza, B., Ringer, F. B., Michaels, M. S., Patros, C., & Joiner, T. E. (2017). The interpersonal theory of suicide: A systematic review and meta-analysis of a decade of cross-national research. *Psychological Bulletin, 143*(12), 1313–1345. <https://doi.org/10.1037/bul0000123>
- Cramer, R. J., Bryson, C. N., Gardner, B. O., & Webber, W. B. (2016). Can preferences in information processing aid in understanding suicide risk among emerging adults?. *Death Studies, 40*(6), 383–391. <https://doi.org/10.1080/07481187.2016.1166161>
- Cramer, R. J., Franks, M., Cunningham, C. A., & Bryan, C. J. (2020). Preferences in information processing: Understanding suicidal thoughts and behaviors among active duty military service members. *Archives of Suicide Research, 1–18*. Advance online publication. <https://doi.org/10.1080/13811118.2020.1760156>
- Cramer, R. J., & Kapusta, N. D. (2017). A social-ecological framework of theory, assessment, and prevention of suicide. *Frontiers in Psychology, 8*, 1756. <https://doi.org/10.3389/fpsyg.2017.01756>
- Cramer, R. J., Kehn, A., Pennington, C. R., Wechsler, H. J., Clark, J. W. III, & Nagle, J. (2013). An examination of sexual orientation- and transgender-based hate crimes in the post Matthew Shepard era. *Psychology, Public Policy, and Law, 19*(3), 355–368. <https://doi.org/10.1037/a0031404>

- Cramer, R. J., Langhinrichsen-Rohling, J., Kaniuka, A. R., Wilsey, C. N., Mennicke, A., Wright, S., Montanaro, E., Bowling, J., & Heron, K. E. (2020). Preferences in information processing, marginalized identity, and non-monogamy: Understanding factors in suicide related behavior among members of the alternative sexuality community. *International Journal of Environmental Research and Public Health*, *17*(9), 3233. <https://doi.org/10.3390/ijerph17093233>
- Cramer, R. J., Long, M. M., Gordon, E., & Zapf, P. A. (2019). Preliminary effectiveness of an online-mediated competency-based suicide prevention training program. *Professional Psychology: Research and Practice*, *50*(6), 395–406. <https://doi.org/10.1037/pro0000261>
- Cramer, R. J., Mandracchia, J., Gemberling, T. M., Holley, S. R., Wright, S., Moody, K., & Nobles, M. R. (2017). Can need for affect and sexuality differentiate suicide risk in three community samples? *Journal of Social and Clinical Psychology*, *36*(8), 704–722. <https://doi.org/10.1521/jscp.2017.36.8.704>
- Cramer, R. J., Rasmussen, S., Webber, W. B., Sime, V. L., Haile, C., McFadden, C., & McManus, M. C. (2019). Preferences in information processing and suicide: Results from a young adult health survey in the United Kingdom. *International Journal of Social Psychiatry*, *65*(1), 46–55. <https://doi.org/10.1177/0020764018815206>
- Cramer, R. J., Wevodau, A. L., Gardner, B. O., & Bryson, C. N. (2017). A validation study of the Need for Affect Questionnaire–Short Form in legal contexts. *Journal of Personality Assessment*, *99*(1), 67–77. <https://doi.org/10.1080/00223891.2016.1205076>
- Dash, S. R., & Davy, G. C. L. (2012). An experimental investigation of the role of negative mood in worry: The role of appraisals that facilitate systematic information processing.

Journal of Behavior Therapy and Experimental Psychiatry, 43, 823-831.

<http://dx.doi.org/10.1016/j.jbtep.2011.12.002>

Department of Veterans Affairs & Department of Defense (2019). *VA/DoD clinical practice guideline for the assessment and management of patients at risk for suicide*.

<https://www.healthquality.va.gov/guidelines/MH/srb/VADoDSuicideRiskFullCPGFinal088212019.pdf>

DeSteno, D., Petty, R. E., Rucker, D. D., Wegener, D.T., & Braverman, J. (2004). Discrete emotions and persuasion: The role of emotion-induced expectancies. *Journal of Personality and Social Psychology*, 86, 43-56. <http://dx.doi.org/10.1037/0022-3514.86.1.43>

Diamantopoulos, A., Arslanagic-Kalajdzic, M., & Moschik, N. (2020). Are consumers' minds or hearts guiding country of origin effects? Conditioning roles of need for cognition and need for affect. *Journal of Business Research*, 108, 487-495.

<https://doi.org/10.1016/j.jbusres.2018.10.020>

Gareth, J., Witten, D., Hastie, T., & Tibshirani, R. (2013). *An Introduction to Statistical Learning with Applications in R*. Springer.

Golub, G. H., Heath, M., & Wahba, G. (1979). Generalized cross validation as a method for choosing a good ridge parameter. *Technometrics*, 21, 215-223.

<https://doi.org/10.2307/1268518>

Haddock, G., Maio, G. R., Arnold, K., & Huskinson, T. (2008). Should persuasion be affective or cognitive? The moderating effects of need for affect and need for cognition.

Personality and Social Psychology Bulletin, 34, 769-778.

Johnson, B. K., & Rosenbaum, J. E. (2018). Don't tell me how it ends: Spoilers, enjoyment, and

- involvement in television and film. *Media Psychology*, 21(4), 582-612.
<https://doi.org/10.1080/15213269.2017.1338964>
- Joiner, T. (2005). *Why people die by suicide*. Harvard University Press.
- Kirkpatrick, L. A., & Epstein, S. (1992). Cognitive-experiential self- theory and subjective probability: Further evidence of two conceptual systems. *Journal of Personality and Social Psychology*, 63, 534–544. [https://doi.org/ 10.1037//0022-3514.63.4.534](https://doi.org/10.1037//0022-3514.63.4.534)
- Klonsky, E. D., & May, A. M. (2014). Differentiating suicide attempters from suicide ideators: A critical frontier for suicidology research. *Suicide & Life-Threatening Behavior*, 44(1), 1–5. <https://doi.org/10.1111/sltb.12068>
- Klonsky, E. D., & May, A. M. (2015). The Three-Step Theory (3ST): A new theory of suicide rooted in the “ideation-to-action” framework. *International Journal of Cognitive Therapy*, 8(2), 114–129. <https://doi.org/10.1521/ijct.2015.8.2.114>
- Klonsky, E. D., Saffer, B. Y., & Bryan, C. J. (2018). Ideation-to-action theories of suicide: A conceptual empirical update. *Current Opinion in Psychology*, 22, 38–43.
<https://doi.org/10.1016/j.copsyc.2017.07.020>
- Lord, K. R., & Putrevu, S. (2006). Exploring the dimensionality of the Need for Cognition Scale. *Psychology & Marketing*, 23(1), 11–34. <https://doi.org/10.1002/mar.20108>
- Maio, G. R., & Esses, V. M. (2001). The need for affect: Individual differences in the motivation to approach or avoid emotions. *Journal of Personality*, 69(4), 583-615.
<https://doi.org/10.1111/1467-6494.694156>
- Mitchell, S. M., Brown, S. L., Roush, J. F., Tucker, R. P., Cukrowicz, K. C., & Joiner, T. E. (2020). The Interpersonal Needs Questionnaire: Statistical considerations for improved

- clinical application. *Assessment*, 27(3), 621–637.
<https://doi.org/10.1177/1073191118824660>
- O'Connor, R. C. (2011). The integrated motivational-volitional model of suicidal behavior [Editorial]. *Crisis: The Journal of Crisis Intervention and Suicide Prevention*, 32(6), 295–298. <https://doi.org/10.1027/0227-5910/a000120>
- Olson, M. A., McNulty, J. K., March, D. S., Joiner, T. E., Rogers, M. L., & Hicks, L. L. (in press). Automatic and controlled antecedents of suicidal ideation and action: A dual process conceptualization of suicidality. *Psychological Bulletin*.
- Osman, A., Bagge, C. L., Gutierrez, P. M., Konick, L. C., Kopper, B. A., & Barrios, F. X. (2001). The Suicidal Behaviors Questionnaire-Revised (SBQ-R): Validation with clinical and nonclinical samples. *Assessment*, 8(4), 443–454.
<https://doi.org/10.1177/107319110100800409>
- Pennington, C. R., Cramer, R. J., Miller, H. A., & Anastasi, J. S. (2015). Psychopathy, depression, and anxiety as predictors of suicidal ideation in offenders. *Death Studies*, 39, 288–295. <https://doi.org/10.1080/07481187.2014.991953>
- Petty, R. E., & Briñol, P. (2015). Emotion and persuasion: Cognitive and meta-cognitive processes impact attitudes. *Cognition & Emotion*, 29, 1–26.
<https://doi.org/10.1080/02699931.2014.967183>
- Petty, R. E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: Central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, 46, 69–81. <https://doi.org/10.1037/0022-3514.46.1.69>
- Stanciu, A., & Vos, M. W. (2017). Stereotype-based faultlines and out-group derogation in diverse teams: The moderating role of task stereotypicality and need for cognition. *The*

- Journal of Social Psychology*, 157, 352-365.
<http://dx.doi.org/10.1080/00224545.2016.1218321>
- Standley C. J. (2020). Expanding our paradigms: Intersectional and socioecological approaches to suicide prevention. *Death Studies*, 1–9. Advance online publication.
<https://doi.org/10.1080/07481187.2020.1725934>
- Sudak, H., Maxim, K., & Carpenter, M. (2008). Suicide and stigma: A review of the literature and personal reflections. *Academic Psychiatry*, 32(2), 136–142.
<https://doi.org/10.1176/appi.ap.32.2.136>
- Van Orden, K. A., Witte, T. K., Cukrowicz, K. C., Braithwaite, S. R., Selby, E. A., & Joiner, T. E., Jr. (2010). The interpersonal theory of suicide. *Psychological Review*, 117(2), 575–600. <https://doi.org/10.1037/a0018697>
- Wegener, D. M., Petty, R. E., & Klein, D. J. (1994). Effects of mood on high elaboration attitude change: The mediating role of likelihood judgments. *European Journal of Social Psychology*, 23, 25-44. <http://dx.doi.org/10.1002/ejsp.2420240103>
- Wevodau, A. L., Cramer, R. J., Clark, J. W., & Kehn, A. (2014). The role of emotion and cognition in juror perceptions of victim impact statements. *Social Justice Research*, 27, 45-66. <https://doi.org/10.1007/s11211-014-0203-9>
- Williams-Piehot, P., Schneider, T. R., Pizarro, J., Mowad, L., & Salovey, P. (2003). Matching health messages to information-processing styles: Need for cognition and mammography utilization. *Health Communication*, 15(4), 375–392.
https://doi.org/10.1207/S15327027HC1504_01
- Wolf, L. J., von Hecker, U., & Maio, G. R. (2017). Affective and cognitive orientations in intergroup perception. *Personality & Social Psychology Bulletin*, 43(6), 828–844.

<https://doi.org/10.1177/0146167217699582>

Table 1. Cross-sectional Evidence for the Preferences for Information Processing (PIP) Model of Suicide

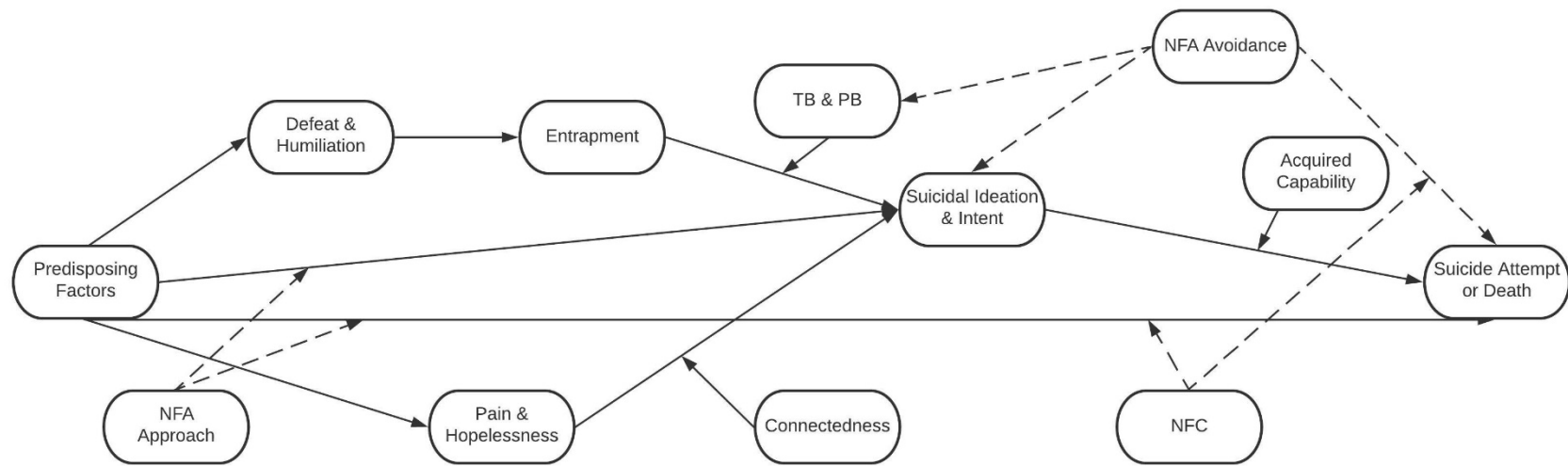
Sample(s)	IVs, PIP Constructs, and Suicide Outcomes	PIP Main Effects	PIP Mediation & Moderation effects
College students ¹	IVs: Depression PIP: NFC, NFA approach, NFA avoidance Suicide Outcomes: Lifetime suicidal behavior	1. NFA avoidance positively associated with lifetime suicidal behavior (bivariate correlations and regression model).	1. Depression positive association with lifetime suicidal behavior is strongest among those high in NFA avoidance. 2. NFA approach positive association with lifetime suicidal behavior is present only for those high in NFC.
College students ²	IVs (PIP): NFA approach, NFA avoidance Suicide Outcomes: PB, TB, lifetime suicidal behavior, recent suicidal ideation	1. NFA avoidance positively associated with lifetime suicidal behavior, PB, and TB (bivariate correlations). 2. NFA approach positively associated with recent suicidal ideation.	1. PB mediated the pathway from NFA avoidance to suicidality (lifetime behavior + recent ideation latent variable). 2. TB mediated the pathway from NFA avoidance to suicidality (lifetime behavior + recent ideation latent variable).
Combined college students, U.S. community-dwelling adults, & members of a sexual diversity special interest group ³	IVs: Depression, stress, anxiety PIP: NFA approach, NFA avoidance Suicide Outcomes: Suicide clinical risk group membership	1. NFA approach was higher for those in the elevated suicide risk group (compared to those in the no risk group). 2. As NFA approach increased, odds of clinical risk group membership increased (regression model). 3. NFA avoidance was higher for those in the elevated suicide risk group (compared to those in the no risk group). 4. As NFA avoidance increased, odds of clinical risk group	None

		membership increased (regression model).	
U.K. community-dwelling adults ⁴	IVs: Depression, anxiety PIP: NFC, NFA approach, NFA avoidance Suicide Outcomes: Suicide clinical risk group membership, lifetime ideation-to-action group membership (none, ideation only, attempt)	1. NFA avoidance was higher for those in the elevated suicide risk group (compared to those in the no risk group). 2. NFA avoidance was higher for those in the ideation only and attempt subgroups compared to no lifetime suicidal behavior. 3. As NFA avoidance increased, odds of clinical risk group membership increased (regression model). 4. As NFA avoidance increased, odds of ideation only group membership increased (compared to no ideation; regression model).	1. NFA approach lessens the positive association between depression and suicide attempt group membership (compared to ideation only). 2. NFC lessens the positive association between anxiety and suicide attempt group membership (compared to ideation only). 3. NFC worsens the positive association between NFA avoidance and suicide attempt group membership (compared to ideation only).
Members of a sexual diversity special interest group ⁵	IVs: Depression, anxiety PIP: NFC, NFA approach, NFA avoidance Suicide Outcomes: Lifetime suicidal behavior (total), lifetime ideation-to-action group membership (none, ideation only, attempt)	1. NFA avoidance was higher for those in the attempt group compared to ideation only and no suicidal behavior.	1. The positive association between depression and suicide ideation group membership (compared to no suicidal behavior) lessens as NFA approach increases.
Treatment-seeking active duty military personnel ⁶	IVs: Depression, anxiety PIP: NFC, NFA approach, NFA avoidance	1. NFA avoidance was positively associated with lifetime suicidal behavior, PB, and TB (bivariate correlations).	1. Significant negative association between depression and PB for those high in NFA approach.

	<p>Suicide Outcomes: Lifetime suicidal behavior, suicide clinical risk group membership, TB, PB</p>		<p>2. Significant positive association between depression and TB for those low in NFA approach. 3. Significant positive association between depression and lifetime suicidal behavior for those low in NFA approach. 4. Significant positive association between anxiety and TB for those low in NFA avoidance. 5. The positive association between depression and elevated suicide risk group membership (compared to no risk) lessens as NFA approach increases.</p>
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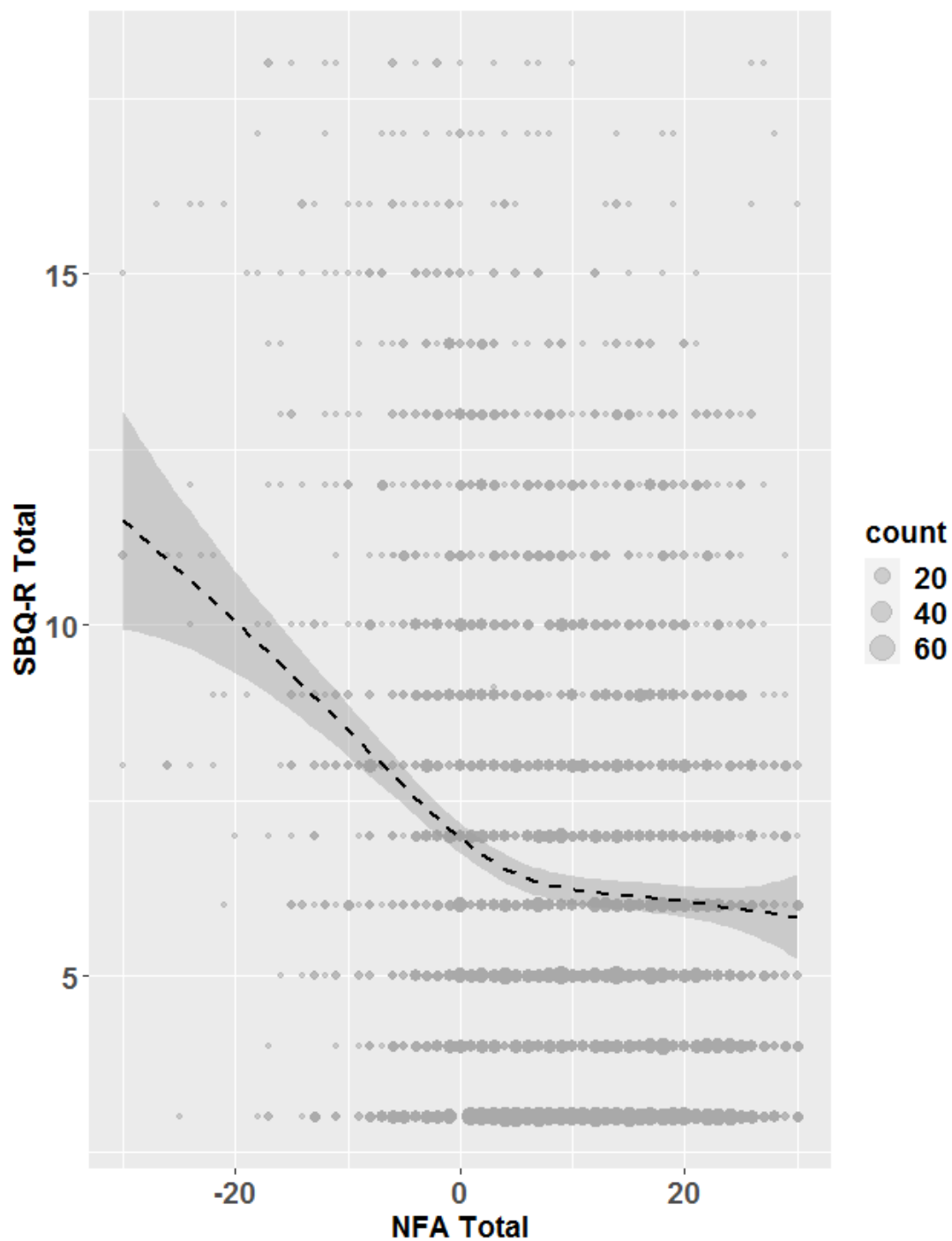
Notes: IVs = Independent variables; PIP = Preferences in information processing; NFA = Need for affect; NFC = Need for cognition; TB= Thwarted belongingness; PB= Perceived burdensomeness; U.S. = United States; U.K. = United Kingdom; ¹Cramer et al., 2016; ²Bryson et al., 2019 [secondary analysis of Cramer et al., 2016]; ³Cramer, Mandracchia, et al., 2017; ⁴Cramer, et al., 2019; ⁵Cramer, et al., 2020; ⁶Cramer, et al., 2020.

Figure 1. Hypothesized Preferences in Information Processing Model of Suicide Pathways within an Integrated Ideation-to-Action Framework



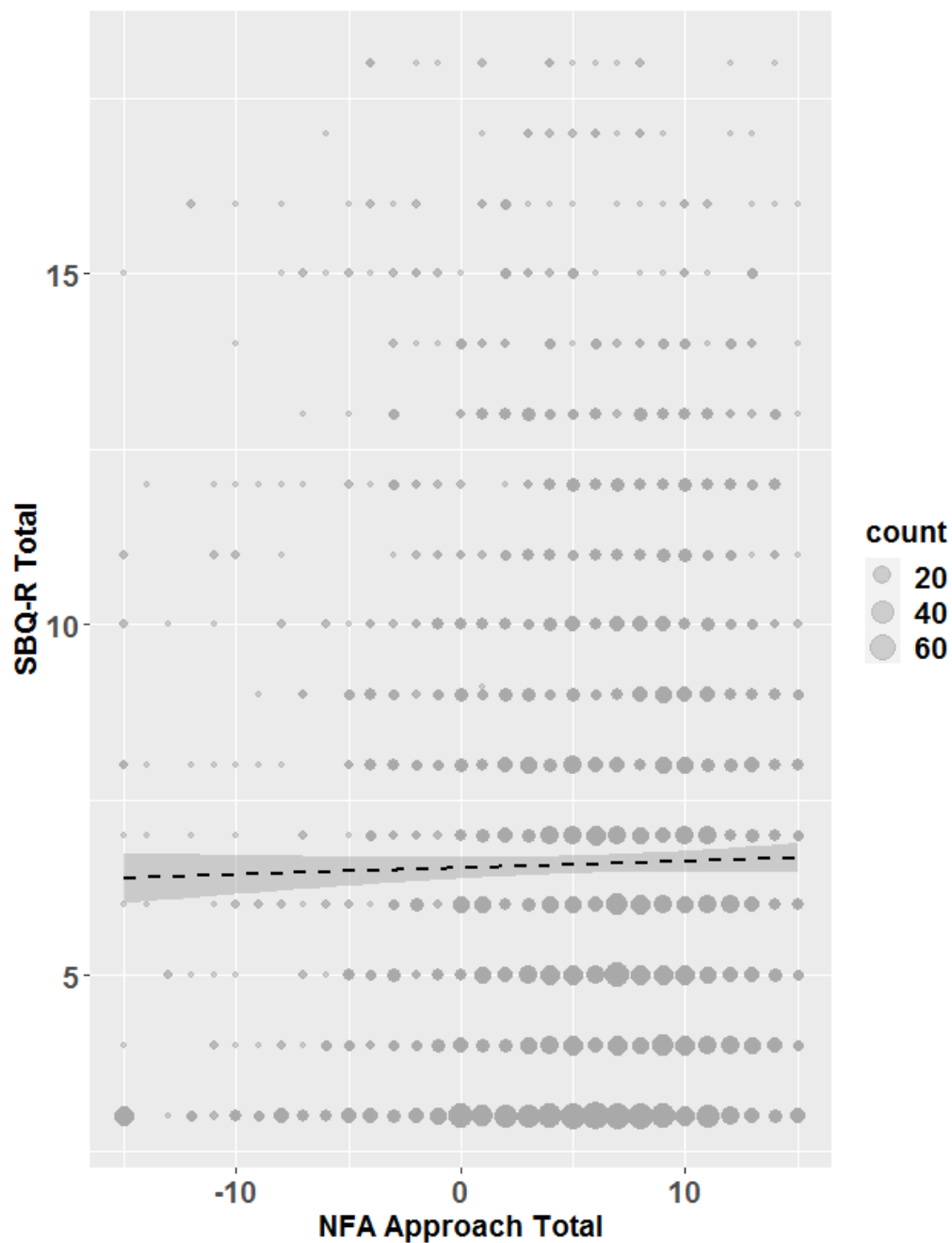
Notes: TB = Thwarted belongingness; PB = Perceived burdensomeness; NFA = Need for affect; NFC = Need for cognition; Predisposing factors = Mental health, genetic predisposition, or suicide history; Solid black line denotes Ideation-to-Action supported pathway; Dashed black line denotes hypothesized Preferences in Information Processing pathway.

Figure 2a. Locally Estimated Scatterplot Smoothing of Need for Affect Total by Total Lifetime Suicidal Behavior



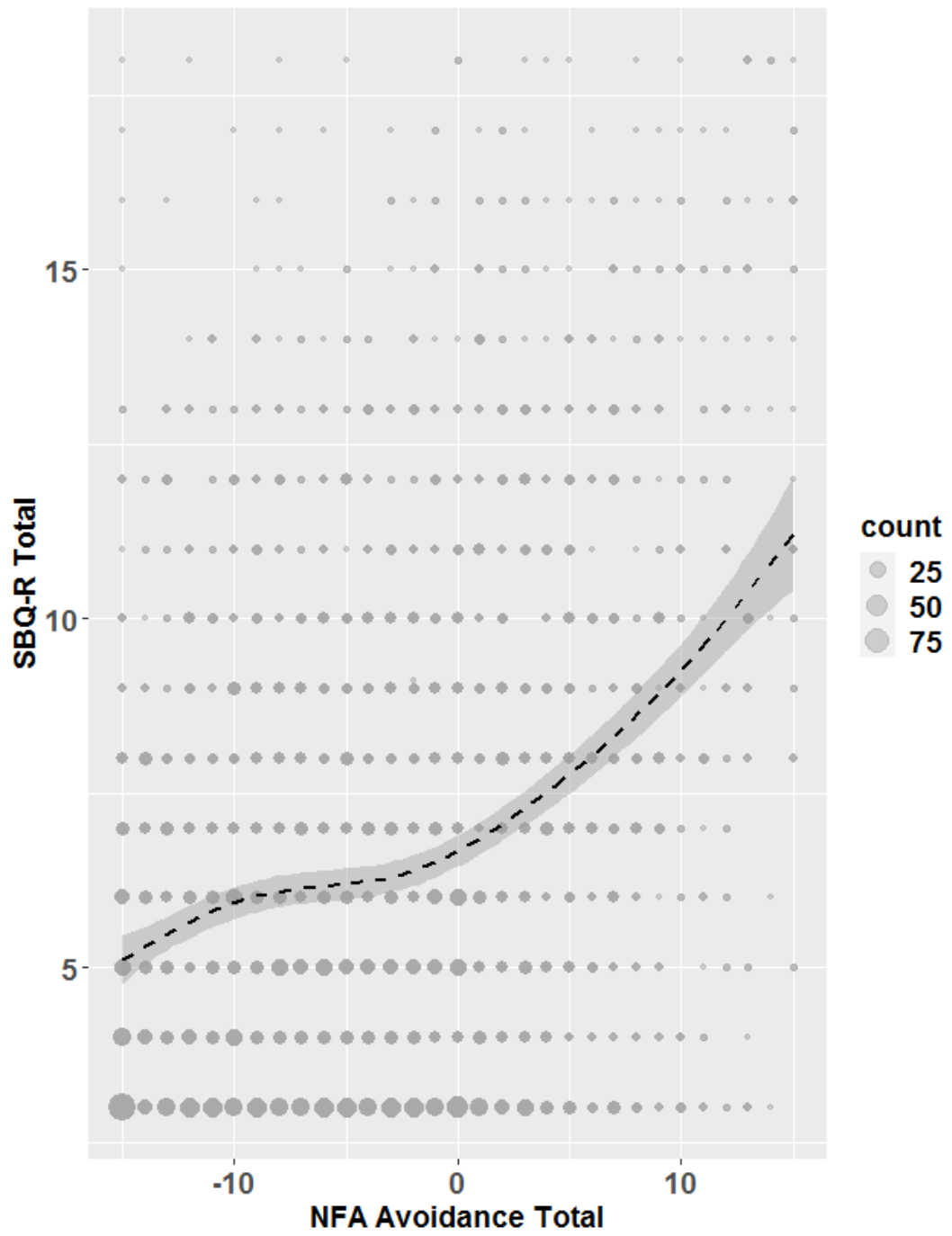
Notes: Fit (dashed line) and corresponding 95% confidence intervals (shaded areas) for NFA total; Bubble sizes within each plot are proportional to observed counts across datasets; NFA = Need for affect; SBQ-R = Suicidal Behaviors Questionnaire-Revised.

Figure 2b. Locally Estimated Scatterplot Smoothing of Need for Affect Approach by Total Lifetime Suicidal Behavior



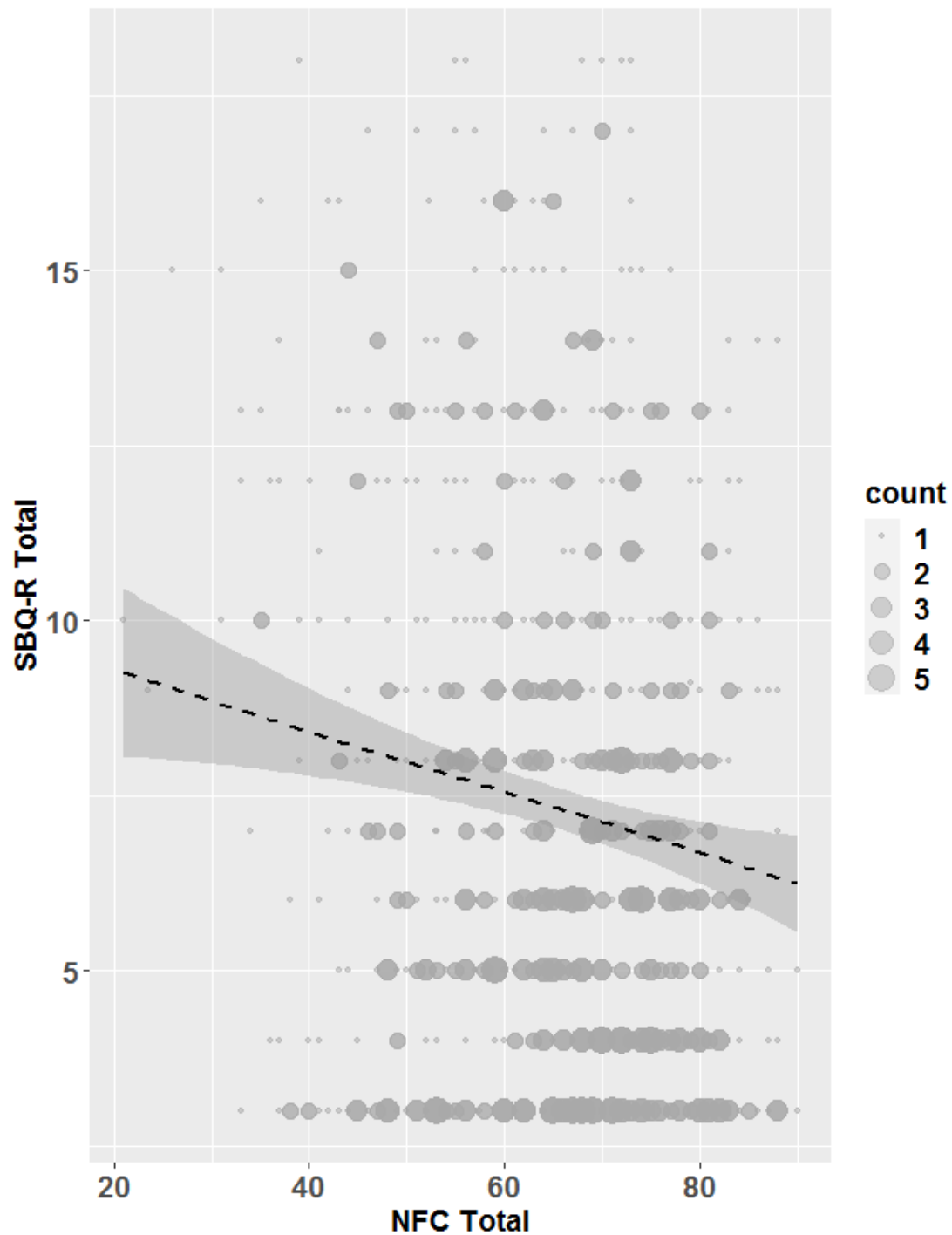
Notes: Fit (dashed line) and corresponding 95% confidence intervals (shaded areas) for NFA approach; Bubble sizes within each plot are proportional to observed counts across datasets; NFA = Need for affect; SBQ-R = Suicidal Behaviors Questionnaire-Revised.

Figure 2c. Locally Estimated Scatterplot Smoothing of Need for Affect Avoidance by Total Lifetime Suicidal Behavior



Notes: Fit (dashed line) and corresponding 95% confidence intervals (shaded areas) for NFA avoidance; Bubble sizes within each plot are proportional to observed counts across datasets; NFA = Need for affect; SBQ-R = Suicidal Behaviors Questionnaire-Revised.

Figure 2d. Locally Estimated Scatterplot Smoothing of Need For Cognition by Total Lifetime Suicidal Behavior



Notes: Fit (dashed line) and corresponding 95% confidence intervals (shaded areas) for NFC; Bubble sizes within each plot are proportional to observed counts across datasets; NFC = Need for cognition; SBQ-R = Suicidal Behaviors Questionnaire-Revised.