

# Predicting Self-Harm with NEO-PI-R Facets

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## Abstract

The current study explores the facet level personality predictors of self-harm in a college student sample and compares the facet scores for self-harming students to those in non-harming students. Personality is assessed using the Revised NEO Personality Inventory NEO-PI-R and self-harm is assessed using the Deliberate Self-Harm Inventory (DSHI). Results indicate self-harm can be predicted with four NEO-PI-R facets: E2: Gregariousness, N3: Depression, A3: Altruism, O5: Ideas. Multivariate analysis of variance revealed 10 facets that self-harmers scored significantly different on than their non-harming peers including: N1; Anxiety, O1: Fantasy, A1: Trust, N2: angry hostility, O2: Aesthetics, N3: Depression, N4: Self-consciousness, A4: compliance, N5: Impulsiveness, E5; Excitement-seeking, O5: Ideas, and N6; Vulnerability.

Deliberate self-harm is a growing clinical problem that has concerned mental health professionals for decades (Klonsky, 2007). However, self-injury is not a brand new concept. Self-harming behaviors have been practiced for thousands of years; yet there is a dearth of systematic research in this area (Nock, 2010). Self-harm has been considered a symptom of borderline personality disorder, a psychiatric disorder characterized by the intense experiencing of everyday emotions (Linehan, 1993). However, Klonsky and Muehlenkamp (2007) suggest that self-injury does not necessarily imply the presence of a psychiatric diagnosis, although psychiatric problems such as borderline personality disorder, depression, substance abuse and eating disorders are risk factors for self-harming behavior. In fact, Klonsky, Oltmanns, and

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Turkheimer (2003) found in a study of non-clinical participants (1986 military recruits) that one in every 25 participants reported a history of self-harm. Finding ways to systematically identify and treat self-harming behaviors has been challenging, given its many perplexities. Therefore, examining the relationship of self-harming behaviors and relatively stable individual characteristics such as personality traits could lend more clarity to research in this area.

### **Deliberate Self-Harm**

Deliberate self-injury (or self-harm) has been defined by Klonsky (2007) as “the intentional, direct injuring of body tissue without suicidal intent” (p. 226). This type of self-harm coined moderate/superficial by Favazza (1996) may be compulsive, episodic, repetitive, or a combination of these three subtypes. Moderate/superficial, compulsive, episodic or repetitive self-harm consists of behavior that is low in lethality, and results in minor tissue damage (Favazza). Common self-harming behaviors include: skin cutting, burning, skin carving, interference with healing of wounds, breaking of bones, self-punching, needle sticking, hair pulling, nail biting, and skin scratching. Favazza argues that moderate/superficial, episodic or repetitive self-harm differs from stereotypic self-harm in a variety of ways; among them is the fact that the behavior is not rhythmic, often requires the use of implements, tends to be ritualistic as well as symbolic, and usually does not occur in the company of others.

Self-harming behavior may function as a means of managing the internal world and/or a form of seeking relief from the feelings of emptiness, depersonalization, and unreality that occur during dissociation (Figuroa, 1988). Self-harming behavior often is reported as a means of reestablishing ego boundaries that are lost during dissociative experiences (e.g., patients report feeling as if they return from someplace else when they self-harm). Individuals who self-harm regain control over their sense of self via the rituals frequently associated with the act of self-harm (Figuroa, 1988). Gratz, Conrad, and Roemer (2002); Leibenluft, Gardner, and Cowdry (1987); and Solomon and Farrand (1996) found individuals who engage in self-harm are more likely to dissociate

than their non-harming counterparts. Similarly, LeBoeuf-Davis and Williams (2004) revealed a significant association between dissociative experiences and self-harm.

There are several other functions to self-injury besides being a means of coping with disassociation. Self-harm is viewed as a mechanism that serves many functions including: affect [or emotion] regulation, self-punishment or derogation, interpersonal influence, anti-suicide, sensation seeking, and the affirming of interpersonal boundaries (Klonsky & Muehlenkamp, 2007).

Moderate/superficial self-harm is associated with a neurochemical “addiction” to the rush accompanying the neurochemical changes that occur (Smith, Cox, & Saradjian, 1999). Smith et al. (1999) explain endogenous opioids and serotonin are released when the body experiences trauma. This chemical release performs two functions: a natural analgesic effect, and a feeling of calm or euphoria. As with other addictions, tolerance develops and more extreme self-harm is necessary to elicit the same euphoric experience. It has been suggested that this process is directly related to coping with intense emotions, such as borderline personality disorder (Linehan, 1993).

Linehan (1993) and Moskowitz (2001) propose self-harm is not only a symptom of borderline personality disorder, but also a trademark of the diagnosis. Similarly, Sansone, Weidemen, and Sansone (1998) contend that self-harm should be an indication for further assessment for borderline personality disorder. Alternately, Pattison and Kahan (1983) argue that self-harming behavior is a separate disorder that should be treated as such. Further research exploring the correlates of self-harm is needed to confirm or deny these contentions.

### **The Five-Factor Model**

The Five-Factor Model of personality (Costa & McCrae, 1992) posits that individual differences, along with environmental variables, play a role in five heritable factors or domains possessed by individuals in varying degrees. This variability results in characteristic responses to similar situations across individuals (i.e., how one person responds in a given situation may not be the same way that another person responds to the same situation, and those differences are attributed to variation within these domains). To more specifically capture the essence of individual differences across

persons, each of the five domains has been subdivided into facets or traits. The Five-Factor Model of personality has been operationalized by the development of the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) and more recently, in the public domain, by Lewis Goldberg (2001) with the International Personality Item Pool (IPIP). Goldberg (1993) proposed an alternate interpretation of the “Big Five” in which he titled the dimensions: Factor I – surgency (i.e., extraversion), Factor II – agreeableness, Factor III – conscientiousness, Factor IV – emotional stability (i.e., neuroticism), and Factor V – Intellect or Imagination (i.e., openness).

Neuroticism (N) is characterized by an increased likelihood of experiencing negative affect (Costa & McCrae, 1992). Goldberg (1992) describes individuals who score low on emotional stability as anxious, hostile, envious, insecure, depressed, self-conscious, moody, impulsive, and vulnerable.

Extraversion (E) is a personality domain that is easily described and observed (Costa & McCrae, 1992). Goldberg’s (1992) surgency (i.e., his taxonomic version of extraversion) describes extraverts as social, assertive, active, bold, energetic, and adventurous. An individual who scores low on an extraversion scale would prefer to be alone.

Openness (O) (Costa & McCrae, 1992) determines the degree to which individuals experience emotions, both positive and negative). Individuals who score high on the feelings facet of openness usually experience their emotions rather intensely and that experience is important to them.

Agreeableness (A) focuses on interpersonal relations rather than intrapersonal preferences; individuals who score high on this domain tend to be more altruistic and concerned with the well-being of others (Costa & McCrae, 1992). Individuals who score low on agreeableness tend to be concerned with personal well-being, skeptical of others’ motives, and competitive (Costa & McCrae, 1992).

The domain of conscientiousness (C) is most readily understood as the ability to prioritize, arrange, and inevitably complete tasks (Costa & McCrae, 1992). Digman (1990) describes conscientious individuals as dependable, orderly, self-disciplined,

hardworking, and achievement striving. Individuals scoring high on deliberation are adept at thinking things through rather than making decisions impulsively.

#### Personality's Association with Self-harm

Paunonen (2003) argues an adequately designed personality measure should effectively predict any behaviors that have personality determinants and that the prediction of behaviors is much more accurate when facets rather than factors are used to predict the target behavior. One or more lower-level facets constitute a factor. Exploring the association between personality and self-harm may uncover important implications to the causes, motivations, and treatment of self-harming behavior. Reynolds and Clark (2001) found the NEO-PI-R adequately predicts personality disorders; they contend the NEO-PI-R has predictive power comparable to the Schedule for Nonadaptive and Adaptive Personality (SNAP) scales and superior to the Five-Factor Model domains (i.e., factors) for clinical and research application. Additionally, Reynolds and Clark found the self-harm subscale of the SNAP to be associated with high Neuroticism (facet N3): Depression, low Conscientiousness (facet C1): Competence, and high Conscientiousness (facet C2): Order in a clinical sample.

MacLauren and Best (2010) investigated the predictive relationship of personality traits and self-harm in 151 college undergraduate students using the NEO-PI-R. The authors discovered a relationship between "severe self-injurers" who self-injured ten or more times and other problems such as substance abuse, disordered eating, sexual compulsivity and dysfunctional relationships. Furthermore, these individuals scored higher on the NEO-PI-R on Neuroticism and lower on Agreeableness and Conscientiousness.

Research supports a predictive relationship between the Five-Factor Model of personality (Costa & McCrae, 1992) and self-injurious behaviors. The current study will examine differences in the personality structure of self-harming and non-self-harming individuals with the intention of lending to the current research and informing current clinical practice in the hope of preventing and/or effectively treating self-injuring individuals.

The following hypotheses are predicted in the current study:

1. Self-harming individuals will have significantly different NEO-PI-R facet scores than their non-harming counterparts.
2. The current data will fit Reynolds and Clark's model (depression, order, and competence predict self-harm).

## Method

### Participants

Participants were 432 students in undergraduate psychology classes at a midsize southeastern university. Students were compensated for participation in the study with extra credit in the class from which they were recruited. Participants were informed of their right to withdraw from the experiment at any time without loss of extra credit or the application of any ramifications. One percent of participants ( $n = 6$ ) did not complete demographic information for the study and an additional two participants did not identify their sex.

Participants included 165 male and 259 female students over the age of 17 years. The mean age for participants was 20.74 years ( $SD = 4.68$ ), ranging from 17 to 54 years. Participants' reported ethnic identity was as follows: 69% European American/white ( $n = 299$ ); 22% African American ( $n = 95$ ); 3% Hispanic/Latino ( $n = 12$ ); 2% Asian/Pacific Islander ( $n = 10$ ); 1% "other" ( $n = 5$ ), and the remaining 1% Middle East American/American Indian ( $n = 5$ ). Student's reported year in school (i.e., freshman, sophomore, junior, etc) follows: 43% freshman ( $n = 181$ ); 26% sophomore ( $n = 114$ ); 16% junior ( $n = 69$ ); 12% senior ( $n = 51$ ), 1% "other", and the remaining 1% graduate student ( $n = 3$ ).

### Materials

The Revised NEO Personality Inventory (NEO PI-R). The NEO PI-R (Form S) is a comprehensive 240-item self-report measure of personality which assesses the five factors (domains), each containing six facets (i.e., narrower personality traits that are aggregated to produce the respective factor). A carbon copy is designed to score, and reverse score, items from attitudinal responses such as, strongly agree, agree, neutral,

disagree, and strongly disagree, and code them into an ordinal score, which is an aggregate of eight independent items intended to measure a single facet. The six corresponding facet scores are then aggregated to produce a single factor (also on an ordinal scale). Individuals proficient in reading at the sixth grade level are competent to complete the NEO-PI-R. The inventory includes three validity checks (i.e., “I have tried to answer all of these questions honestly and accurately” on the same scale as mentioned above, “Have you responded to all the statements” dichotomously weighted (i.e., forced choice yes/no responses), and “Have you entered your responses in the correct areas” also dichotomously weighted. These items are designed to confirm participant accuracy and carefulness when completing the questionnaire.

The NEO-PI-R is a widely used, well standardized measure of the Five-Factor Model of personality, including psychometric support for the 30 facets (Costa & McCrae, 1992). The research conducted to ensure the validity and reliability of the NEO PI-R has been extensive and representative of the United States population. The authors reported adequate internal consistency for the five domains using Form S of the inventory with a sample of college students (see Table 1). Alpha coefficients were: neuroticism = .79, extraversion = .79, openness = .80, agreeableness = .75, and conscientiousness = .86. The reliability of the thirty facets was sufficient with a slightly broader range from .66 to .92 in a study containing 31 men and women. In the current study, Cronbach’s alphas for the thirty facets ranged from .43 to .81, with a median of .71 and a mean of .68. Although some of the facet alphas were lower than average, significant facets with a Cronbach alpha of .70 or higher had adequate internal reliability. Facets N4, A4, N5, and E5 have limited generalizability in the current study, given their low Cronbach alphas. Specific facet correlation coefficient alphas are presented in Table 1.

Table 1

## Reliability and Descriptive Statistics for Significant NEO-PI-R Facets

Facets	Cronbach's Alpha	Mean	Standard Deviation
N1: Anxiety	.75	17.98	5.18
N2: Angry hostility	.75	14.67	5.22
E2: Gregariousness	.72	18.41	5.27
O2: Aesthetics	.73	19.11	5.35
N3: Depression	.76	15.42	5.52
A3: Altruism	.74	23.94	4.31
N4: Self-Consciousness	.66	16.25	4.85
A4: Compliance	.65	16.17	4.86
N5: Impulsiveness	.63	17.59	4.44
E5: Excitement-seeking	.62	21.18	4.69
O5: Ideas	.81	19.36	5.65
N6: Vulnerability	.75	12.88	4.89

Alpha coefficients are reported for all facets significant in the regression equation, the MANOVA, or both.



Deliberate Self-Harm Inventory. Self-harming behavior was measured using the Deliberate Self-Harm Inventory, a 17-item, forced choice, dichotomously anchored (i.e., yes/no), behavioral self-report questionnaire that measures the occurrence of self-harming behavior (Gratz, 2001). The endorsed items are then aggregated producing a DSHI score. The inventory is composed of self-harming behaviors frequently exhibited by self-harming individuals. Each of the specific behaviors includes qualitative items related to the specific behavior including: frequency, severity, duration, and type of self-harm in which he or she engages.

#### Procedure

Participants completed the questionnaire packet in small groups at scheduled times of their choosing. Completion of the packet took participants approximately 45 minutes. Participants were given a questionnaire packet including the DSHI, a demographic questionnaire, and the NEO-PI-R. The demographic questionnaire was presented first, followed by the NEO-PI-R, and finally the DSHI. The DSHI was presented last in an attempt to prevent exposure to the self-harming items from influencing NEO-PI-R responses.

### Results

Thirty-one percent of participants ( $n = 135$ ) endorsed at least one item on the DSHI. Of the 135 self-harming participants, 28% reported greater than or equal to 3 self-harming behaviors ( $n = 38$ ). Sixteen of the seventeen self-harming behaviors included in the DSHI were endorsed by at least one participant (see Table 2). Frequently reported "other" self-harming behaviors (i.e., item 17 of the DSHI) included: overdosing ( $n = 4$ ), attempting suicide ( $n = 3$ ), disorder eating ( $n = 3$ ), choking/suffocation ( $n = 3$ ), and punching oneself ( $n = 2$ ). Frequencies and the proportion of participants endorsing each behavior are presented in Table 2.

Table 2

## Frequencies of Items (i.e., behaviors) Endorsed in the Current Study

Behavior	Frequency	Percent of Participants
Cut	40	9.3
Burned with cigarette	26	6.0
Burned with lighter/match	27	6.3
Carved words	32	7.4
Carved pictures, designs, etc.	25	5.8
Severely scratched	22	5.1
Bit self	10	2.3
Rubbed sandpaper	5	1.2
Dripped acid	0	0.0
Scrubbed with products	14	3.2
Punctured with objects	32	7.4
Rubbed glass	4	0.9
Broken bones	1	0.2
Banged head	11	2.5
Punched self	10	2.3
Prevented wounds from healing	9	2.1
Other	28	6.5

Given research that suggests group differences in ethnicity related to self-injury (Gratz, 2006), an Independent samples *t*-test was used to determine a significant difference in DSHI scores between African American and Caucasian participants. There was a significant difference between self-harm for African American ( $M = .42$ ,  $SD = 1.49$ ) and Caucasian ( $M = .72$ ,  $SD = .92$ ) participants,  $t(260.24) = -2.38$ ,  $p = .02$ . Levene's test for equality of variance determined that the two group variances were not homogeneous. No other reported ethnic group had a sufficient sample size to be included in the analysis; therefore, no other ethnic identity categories were included in the comparison. A limitation to this study was that no other group comparisons were administered; groups were not combined due to difficulty developing a multiculturally sensitive method of merging ethnicity data reported by participants into a unified group. Group sizes were too small to report inferences about populations; therefore no inferential statistics were analyzed on these groups. There was no significant difference in self-harm scores between males and females.

Assumptions were tested for normality, linearity, homogeneity of variance-covariance, and multicollinearity. DSHI scores were positively skewed and leptokurtic due to the relatively low incidence of self-harm in the general population (Arney & Crowther, 2008). In order to correct for positive skew and kurtosis, DSHI scores were logarithmically transformed ( $\log_{10}$ ). The  $\log_{10}$  transformation provided the closest approximation to a normal distribution for the DSHI scores. The transformation will prevent any hindrance of model fit. Transformed DSHI scores were used for all further analyses. Box's M test of equality of covariance matrices revealed significant differences between the two groups; however, Box's test may be too strict when sample sizes are large (Tabachnick & Fidell, 2001). Exploratory data analyses to test for the presence of multivariate outliers and/or potentially influential data points were conducted. The Mahalanobis Distance value indicated potential multivariate outliers; however, the Cook's Distance value was well below 1.0 (i.e.,  $< .01$ ), suggesting these data do not significantly influence regression analyses (Stevens, 2002).

Multiple linear regression analysis provided an adequate fit to the data ("adjusted"  $R^2 = .22$ ); beta coefficients for the four significant predictor variables (facets) were as follows: ideas ( $\beta = .338$ ,  $p < .001$ ), depression ( $\beta = .188$ ,  $p = .02$ ),

gregariousness ( $\beta = -.200, p = .01$ ), and altruism ( $\beta = -.272, p < .001$ ). These results indicate this model accounts for approximately 25% of the observed variance in DSHI scores. These findings suggest that individuals who score higher on the depression and ideas facets have a positive predictive relationship with self-harming behavior and individuals who score higher on the gregariousness and altruism facets have a negative predictive relationship to self-injury. Linear regression analysis using Reynolds and Clark's model fit the data ("adjusted"  $R^2 = .07$ ); however, only depression significantly loaded into the regression equation ( $\beta = .31, p = .001$ ).

A one-way between-groups multivariate analysis of variance (MANOVA) was performed to investigate group (i.e., harmers versus non-harmers) differences in lower order personality traits. The thirty facets were entered into the analysis as dependent variables. The independent variable was self-harm or no self-harm. There was a statistically significant difference between self-harming and non-self-harming individuals on the combined dependent variables:  $F(30, 398) = 2.35, p < .001$ ; Pillai's Trace = .15; partial eta squared = .15 (see Table 3). When the results for the dependent variables were considered separately, five variables were significant at the Bonferroni corrected alpha level of .002; an additional five variables were significant at the conventional .05 level of significance. Results for the ten variables are presented in Table 3.

Table 3

Between-Subjects Effects

Dependent Variable	<i>F</i>	Partial Eta Squared	Observed Power
N1: Anxiety*	8.99	.02	.85
N2: Angry hostility**	14.04	.03	.96
O2: Aesthetics*	8.35	.02	.82
N3: Depression**	17.60	.04	.99
N4: Self-Consciousness*	8.51	.02	.83
A4: Compliance**	10.16	.02	.89
N5: Impulsiveness*	5.78	.01	.67
E5: Excitement seeking*	8.16	.02	.81
O5: Ideas**	10.75	.03	.91
N6: Vulnerability**	13.61	.03	.96

\* Indicates significance at the Conventional level of significance ( $\alpha = .05$ )

\*\* Indicates significance at the Bonferroni corrected level of significance ( $\alpha = .002$ )

Only facets with observed power > .80 were retained, in keeping with Cohen's (1992) suggested power coefficients.

## Discussion

In the current study, we explored the predictive value of the NEO-PI-R facets of personality for self-harming behavior. The results indicate that four facets significantly explain 22% of the variance in self-harm scores. Those facets include: ideas (Openness 5), depression (Neuroticism 3), gregariousness (Extraversion 2), and altruism (Agreeableness 3).

High scores on the ideas facet are associated with intellectual curiosity, open-mindedness, and a willingness to try novel, perhaps unconventional, possibilities. Individuals scoring high on depression tend to experience feelings of guilt, sadness, hopelessness, and loneliness. Those scoring low on gregariousness are likely to avoid social stimulation. Low scores on the altruism scale are indicative of an individual who is somewhat more self-centered and reluctant to assist others. Results suggest that one who engages in self-harm is prone to depression, social isolation, openness to novel ideas, and less concern for the well-being of others.

The results of the MANOVA suggest that individuals who engage in self-harm are less trusting, gregarious, altruistic, and compliant than their non-harming counterparts. Self-harmers scored higher on anxiety, fantasy, angry hostility, aesthetics, depression, self-consciousness, impulsiveness, excitement-seeking, ideas, and vulnerability. It is noteworthy that anxiety, angry hostility, self-consciousness, impulsiveness, and vulnerability are the six facets of neuroticism and self-harmers scored significantly higher on each of these facets, suggesting that self-harming individuals are more emotionally unstable overall than their non-harming counterparts. This also aligns with MacLauren and Best (2010) suggestion that individuals who self-harm are more likely to score high on the (N) Neuroticism scale of the NEO-PI-R.

While results of this study do not fit Reynolds and Clark's (2001) model, depression was a significant predictor of self-harm. This supports a strong predictive correlation between depression and self-harm, which can have implications for how health professionals predict and assess for self-harm behaviors of their patients. Predicting self-harm behaviors could lend to better interventions as well as prevention for those at risk for self-harm.

## Limitations and Future Research

A limitation of the current study is that the study did not assess social desirability scores for participants. Barrick, Mount, and Gupta (2003) found that high self-monitoring, an individual characteristic, was a moderator for extraversion and emotional stability (i.e., neuroticism) as predictors of performance. The authors contend that individuals high on self-monitoring are more likely to engage in impression management, an intentional or unintentional behavior; therefore they are more likely to respond to personality items in socially desirable ways. Due to the sensitive nature of self-harming behavior, social desirability is a critical variable to be evaluated in future studies examining self-harm.

One statistical concern inherent in the use of facet level regression and MANOVA analyses is the risk of multicollinearity and highly correlated dependent variables, respectively. Reynolds and Clark's (2001) study indicated that facet level analysis was superior to factor level analysis in predicting personality disorder; therefore facet level analysis in the current study is warranted. Using the standard entry method of regression, only four of the thirty facets significantly contributed to the regression equation. The standard entry method of regression controls for correlations among the independent variables and prevents the artificial inflation of  $R^2$  (Spicer, 2005).

The current study explores the personality predictors of self-harm and group differences across the thirty facets of personality defined by the NEO-PI-R. The results suggest that in a sample of college students, there are distinct predictors of self-harm and a clear pattern of differences across 10 of the thirty facets of personality. These findings begin to elucidate a personality profile for self-harm that has extensive potential utility in clinical practice and may assist in identifying individuals who are at risk for engaging in self-harm. Further research is warranted to begin exploring the influences that create such a personality profile.

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