

FACTOR STRUCTURE OF  
BORDERLINE PERSONALITY DISORDER CRITERIA

by

Lauren C. Tahash

A Thesis Submitted in Partial Fulfillment of the  
Requirements for the Degree of Master of Arts  
in Quantitative Psychology

Middle Tennessee State University

August 2013

Thesis Committee:

Dr. Dana Fuller, Advisor

Dr. Jwa Kim

Dr. Michael Hein

I dedicate this research to those who are struggling with mental illness and are still fighting stigma.

## ABSTRACT

During the past few decades, researchers have used factor analysis to study the relationship between the symptoms manifested in borderline personality disorder (BPD). Much debate has occurred in the literature about the underlying factor structure of the BPD symptoms. The present study used confirmatory factor analysis (CFA) to compare the unidimensional model, Becker, McGlashan, and Grilo's (2006) four-factor model, Clarkin, James, and Hurt's (1993) four-factor model, Clarkin et al.'s (1993) three-factor model, and Sanislow, Grilo, and McGlashan's (2000) three-factor model on a general sample. Clarkin et al.'s (1993) four-factor model had the lowest AIC value, indicating that this model provided more information than the other models. Future research may include transformation of item scores, structural equation modeling with a variation of Sanislow et al.'s (2000) three-factor model, or cluster analysis concerning BPD subtypes.

## TABLE OF CONTENTS

LIST OF TABLES.....	vi
LIST OF FIGURES.....	vii
INTRODUCTION.....	1
METHOD.....	12
Participants.....	12
Measure.....	12
Procedure.....	14
RESULTS.....	15
Preliminary Analysis.....	15
Missing data.....	15
Normality and outliers.....	15
Confirmatory Factor Analysis.....	17
Unidimensional model.....	18
Clarkin et al.'s (1993) four-factor model.....	24
Clarkin et al.'s (1993) three-factor model.....	28
Sanislow et al.'s (2000) three-factor model.....	30
DISCUSSION.....	34

TABLE OF CONTENTS, CONT.

REFERENCES..... 37

APPENDICES..... 41

    APPENDIX A: The BPD Checklist items..... 42

    APPENDIX B: Email correspondence concerning permission to use  
        the BPD Checklist..... 45

    APPENDIX C: Relationship between the BPD Checklist items and  
        DSM-IV criteria..... 46

    APPENDIX D: Bootstrap estimates for the unidimensional model..... 47

    APPENDIX E: Bootstrap estimates for the Clarkin et al. (1993)  
        four-factor model..... 48

    APPENDIX F: Bootstrap estimates for the Clarkin et al. (1993)  
        three-factor model..... 49

    APPENDIX G: Bootstrap estimates for the Sanislow et al. (1993)  
        three-factor model..... 50

    APPENDIX H: IRB approval letter..... 51

## LIST OF TABLES

1.	Demographic Data.....	13
2.	Skewness and Kurtosis of BPD Checklist Items.....	16
3.	Absolute and Relative Model Fit Indices.....	19
4.	Ten Largest Modification Indices for Four Models (Factor Loadings and Covariance of Error Terms).....	20
5.	Unidimensional Model: Squared Multiple Correlations and Factor Loadings.....	22
6.	Clarkin et al. (1993) 4-Factor Model: Squared Multiple Correlations and Factor Loadings.....	25
7.	Factor Correlations for the Multi-Factor Models.....	27
8.	Clarkin et al. (1993) 3-Factor Model: Squared Multiple Correlations and Factor Loadings.....	29
9.	Sanislow et al. 3-Factor Model (2000): Squared Multiple Correlations and Factor Loadings.....	32

## LIST OF FIGURES

1.	The unidimensional model.....	7
2.	Becker et al.'s (2006) four-factor model.....	8
3.	Clarkin et al.'s (1993) four-factor model.....	9
4.	Clarkin et al.'s (1993) three-factor model.....	10
5.	Sanislow et al.'s (2000) three-factor model.....	11

## INTRODUCTION

During the early developmental stages in life, some people develop healthy adaptive behavioral patterns, while others do not. A subset of the population that develops maladaptive behavioral patterns consists of those who are classified as having borderline personality disorder (BPD). Classification of this illness is determined by the DSM-IV as having five out of the nine listed symptoms of BPD: Stress-related paranoid ideation, chronic feelings of emptiness, identity disturbance, unstable and intense interpersonal relationships, frantic efforts to avoid abandonment, inappropriate anger, affective instability, recurrent suicidal behavior, and impulsivity (American Psychiatric Association [APA], 2000). This is a psychological condition which results from an interaction of biological factors and environmental factors (Crowell, Beauchaine, & Linehan, 2009; Giesen-Bloo & Arntz, 2005; Leichsenring, Leibing, Kruse, New, & Leweke, 2011). The effects of this illness can interfere with every part of daily life, including interaction with one's relationships, one's sense of reality, and one's sense of self. These aspects of daily life remain stable for the nonborderline individual. However, for the borderline individual, these aspects can be chaotically unstable. For example, the emotion dysregulation component of the disorder is a hallmark feature of the borderline personality that can influence the presence of other symptoms (Koenigsberg et al., 2009; Linehan, 1993).

During the past few decades, researchers have used factor analysis to study the relationship between the symptoms manifested in BPD, in particular, the nine BPD criteria listed in the DSM-IV-TR (APA, 2000), in order to find the underlying factors, if



any, of these criteria. Much debate has occurred in the literature about the contradictions of the proposed models of BPD symptomology. Researchers have found that both the number and composition of factors vary from one study to the next, perhaps influenced by the measure used to evaluate symptomology, sample composition, or statistical analysis performed (Andión et al., 2011; Becker, McGlashan, & Grilo, 2006; Giesen-Bloo, Wachters, Schouten, & Arntz, 2010; New, Triebwasser, & Charney, 2008). Combinations of BPD symptomology in patients also influence the types of models found, as meeting only five of the nine DSM-IV-TR criteria is sufficient for diagnosis (APA, 2000). This implies that patients are likely to exhibit one of 256 possible combinations of BPD criteria at any given time while maintaining a BPD diagnosis. Given this information, it should not be surprising that literature on this topic has presented such a variety of factorial models.

Fossati et al. (1999) and Becker, Añez, Paris, and Grilo (2010) each found evidence for a unidimensional model of BPD symptomology. The single factor consisted of the nine criteria of BPD listed in the DSM-IV-R. Fossati et al. (1999) used confirmatory factor analysis (CFA) to support the fit of this model on data from 564 inpatients and outpatients with and without BPD. The Structured Clinical Interview for DSM-IV axis II personality disorders, Version 2.0 (SCID-II; First, Spitzer, Gibbon, Janet, & Benjamin, 1994) was utilized to assess the presence of BPD in the sample. One hundred participants were diagnosed with either BPD alone or with additional personality disorders, while the other participants showed only some or none of the BPD criteria. From the analysis, the BPD criteria were found to be ranked in diagnostic efficacy among

the participants. Ranked in decreasing efficiency: Unstable and intense interpersonal relationships, identity disturbance, chronic feelings of emptiness, affective instability, impulsivity, stress-related paranoid ideation, inappropriate anger, recurrent suicidal behavior, and frantic efforts to avoid abandonment, respectively.

Becker et al. (2010) found support for the unidimensional model with exploratory factor analysis (EFA) based on a sample of 130 Spanish-speaking outpatients with substance use disorders. The Spanish-Language Version of the Diagnostic Interview for DSM-IV Personality Disorders (S-DIPD-IV; Grilo et al., 2003) was used to diagnose 39 of the 130 participants with BPD. Borderline personality disorder was the most frequent diagnosis in the sample, with the second and third most frequent diagnoses being obsessive-compulsive personality disorder (34 subjects) and avoidant personality disorder (34 subjects). The unidimensional model found by EFA accounted for slightly over half of the variance in this sample (53%; Becker et al., 2010).

Clarkin, James, and Hurt (1993) extracted a three-factor solution with EFA using DSM-III-R criteria (APA, 1987). The DSM-III-R criteria are slightly different from the DSM-IV-TR BPD criteria in that stress-related paranoid ideation was listed as an additional criterion for BPD in the DSM-IV-TR. This study used a sample that consisted of 75 BPD patients who required long-term hospitalization. The ages of the patients ranged from 15 to 45 years, averaging 28 years. The patients were evaluated for BPD with the SCID-II interview based on the DSM-III-R. Three factors were extracted from the data: Factor 1: Emptiness or boredom, identity disturbance, abandonment fears, and unstable relationships; Factor 2: Suicidal threats or gestures, uncontrolled anger, and

affective instability; Factor 3: Impulsivity. The researchers also suggested that a four-factor solution where anger loaded on its own factor would be viable.

A four-factor model of BPD symptomology was found using EFA in a study of a sample of 123 adolescent inpatients, ranging in age from 13 to 18 (Becker et al., 2006). The Personality Disorder Examination (PDE; Loranger, Susman, Oldham, & Russakoff, 1988), which is based on the DSM-III-R provided the data for the EFA. The obtained four-factor model consists of Factor 1: Suicidal threats or gestures and emptiness or boredom; Factor 2: Affective instability, uncontrolled anger, and identity disturbance; Factor 3: Unstable relationships and abandonment fears; and Factor 4: Impulsivity. The criterion identity disturbance also loaded on Factor 3, but to a lesser degree. In this study, logistic regression also was conducted to examine how each factor predicted Axis I disorders. Results from the regression analysis revealed the predictive efficacy of the factor structure: Factor 1 predicted major depression, dysthymia, and alcohol use disorders; Factor 2 predicted oppositional defiant disorder and anxiety disorders; Factor 3 was loosely associated with anxiety disorders; and Factor 4 predicted conduct disorder and substance use disorders.

The methodology of the previous study (Becker et al., 2006) was very similar to that of another study of a sample of 141 adult inpatients (aged 18 to 60) taken from the same location at approximately the same time, using identical diagnostic criteria of the DSM-III-R (Sanislow, Grilo, & McGlashan, 2000). This study used exploratory factor analysis and extracted three different factors from the data. Unstable relationships, identity disturbance, and emptiness and boredom loaded on the first factor, Disturbed

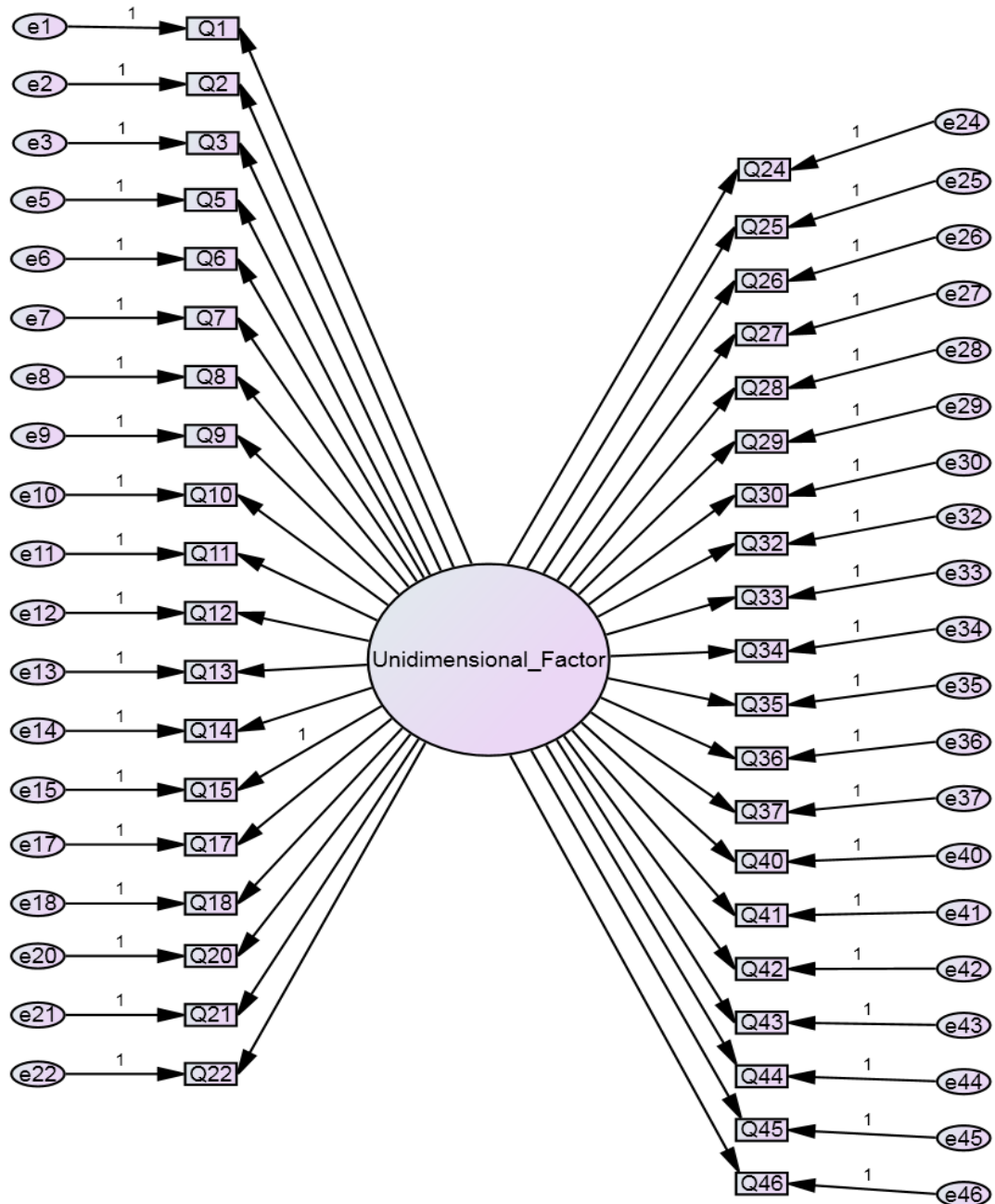
Relatedness; impulsiveness and recurrent suicidal behavior loaded on the second factor, Behavioral Dysregulation; and affective instability, inappropriate anger, and frantic efforts to avoid abandonment loaded on the third factor, Affective Dysregulation.

Surprisingly, the only similarity between this three-factor model from the adult inpatient sample (Sanislow et al., 2000) and the four-factor model from the adolescent inpatient sample (Becker et al., 2006) is that affective instability and inappropriate anger/uncontrolled anger loaded on the same factor in the three-factor model. This three-factor model was replicated in a follow-up study (Sanislow et al., 2002) with the same sample and CFA using DSM-IV criteria (stress-related paranoid ideation symptom was added to the Affective Dysregulation factor). In the follow-up study, the unidimensional model was also analyzed and showed good fit. However, a chi-square test of differences indicated that the three-factor model fit the data better than the unidimensional model.

The previous studies have found a number of different factor models. This may have been because a majority of the samples sizes in these studies were meager for a factor analysis study (excluding Fossati et al.'s (1999) study, which had a sample size of 564 patients). Four out of five of the previously mentioned studies had sample sizes less than 150 participants. The compositions of the samples also differed. Several of the samples were composed of inpatients classified with a variety of disorders (Becker et al., 2006; Sanislow et al., 2000). One of the samples was composed of only BPD patients (Clarkin et al., 1993). The sample in Becker et al.'s (2010) study was composed of 130 Spanish-speaking outpatients with substance abuse disorders. Some of the patients in this

sample were diagnosed with BPD. Fossati et al.'s (1999) study included both inpatients and out patients with and without BPD. None of these studies included only subclinical BPD participants.

The present study used confirmatory factor analysis to compare the unidimensional model (using DSM-III-R criteria), Becker et al.'s (2006) four-factor model, Clarkin et al.'s (1993) four-factor model, Clarkin et al.'s (1993) three-factor model, and Sanislow et al.'s (2000) three-factor model on a sample of 325 subclinical BPD participants (see Figures 1-5 for the models being compared). A subclinical BPD sample was collected so that the greater number of combinations of BPD symptoms that would naturally arise in the data could provide additional information in the search for the underlying factor structure of BPD symptomology. Individuals with BPD do not share the same symptoms of BPD (at least five of nine symptoms). This principle applies to subclinical BPD individuals at a greater degree. The analysis was conducted with data from the BPD Checklist (Arntz & Dreessen, 1995; shown in Appendix A), a self-report questionnaire based on DSM-IV BPD criteria that assesses the severity of BPD symptoms. However, the criterion of stress-related paranoid ideation (items 4, 16, 19, 23, 31, 38, 39, and 47) was not analyzed in this study so that the unidimensional model would utilize the same number of items as the four multidimensional models, which are based on DSM-III-R criteria. The researcher expected Sanislow et al.'s (2000) three-factor model to have the best fit with the data due to the confirmation of this model in the two-year follow-up study (Sanislow et al., 2002) previously discussed.



*Figure 1.* The unidimensional model. The one factor consisted of items pertaining to fear of abandonment, unstable relationships, unstable identity/self-concept, impulsivity, parasuicidal behavior, emotional instability, emptiness or boredom, and uncontrolled anger.

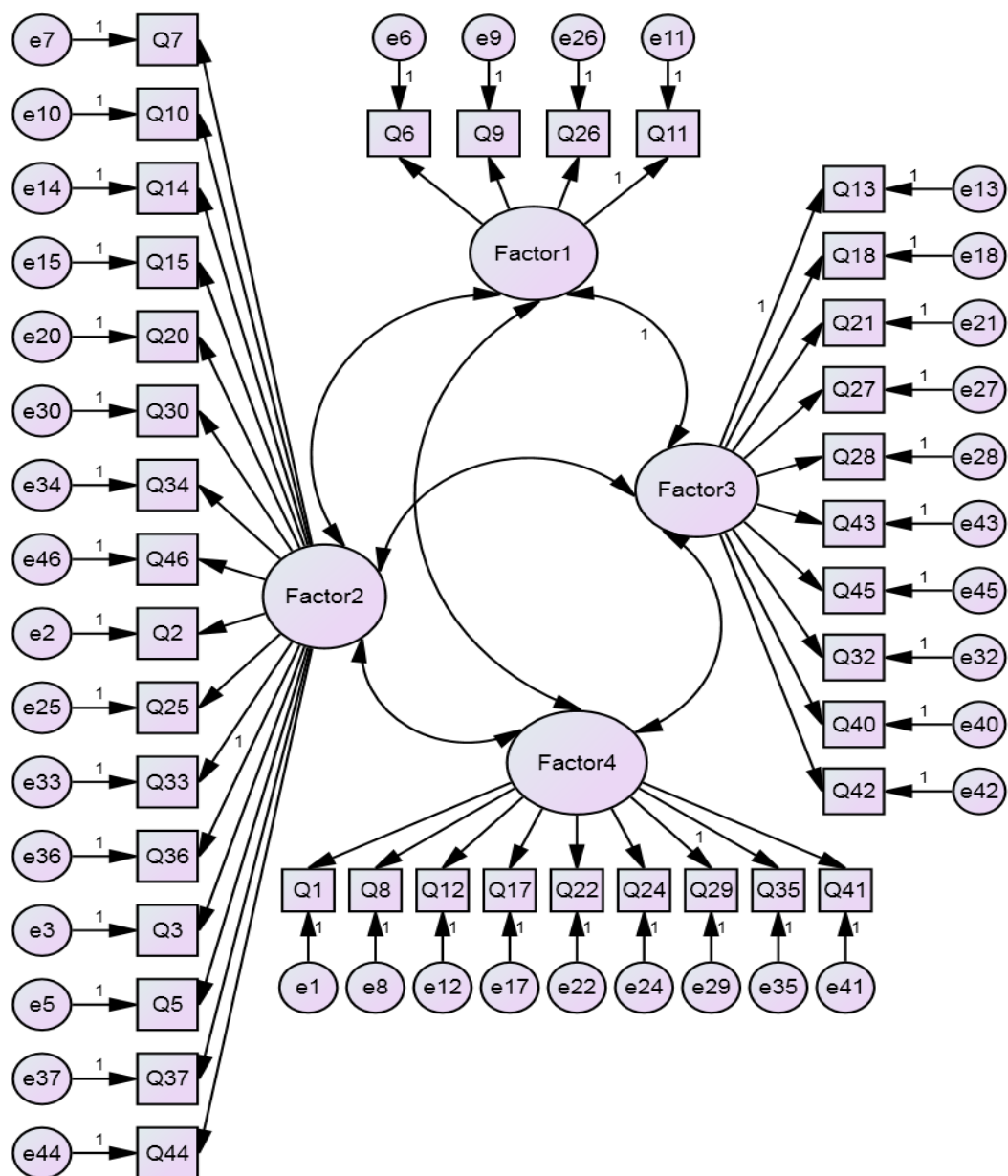
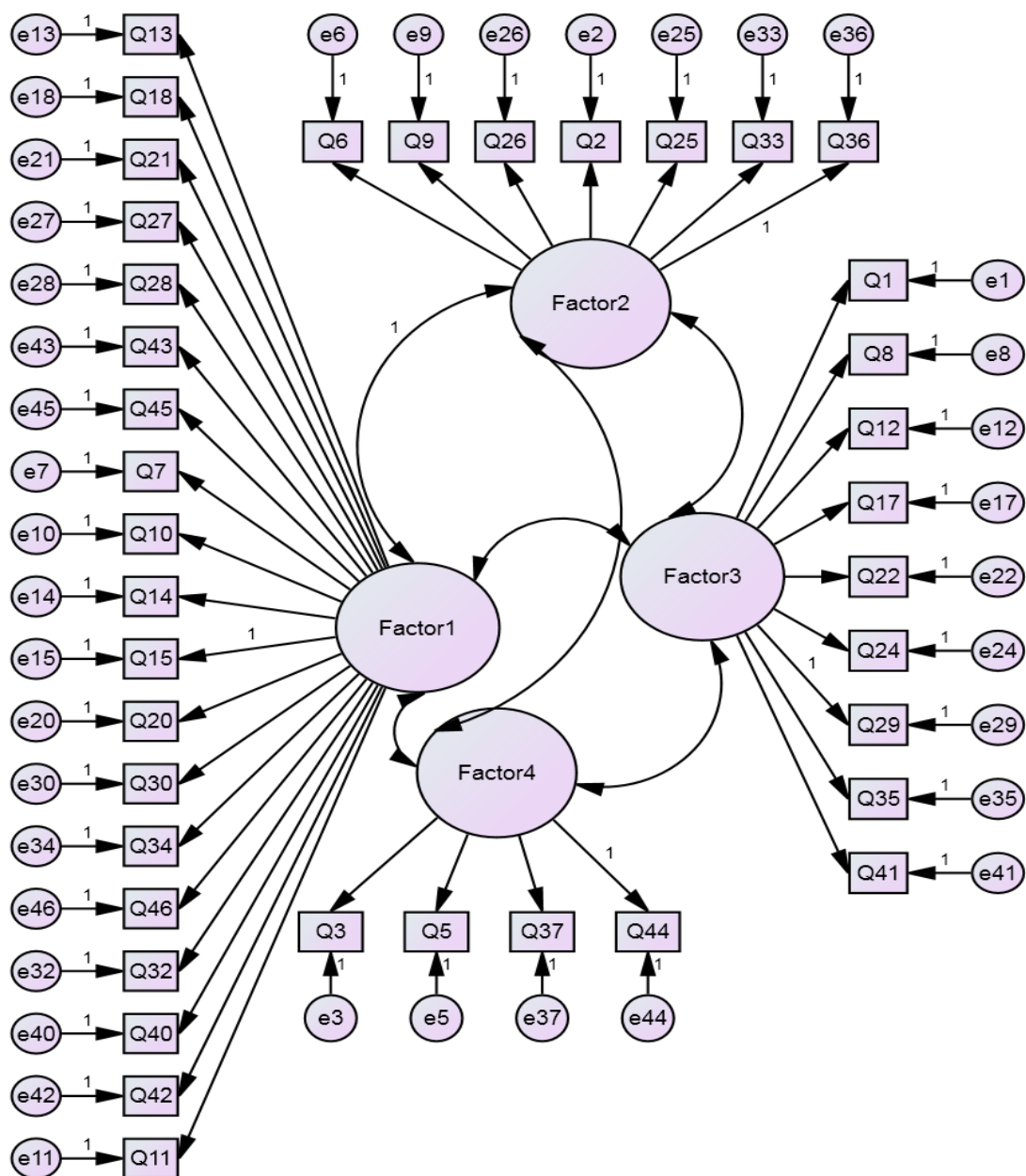
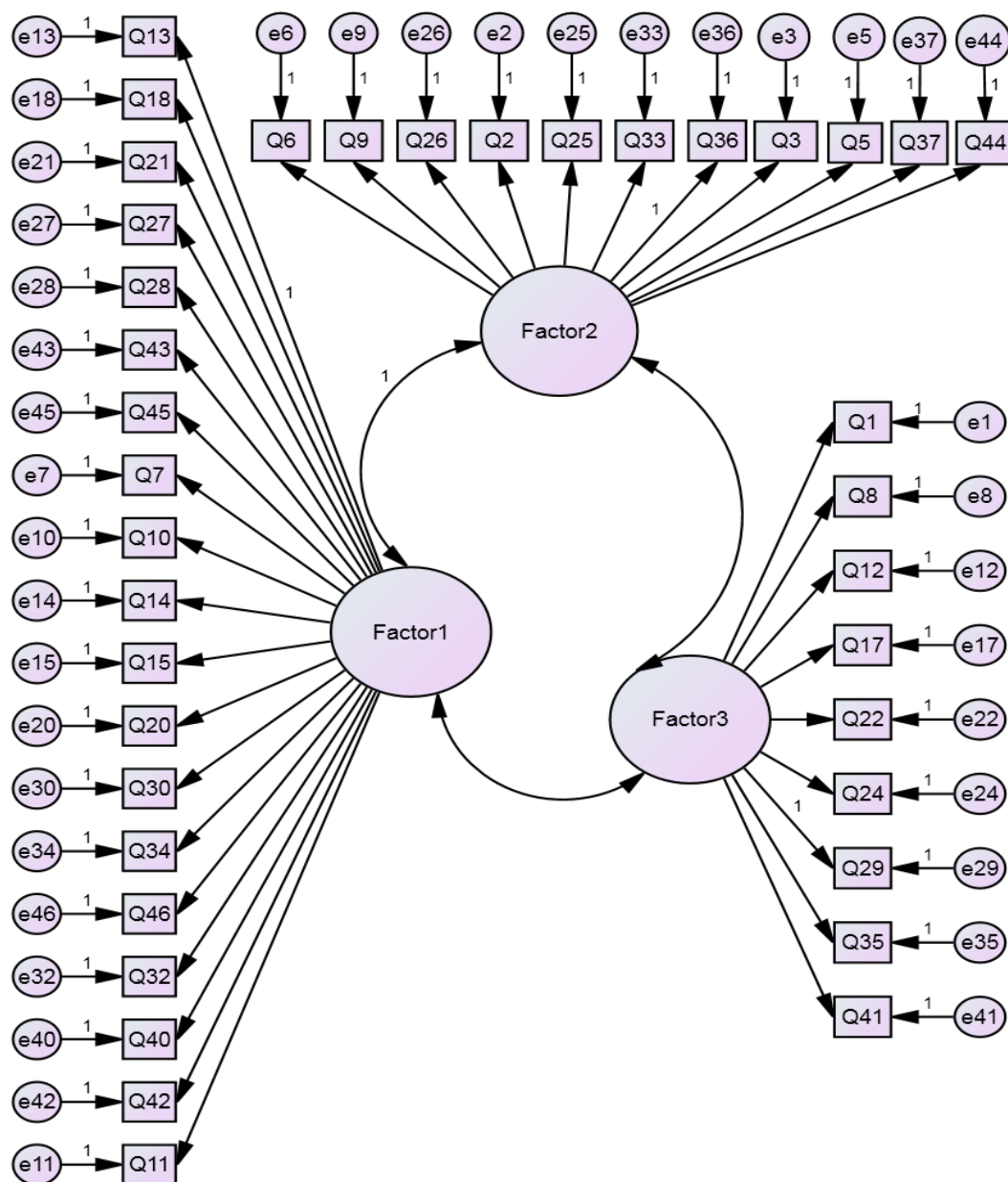


Figure 2. Becker et al.'s (2006) four-factor model. Factor 1 consisted of items pertaining to parasuicidal behavior and emptiness or boredom. Factor 2 consisted of items pertaining to emotional instability, uncontrolled anger, and unstable identity/self-concept. Factor 3 consisted of items pertaining to unstable relationships and fear of abandonment. Factor 4 consisted of items pertaining to impulsivity.



*Figure 3.* Clarkin et al.'s (1993) four-factor model. Factor 1 consisted of items pertaining to emptiness or boredom, unstable identity/self-concept, fear of abandonment, and unstable relationships. Factor 2 consisted of items pertaining to parasuicidal behavior and emotional instability. Factor 3 consisted of items pertaining to impulsivity. Factor 4 consisted of items pertaining to uncontrolled anger.





*Figure 4.* Clarkin et al.'s (1993) three-factor model. Factor 1 consisted of items pertaining to emptiness or boredom, unstable identity/self-concept, fear of abandonment, and unstable relationships. Factor 2 consisted of items pertaining to parasuicidal behavior, uncontrolled anger, and emotional instability. Factor 3 consisted of items pertaining to impulsivity.

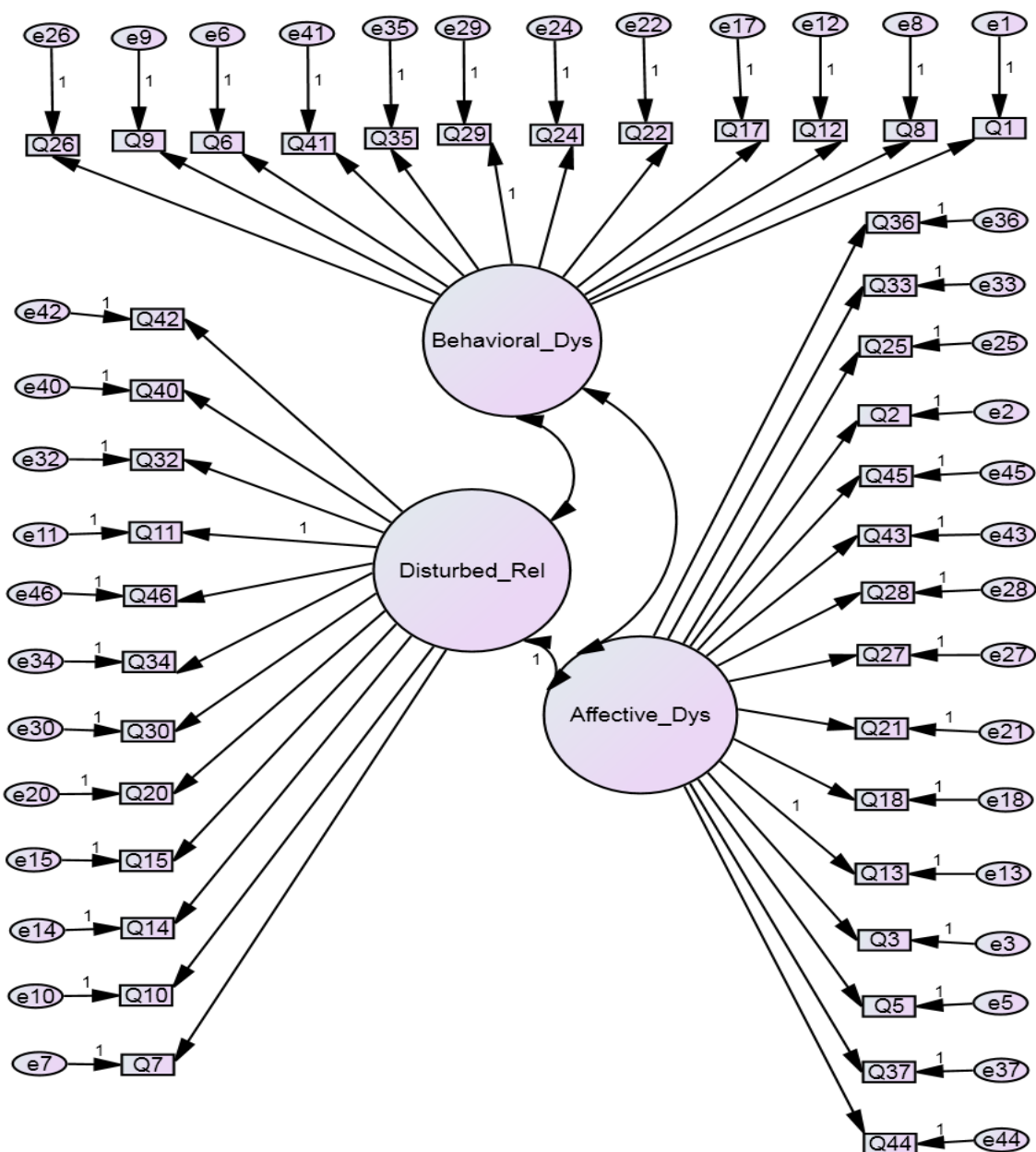


Figure 5. Sanislow et al.'s (2000) three-factor model. Disturbed Relatedness consisted of items pertaining to unstable relationships, unstable identity/self-concept, and emptiness or boredom. Behavioral Dysregulation consisted of items pertaining to impulsivity and parasuicidal behavior. Affective Dysregulation consisted of items pertaining to emotional instability, uncontrolled anger, and fear of abandonment.

## METHOD

### Participants

Four hundred and five participants were recruited through snowball sampling. After removing the participants who responded incorrectly to the control questions and after the missing value analysis, 325 participants remained in the sample. The ages of the participants ranged from 18 to 77 years ( $M = 36.34$ ,  $SD = 13.58$ ), and about three-quarters of the participants were female (71.4% female, 28.6% male). The majority of the participants identified themselves as having a “White” ethnicity (87.7%). About 13.8% of the participants claimed to have been diagnosed with a mental illness by a medical practitioner. One participant did not respond to this question. Additional demographic information is included in Table 1.

### Measure

This study utilized the Borderline Personality Disorder Checklist (BPD Checklist; Arntz & Dreessen, 2005; see Appendix B concerning permission for use of the BPD Checklist) to assess the prevalence and severity of borderline symptomology in the sample. This instrument is composed of 47 items pertaining to the nine criteria of BPD, as defined in the DSM-IV-R. The relationship between the items and their corresponding criteria are shown in Appendix C. The eight items pertaining to stress-related paranoid ideation (items 4, 16, 19, 23, 31, 38, 39, and 47) were not analyzed in this study, as previously stated. The items inquire how much the participant has been troubled by particular grievances related to BPD symptoms in the past month on a 5-point Likert

Table 1

*Demographic Data*

		<i>N</i>	<i>%</i>
Total		325	100.0%
Age		314	96.6%
	No response	11	3.4%
Gender	Female	232	71.4%
	Male	93	28.6%
Ethnicity	White	285	87.7%
	Hispanic, Latino, or Spanish	15	4.6%
	African American	9	2.8%
	Asian, Asian American, or Pacific Islander	7	2.2%
	None of the above	6	1.8%
	American Indian or other Native American	3	0.9%
Diagnosed with Mental Illness (self-report)	No	279	85.8%
	Yes	45	13.8%
	No response	1	0.3%

scale (“1” indicates “not at all” and “5” indicating “extremely”). The BPD Checklist has shown high internal consistency (*Cronbach’s*  $\alpha = .97$ ; Giesen-Bloo, Arntz, van Dijk, Spinhoven & van Tilburg, 2001). In this study, high internal consistency for the BPD Checklist was also found (*Cronbach’s*  $\alpha = .95$  for the whole scale, and *Cronbach’s*  $\alpha = .94$  when the eight items pertaining to stress-related paranoid ideation were excluded).

**Procedure**

The researcher created an electronic version of the BPD Checklist using Qualtrix software. The Qualtrix questionnaire included the BPD Checklist items, three demographic items, an item inquiring about previous mental illness diagnosis, and two quality control items to screen for participants who were not providing the questionnaire adequate attention. The electronic version of the questionnaire allows participants to complete the study in private. This privacy, along with appropriate instructions, encourages participants to respond honestly. The researcher excluded participants who took less than four minutes to complete the 47 items or responded to less than 90% of the items.

## RESULTS

### Preliminary Analysis

**Missing data.** The missing value analysis was conducted with IBM SPSS 20. The amount of missing data was not as prevalent as expected. After removing the participants who responded incorrectly to the quality control questions or took less than four minutes to finish the questionnaire, 362 participants remained in the sample. The missing value analysis revealed that 323 participants answered every BPD Checklist item that this study intended to analyze (i.e. 39 items). Seventy-four percent of the cases with missing data did not answer only one item. Although 33.3% of the items contained missing data, the item with highest amount of missing data contained merely 1.4% missing data. Little's missing completely at random (MCAR) test revealed that the data were missing completely at random ( $\chi^2_{1047} = 984.08, p = .918$ ). The cases with missing data on the BPD Checklist items that were intended to be analyzed were deleted listwise.

**Normality and outliers.** Skewness and kurtosis were calculated with IBM SPSS Amos 20. Most of the items were positively skewed and had positive kurtosis (see Table 2 for the details of skewness and kurtosis). In increasing severity, the four most nonnormal items were items 5, 28, 26, and 35. Items 28 and 35 were removed from the analysis. Items 5 and 26 were retained so that Factor 4 on Clarkin et al.'s (1993) four-factor model and Factor 1 on Becker et al.'s (2006) four-factor model contained at least four items loading on each factor in order for the integrity of the models to remain intact. After the two items were removed from the analysis, the missing data analysis was rerun and five participants were brought back into the sample who did not respond to Items 28

Table 2

*Skewness and Kurtosis of BPD Checklist Items*

	<i>Item Labels</i>	<i>Skewness</i>	<i>Kurtosis</i>
Q1	Impulsive spending	.94	.26
Q2	Quick changes in mood	.56	-.09
Q3	Tantrums	1.69	2.48
Q5	Hitting or throwing things at others	5.84	42.35
Q6	Injuring self on purpose	5.07	28.18
Q7	Unsure about attraction to men or women	4.02	16.82
Q8	Gambling	4.14	19.78
Q9	Urge to commit suicide	4.62	25.35
Q10	Uncertainty about identity	1.59	2.49
Q11	Bored or empty inside	.95	.43
Q12	Drinking too much	2.99	9.13
Q13	Fear that others will leave	1.81	2.91
Q14	Being different in situations	2.38	6.06
Q15	Uncertainty about life	.76	-.13
Q17	Drug use	4.16	18.10
Q18	Changes in feelings for others	1.78	3.32
Q20	Not seeing bad sides of self	1.89	3.81
Q21	Rejection by others if known	1.48	1.29
Q22	Reckless driving	3.37	13.60
Q24	Life threatening actions to self	4.03	18.38
Q25	Feelings of despair	.99	.32
Q26	Trying to commit suicide	8.72	74.47
Q27	Thinks someone important will abandon	3.76	16.15
*Q28	Threatening to injure or kill self	7.26	56.92
Q29	Binge eating	1.58	2.15
Q30	Bad and unacceptable	2.00	3.97
Q32	Unsure about keeping friends/loved ones	2.27	5.56
Q33	Unacceptable feelings	1.46	2.62
Q34	Unsure what is important to you	1.44	1.80
*Q35	Shoplifting	10.73	135.32
Q36	Sudden anxieties, depression, irritability	.91	.22
Q37	Breaking things out of anger	4.59	23.40
Q40	Disappointed in someone admired	1.55	1.85

Table 2 cont.

	<i>Item Labels cont.</i>	<i>Skewness cont.</i>	<i>Kurtosis cont.</i>
Q41	Sexual impulsivity later regretted	3.96	15.66
Q42	Sudden loss of trust in others	2.42	7.06
Q43	Believes cannot deal with life on own	2.17	4.74
Q44	Hating self, others, and world	3.12	10.83
Q45	Frantically preventing others from leaving	4.89	25.93
Q46	Uncertainty about standards and values	2.09	4.41

*\*Deleted due to nonnormality.*

and 35, but responded to the other BPD Checklist items used in this study. This increased the usable sample size to 328.

The three cases with the largest Mahalanobis  $d^2$  values (distance from the centroid of the distribution) were relatively distant from the rest of the cases. These three cases were deleted in a step-wise fashion in order to reevaluate each case's distance from the remaining cluster of cases. These three cases after step-wise reevaluation were 176.00, 166.72, and 147.23, respectively. The largest retained Mahalanobis  $d^2$  value was 143.06. After deleting these three cases, the usable (and final) sample size became 325.

### **Confirmatory Factor Analysis**

This study used IBM SPSS Amos 20 to conduct a confirmatory factor analysis to compare the unidimensional model, Becker et al.'s (2006) four-factor model, Clarkin et al.'s (1993) four-factor model, Clarkin et al.'s (1993) three-factor model, and Sanislow et al.'s (2000) three-factor model. The comparative fit index (CFI), normative fit index



(NFI), root mean square error of approximation (RMSEA) with 90% confidence interval, standardized root mean square residual (SRMR), expected cross-validation index (ECVI), and the Tucker-Lewis index (TLI) were calculated to compare the fit of each model to the data. Akaike's information criterion (AIC) was calculated to measure how much information each model provided. This fit index was used to compare the models with each other (see Table 3 for model fit indices). The ten largest modification indices for each model were provided for additional fit information (see Table 4 for details on the modification indices). Due to the nonnormal nature of the data, bootstrap was used to estimate the bias of the original estimates compared to the bootstrap sample estimate means. The bootstrap provided estimates of squared multiple correlations (SMCs) and factor loadings, as well as bias-corrected 95% confidence intervals for the original estimates (see Appendices D, E, F, and G for details on the bootstrap estimates). The CFA was conducted with maximum likelihood estimation. The analysis of Becker et al.'s (2006) four-factor model produced a nonpositive definite covariance matrix, thereby producing a Heywood case. Therefore, the results of this model were rendered invalid and were not analyzed or compared with the other four models.

**Unidimensional model.** The unidimensional model contained a single factor on which each of the items pertaining to the eight criteria of BPD loaded. The squared multiple correlations (SMC) and factor loadings are shown in Table 5. The factor loadings ranged from .13 to .76. However, about 60% of the loadings were above .45.

Table 3

*Absolute and Relative Model Fit Indices*

	Unidimensional Model	Clarkin et al.'s (1993) 4- Factor Model	Clarkin et al.'s (1993) 3-Factor Model	Sanislow et al.'s (2000) 3-Factor Model
$\chi^2$	2059.25	1953.05	1971.91	2012.46
<i>df</i>	629	624	627	627
CFI	.71	.73	.73	.72
NFI	.63	.65	.65	.64
TLI	.70	.71	.71	.70
ECVI	6.81	6.52	6.56	6.68
SRMR	.07	.10	.10	.10
RMSEA [90% C.I.]	.084 [.080, .088]	.081 [.077, .085]	.081 [.077, .085]	.083 [.079, .087]
AIC	2207.25	2111.05	2123.91	2164.46

*Note.* CFI = comparative fit index. NFI = normative fit index. TLI = Tucker-Lewis index.  
 ECVI = expected cross-validation index. SRMR = standardized root mean squared residual.  
 RMSEA = root mean square of approximation. C.I. = confidence interval.  
 AIC = Akaike's information criterion.

Table 4

*Ten Largest Modification Indices for Four Models (Factor Loadings and Covariance of Error Terms)*

			<i>Modification Index</i>
Unidimensional Model			
e22	<-->	e24	92.07
e27	<-->	e45	70.43
e13	<-->	e27	64.53
e34	<-->	e46	43.66
e2	<-->	e36	36.92
e9	<-->	e26	36.79
e2	<-->	e3	32.21
e12	<-->	e17	32.16
e40	<-->	e42	29.70
e6	<-->	e9	26.27
Clarkin et al. 4-Factor Model (1993)			
e27	<-->	e45	70.39
e13	<-->	e27	64.72
e22	<-->	e24	57.13
e34	<-->	e46	38.01
e9	<-->	e26	37.45
e2	<-->	e3	32.15
e40	<-->	e42	30.81
e6	<-->	e9	25.71
e24	<-->	e26	24.28
e42	<-->	e41	22.41
Clarkin et al. 3-Factor Model (1993)			
e27	<-->	e45	70.79
e13	<-->	e27	64.59
e22	<-->	e24	53.31
e34	<-->	e46	38.15
e9	<-->	e26	36.97
e40	<-->	e42	30.84
e2	<-->	e3	28.16
e6	<-->	e9	25.48
e24	<-->	e26	24.54
e42	<-->	e41	22.83

Table 4 cont.

			<i>Modification Index cont.</i>
Sanislow et al. 3-Factor Model (2000)			
e27	<-->	e45	67.58
e13	<-->	e27	59.48
e22	<-->	e24	55.56
e40	<-->	e42	34.13
e34	<-->	e46	32.62
e9	<-->	e26	29.44
e2	<-->	e3	29.09
e2	<-->	e36	28.14
e6	<-->	e9	22.52
e41	<-->	e42	22.25

Table 5

*Unidimensional Model: Squared Multiple Correlations and Factor Loadings*

<i>Item Labels</i>	<i>SMC<sup>a</sup></i>	<i>Factor Loadings<sup>ab</sup></i>
Unidimensional Factor		
Q34 Unsure what is important to you	.57**	.76**
Q46 Uncertainty about standards and values	.57**	.75**
Q10 Uncertainty about identity	.52**	.72**
Q25 Feelings of despair	.50**	.71**
Q44 Hating self, others, and world	.51**	.71**
Q11 Bored or empty inside	.50**	.70**
Q36 Sudden anxieties, depression, irritability	.49**	.70**
Q15 Uncertainty about life	.48**	.70**
Q21 Rejection by others if known	.48**	.69**
Q30 Bad and unacceptable	.46**	.68**
Q32 Unsure about keeping friends/loved ones	.45**	.67**
Q43 Believes cannot deal with life on own	.45**	.67**
Q14 Being different in situations	.42**	.65**
Q33 Unacceptable feelings	.43**	.66**
Q42 Sudden loss of trust in others	.38**	.62**
Q13 Fear that others will leave	.38**	.61**
Q27 Thinks someone important will abandon	.38**	.62**
Q18 Changes in feelings for others	.36**	.60**
Q45 Frantically preventing others from leaving	.31**	.56**
Q2 Quick changes in mood	.25**	.50**
Q29 Binge eating	.22**	.47**
Q20 Not seeing bad sides of self	.21**	.46**
Q40 Disappointed in someone admired	.19**	.43**
Q9 Urge to commit suicide	.18**	.42**
Q24 Life threatening actions to self	.17**	.41**
Q3 Tantrums	.14**	.38**
Q1 Impulsive spending	.14**	.38**
Q22 Reckless driving	.14**	.37**
Q37 Breaking things out of anger	.10**	.32**

Table 5 cont.

	<i>Item Labels cont.</i>	<i>SMC<sup>a</sup> cont.</i>	<i>Factor Loadings<sup>ab</sup> cont.</i>
Q41	Sexual impulsivity later regretted	.11**	.33**
Q12	Drinking too much	.10**	.31**
Q5	Hitting or throwing things at others	.05**	.23*
Q7	Unsure about attraction to men or women	.06**	.24**
Q6	Injuring self on purpose	.04**	.19**
Q8	Gambling	.04**	.19**
Q17	Drug use	.02**	.15*
Q26	Trying to commit suicide	.02**	.13

*Note.* SMC = squared multiple correlation.

<sup>a</sup>Bootstrap bias-corrected 90% confidence interval. <sup>b</sup>Factor loadings are the standardized regression weights.

\* $p < .05$ . \*\* $p < .01$ .

Bootstrap bias-corrected 95% confidence intervals provided significance criteria for the factor loadings. Thirty-four of the thirty-seven factor loadings were significant to the  $p = .01$  level, two of the loadings were significant to the  $p = .05$  level, and only one of the loadings was not significant. The SMCs ranged from .02 to .57. About half of the SMCs were above .35. With bootstrap bias-corrected 95% confidence intervals, each of the SMCs were significant to the  $p = .01$  level. The means for the bootstrap sample SMCs estimates and for the factor loading estimates were very close to the originally estimated SMCs and factor loadings. Biases for the SMC estimates ranged from -.004 to .009 and averaged .003, and biases for the factor loadings ranged from -.008 to .008 and averaged .002. The majority of the SMC estimates were positively biased, while the majority of the factor loadings were negatively biased.

The unidimensional model had  $\chi^2(629) = 2059.25$ . There is not much to infer from the  $\chi^2$  -value, as this statistic is very sensitive to large sample sizes. The CFI and NFI values were .71 and .63, respectively, indicating poor fit to the data. The RMSEA value was .08, indicating that the model had a mediocre, but not horrible, fit to the data. The AIC value was 2207.25. The unidimensional model's SRMR was .07, which was the lowest of the models. The ten largest modification indices ranged from 26.27 to 92.07.

**Clarkin et al.'s (1993) four-factor model.** This model contained four factors, with items pertaining to the criteria of emptiness or boredom, identity disturbance, abandonment fears, and unstable relationships loading on the first factor; suicidal threats or gestures and affective instability loading on the second factor; impulsivity loading on the third factor; and uncontrolled anger loading on the fourth factor. The model's SMCs and factor loadings are provided in Table 6. Factor correlations for this model and the other multi-factor models are provided in Table 7. Factor loadings ranged from .28 to .82 for Factor 1, from .16 to .85 for Factor 2, from .35 to .66 for Factor 3, and from .27 to .77 for Factor 4. With bootstrap bias-corrected 95% confidence intervals, each of the loadings on Factor 1 were significant to the  $p = .01$  level. For Factor 2, five of the loadings were significant to the  $p = .01$  level, one of the loadings was significant to the  $p = .05$  level, and one of the loadings (Item 26) was not significant. The SMCs ranged from .08 to .66 for Factor 1, .03 to .72 for Factor 2, .12 to .43 for Factor 3, and .07 to .59 for Factor 4. Each of the items' SMCs were significant to the  $p = .01$  except for Item 1, which was significant to the  $p < .001$  level. The means for the bootstrap sample SMCs estimates and factor loading estimates showed that this model's original estimates were

Table 6

*Clarkin et al. 4-Factor Model (1993): Squared Multiple Correlations and Factor Loadings*

<i>Item Labels</i>	<i>SMC<sup>a</sup></i>	<i>Factor Loadings<sup>ab</sup></i>
Factor 1		
Q34 Unsure what is important to you	.66**	.82**
Q46 Uncertainty about standards and values	.66**	.82**
Q15 Uncertainty about life	.64**	.80**
Q10 Uncertainty about identity	.62**	.78**
Q11 Bored or empty inside	.58**	.76**
Q21 Rejection by others if known	.57**	.75**
Q30 Bad and unacceptable	.54**	.73**
Q32 Unsure about keeping friends/loved ones	.53**	.73**
Q43 Believes cannot deal with life on own	.53**	.73**
Q14 Being different in situations	.52**	.72**
Q27 Thinks someone important will abandon	.47**	.69**
Q42 Sudden loss of trust in others	.46**	.68**
Q13 Fear that others will leave	.46**	.68**
Q18 Changes in feelings for others	.45**	.67**
Q45 Frantically preventing others from leaving	.39**	.62**
Q20 Not seeing bad sides of self	.27**	.52**
Q40 Disappointed in someone admired	.24**	.49**
Q7 Unsure about attraction to men or women	.08**	.28**
Factor 2		
Q36 Sudden anxieties, depression, irritability	.72**	.85**
Q25 Feelings of despair	.70**	.84**
Q33 Unacceptable feelings	.56**	.75**
Q2 Quick changes in mood	.42**	.65**
Q9 Urge to commit suicide	.29**	.54**
Q6 Injuring self on purpose	.05**	.23*
Q26 Trying to commit suicide	.03**	.16



Table 6 cont.

	<i>Item Labels cont.</i>	<i>SMC<sup>a</sup> cont.</i>	<i>Factor Loadings<sup>ab</sup> cont.</i>
Factor 3			
Q22	Reckless driving	.43**	.66**
Q24	Life threatening actions to self	.38**	.62**
Q12	Drinking too much	.21**	.46**
Q41	Sexual impulsivity later regretted	.22**	.47**
Q8	Gambling	.16**	.39**
Q1	Impulsive spending	.16***	.39***
Q29	Binge eating	.16**	.40**
Q17	Drug use	.12**	.35**
Factor 4			
Q44	Hating self, others, and world	.59**	.77**
Q3	Tantrums	.20**	.45**
Q37	Breaking things out of anger	.14**	.37**
Q5	Hitting or throwing things at others	.07**	.27*

*Note.* SMC = squared multiple correlation.

<sup>a</sup>Bootstrap bias-corrected 90% confidence interval. <sup>b</sup>Factor loadings are the standardized regression weights.

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

Table 7

*Factor Correlations for the Multi-Factor Models*

<i>Factors</i>	<i>Factor Correlations</i>			
Clarkin et al. 4-Factor Model (1993)	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>
Factor 1	1.00	.91	.76	.99
Factor 2		1.00	.61	.96
Factor 3			1.00	.74
Factor 4				1.00
Clarkin et al. 3-Factor Model (1993)	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	
Factor 1	1.00	.94	.75	
Factor 2		1.00	.64	
Factor 3			1.00	
Sanislow et al. 3-Factor Model (2000)	<i>Affective Dys.</i>	<i>Behavioral Dys.</i>	<i>Disturbed Rel.</i>	
Affective Dys.	1.00	.770	.96	
Behavioral Dys.		1.000	.78	
Disturbed Rel.			1.00	

*Note.* Dys. = Dysregulation. Rel. = Relatedness.

more biased than the unidimensional model's original estimates. Bootstrap SMC biases ranged from -.019 to .033 and averaged .006, and factor loading biases ranged from -.038 to .013 and averaged .007.

This model had  $\chi^2(624) = 1953.05$ . The CFI and NFI values were .73 and .65, respectively, indicating poor fit to the data. The RMSEA value was .08, indicating that the model had a mediocre fit to the data. The AIC value was 2111.05, and the SRMR was .10. The ten largest modification indices ranged from 22.41 to 70.39.

**Clarkin et al.'s (1993) three-factor model.** This model contained three factors, with items pertaining to the criteria of emptiness or boredom, identity disturbance, abandonment fears, and unstable relationships loading on the first factor; suicidal threats or gestures, uncontrolled anger, and affective instability loading on the second factor; and impulsivity loading on the third factor. The model's SMCs and factor loadings are provided in Table 8. Factor loadings for Factor 1 ranged from .28 to .81, loadings for Factor 2 ranged from .16 to .84, and the loadings for Factor 3 ranged from .38 to .67. With bootstrap bias-corrected 95% confidence intervals, each of the loadings on Factor 1 were significant to the  $p = .01$  level. For Factor 2, eight of the loadings were significant to the  $p = .01$  level, two of the loadings were significant to the  $p = .05$  level, and one of the loadings (Item 26) was not significant. All of the SMCs were significant to the  $p = .01$  level except for Item 1's SMC, which was significant to the  $p = .001$ . This item loaded on Factor 3. The means for the bootstrap sample SMCs estimates and factor loading estimates showed that this model's original estimates contained a similar amount of bias as Clarkin et al.'s (1993) four-factor model. Biases ranged from -.016 to .028 for the SMCs and from -.033 to .011 for the factor loadings. The average SMC bias was .005, and the average factor loading bias was .006.

Clarkin et al.'s (1993) three-factor model had  $\chi^2 (627) = 1971.91$ . The CFI and NFI values were .73 and .65, respectively, indicating poor fit to the data. The RMSEA value was .08, indicating that the model had a mediocre fit to the data. These fit indices were almost identical to Clarkin et al.'s (1993) four-factor model fit indices. The AIC

Table 8

*Clarkin et al. 3-Factor Model (1993): Squared Multiple Correlations and Factor Loadings*

	<i>Item Labels</i>	<i>SMC<sup>a</sup></i>	<i>Factor Loadings<sup>ab</sup></i>
Factor 1			
Q34	Unsure what is important to you	.66**	.81**
Q46	Uncertainty about standards and values	.66**	.81**
Q15	Uncertainty about life	.63**	.80**
Q10	Uncertainty about identity	.61**	.78**
Q11	Bored or empty inside	.58**	.76**
Q21	Rejection by others if known	.57**	.75**
Q30	Bad and unacceptable	.53**	.73**
Q32	Unsure about keeping friends/loved ones	.53**	.73**
Q43	Believes cannot deal with life on own	.53**	.73**
Q14	Being different in situations	.52**	.72**
Q27	Thinks someone important will abandon	.47**	.69**
Q13	Fear that others will leave	.45**	.67**
Q42	Sudden loss of trust in others	.46**	.68**
Q18	Changes in feelings for others	.44**	.67**
Q45	Frantically preventing others from leaving	.38**	.62**
Q20	Not seeing bad sides of self	.27**	.52**
Q40	Disappointed in someone admired	.24**	.49**
Q7	Unsure about attraction to men or women	.08**	.28**
Factor 2			
Q36	Sudden anxieties, depression, irritability	.70**	.84**
Q25	Feelings of despair	.66**	.81**
Q44	Hating self, others, and world	.59**	.77**
Q33	Unacceptable feelings	.56**	.75**
Q2	Quick changes in mood	.40**	.63**
Q9	Urge to commit suicide	.29**	.54**
Q3	Tantrums	.20**	.45**
Q37	Breaking things out of anger	.15**	.38**
Q5	Hitting or throwing things at others	.06**	.25*

Table 8 cont.

<i>Item Labels cont.</i>		<i>SMC<sup>a</sup> cont.</i>	<i>Factor Loadings<sup>ab</sup> cont.</i>
Q6	Injuring self on purpose	.05**	.23*
Q26	Trying to commit suicide	.03**	.16
Factor 3			
Q22	Reckless driving	.45**	.67**
Q24	Life threatening actions to self	.39**	.63**
Q12	Drinking too much	.21**	.45**
Q41	Sexual impulsivity later regretted	.21**	.46**
Q8	Gambling	.15**	.39**
Q1	Impulsive spending	.15***	.39***
Q17	Drug use	.13**	.35**
Q29	Binge eating	.15**	.38**

*Note.* SMC = squared multiple correlation.

<sup>a</sup>Bootstrap bias-corrected 90% confidence interval. <sup>b</sup>Factor loadings are the standardized regression weights.

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

value was 2123.91, and the SRMR was .10. The ten largest modification indices ranged from 22.83 to 70.79.

**Sanislow et al.'s (2000) three-factor model.** This model contained three factors: Affective Dysregulation, Behavioral Dysregulation, and Disturbed Relatedness. Items pertaining to unstable relationships, identity disturbance, and emptiness or boredom loaded on the Disturbed Relatedness factor. Items pertaining to impulsiveness and recurrent suicidal behavior loaded on the Behavioral Dysregulation factor. Items pertaining to affective instability, inappropriate anger, and frantic efforts to avoid abandonment loaded on the Affective Dysregulation factor.

This model's SMCs and factor loadings are listed in Table 9. The factor loadings for the Affective Dysregulation factor ranged from .28 to .82, the factor loadings for the Behavioral Dysregulation factor ranged from .26 to .66, and the factor loadings for the Disturbed Relatedness factor ranged from .30 to .84. The SMCs for the Affective Dysregulation factor ranged from .08 to .67, the SMCs for the Behavioral Dysregulation factor ranged from .07 to .44, and SMCs for the Disturbed Relatedness factor ranged from .09 to .70. With bootstrap bias-corrected 95% confidence intervals, all but one of the item loadings on the Affective Dysregulation factor were significant to the  $p = .01$  level. Item 5 was significant to the  $p = .05$  level. All but two of the item loadings on the Behavioral Dysregulation were significant to the  $p = .01$  level. Item 12 was significant to the  $p < .001$  level, and Item 26 did not have significance. Each of the item loadings on the Disturbed Relatedness factor were significant to the  $p = .01$  level. All of the items' SMCs were significant to the  $p = .01$  level, except for Item 12, which was significant to the  $p < .001$  level. Biases calculated from the bootstrap sample estimate means ranged from -.037 to .014 for the items' factor loadings and ranged from -.016 to .038 for the items' SMCs. The average bias for the SMCs was .006, and the average factor loading bias was .008.

The Sanislow et al.'s (2000) three-factor model had  $\chi^2 (627) = 2012.46$ . The CFI and NFI values were .72 and .64, respectively, indicating poor fit to the data. The RMSEA value was .08, indicating that the model had a mediocre fit. This model's AIC value was 2164.46, and the SRMR was .10. The ten largest modification indices ranged from 22.25 to 67.58.

Table 9

*Sanislow et al. 3-Factor Model (2000): Squared Multiple Correlations and Factor Loadings*

	<i>Item Labels</i>	<i>SMC<sup>a</sup></i>	<i>Factor Loadings<sup>ab</sup></i>
<b>Affective Dysregulation</b>			
Q36	Sudden anxieties, depression, irritability	.67**	.82**
Q25	Feelings of despair	.62**	.79**
Q44	Hating self, others, and world	.60**	.78**
Q43	Believes cannot deal with life on own	.58**	.76**
Q33	Unacceptable feelings	.57**	.75**
Q21	Rejection by others if known	.55**	.74**
Q13	Fear that others will leave	.51**	.71**
Q27	Thinks someone important will abandon	.50**	.71**
Q18	Changes in feelings for others	.46**	.68**
Q45	Frantically preventing others from leaving	.42**	.65**
Q2	Quick changes in mood	.38**	.62**
Q3	Tantrums	.21**	.46**
Q37	Breaking things out of anger	.14**	.37**
Q5	Hitting or throwing things at others	.08**	.28*
<b>Behavioral Dysregulation</b>			
Q24	Life threatening actions to self	.44**	.66**
Q22	Reckless driving	.41**	.64**
Q9	Urge to commit suicide	.22**	.47**
Q12	Drinking too much	.19***	.43***
Q29	Binge eating	.17**	.42**
Q41	Sexual impulsivity later regretted	.17**	.41**
Q1	Impulsive spending	.15**	.39**
Q17	Drug use	.13**	.36**
Q8	Gambling	.13**	.36**
Q6	Injuring self on purpose	.08**	.28**
Q26	Trying to commit suicide	.07**	.26

Table 9 cont.

<i>Item Labels cont.</i>		<i>SMC<sup>a</sup> cont.</i>	<i>Factor Loadings<sup>ab</sup> cont.</i>
Disturbed Relatedness			
Q34	Unsure what is important to you	.70**	.84**
Q46	Uncertainty about standards and values	.68**	.83**
Q11	Bored or empty inside	.67**	.82**
Q10	Uncertainty about identity	.65**	.81**
Q15	Uncertainty about life	.60**	.78**
Q30	Bad and unacceptable	.55**	.74**
Q14	Being different in situations	.54**	.74**
Q32	Unsure about keeping friends/loved ones	.54**	.73**
Q42	Sudden loss of trust in others	.47**	.68**
Q20	Not seeing bad sides of self	.28**	.53**
Q40	Disappointed in someone admired	.23**	.48**
Q7	Unsure about attraction to men or women	.09**	.30**

*Note.* SMC = squared multiple correlation.

<sup>a</sup>Bootstrap bias-corrected 90% confidence interval. <sup>b</sup>Factor loadings are the standardized regression weights.

\*p < .05. \*\*p < .01. \*\*\*p < .001.



## DISCUSSION

The present study reviewed five factor models of BPD criteria that have been supported in the literature (Becker et al., 2006; Becker et al., 2010; Clarkin et al., 1993; Fossati et al., 1999; and Sanislow et al., 2000). Due to the discrepancy in the literature concerning which model best conveys the factor structure of the symptoms of BPD, the researcher sought to compare these models directly to each other. One of objectives of the present study was to collect a sample that was large enough for a factor analysis study. The majority of the previously mentioned studies did not utilize samples of adequate size for this analysis. The primary objective of the present study was to study the factor structure of BPD symptomology by using confirmatory factor analysis to test the fit of the five models to the data and to comparing the models with each other.

Four out of five models were successfully analyzed with CFA. Becker et al.'s (2006) four-factor model produced a Heywood case, so the results of this model were not analyzed. The four models with successful CFAs had almost identical CFIs, NFIs, and RMSEAs. However, these indices cannot be compared with each other. Akaike's information criterion is a measure of information provided by a model and can be compared between models. Clarkin et al.'s (1993) four-factor model had the smallest AIC among the four models being compared. Clarkin et al.'s (1993) three-factor model had the second smallest AIC. Sanislow et al.'s (2002) three-factor model and the unidimensional model had the third and fourth largest AICs, respectively. These results indicate that Clarkin et al.'s (1993) four-factor model provided the most amount of information about the data out of these four models.

A strength of this study was that the sample size of this study ( $N = 325$ ) was more than twice the size of most of the studies previously mentioned (Becker et al., 2006; Becker et al., 2010; Clarkin et al., 1993; and Sanislow et al., 2000). A large sample size is essential in factor analysis to stabilize the parameter estimates and reduce error. However, a sample size of greater than 400 is preferred in factor analysis, especially if the analysis requires many parameters to be estimated. Another strength of this study was the diversity of participants in the sample. The participants were of a wide variety of ethnicities and ages. Forty-five of the participants reported previous diagnosis of a mental illness.

An instrument that is more sensitive to low-level BPD symptomology may be required in order more successfully analyze a sample with many subclinical BPD participants. It appeared that many of the participants were too subclinical BPD for the BPD Checklist to be used. Many of the participants indicated “None at all” or “Slightly” to a significant amount of the BPD Checklist items, causing the data to be positively skewed and have high kurtosis. An instrument that is more sensitive to low-level BPD symptomology may be required in order to more successfully analyze a sample with many subclinical BPD participants.

An implication of this study is that Clarkin et al.’s (1993) two models provided the most information out of the four models, with Clarkin et al.’s four-factor model providing the best explanation of the data. Much of the previous research supported the unidimensional model (Becker et al., 2010; Fossati et al., 1999), which provided the least amount of information in this study. Future research opportunities include using a more

sensitive BPD instrument for participants who are subclinical BPD. The time period in which BPD symptoms are experienced could be increased, or the items could measure a less severe form of the BPD symptoms. Future research could transform Sanislow et al.'s (2000) three-factor model into a structural equation model, where the Affective Dysregulation and Disturbed Relatedness factors are exogenous variables and the Behavioral Dysregulation factor is a common endogenous variable. Another study could use cluster analysis to analyze how patients with BPD are clustered together when similarities between the combinations of exhibited symptoms are maximized and differences between the combinations of exhibited symptoms are minimized.

## REFERENCES

- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3<sup>th</sup> ed., text revision). Washington, DC: American Psychiatric Association.
- American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed., text revision). Washington, DC: American Psychiatric Association.
- Andión, O., Ferrer, M., Gancedo, B., Calvo, N., Barral, C., Torrubia, R., & Casas, M. (2011). Confirmatory factor analysis of borderline personality disorder symptoms based on two different interviews: The Structured Clinical Interview for DSM-IV Axis II Disorder and the Revised Diagnostic Interview for Borderlines. *Psychiatry Research, 190*, 304-308.
- Arntz, A., & Dreesen, L. (1995). *Borderline personality disorder symptom checklist*. Maastricht, Netherlands: Author.
- Becker, D. F., Añez, L. M., Paris, M., & Grilo, C. M. (2010). Exploratory factor analysis of borderline personality disorder criteria in monolingual Hispanic outpatients with substance use disorders. *Psychiatry Research, 178*, 305-308.
- Becker, D. F., McGlashan, T. H., & Grilo, C. M. (2006). Exploratory factor analysis of borderline personality disorder criteria in hospitalized adolescents. *Comprehensive Psychiatry, 47*, 99-105.
- Clarkin, J. F., Hull, J. W., Hurt, S. W. (1993). Factor structure of borderline personality disorder criteria. *Journal of Personality Disorders, 7*, 137-143.

- Crowell, S.E., Beauchaine, T. P., & Linehan, M. M. (2009). A biosocial developmental model of borderline personality: Elaborating and extending Linehan's theory. *Psychological Bulletin, 135*(3), 495-510. doi: 10.1037/a0015616
- Ferraz, L., Vázquez, M., Navarro, J. B., Gelabert, E., Martín-Santos, R., & Subirà, S. (2009). Dimensional assessment of personality and impulsiveness in borderline personality disorder. *Personality and Individual Differences, 46*, 140-146.
- First, M. B., Spitzer, R. L., Gibbon, M., Janet, B. V., Benjamin, L. (1994). *Structured Clinical Interview for DSM-IV Axis II personality disorders (SCID-II), version 2.0*. New York, NY: Biometric Research Department, New York State Psychiatric Institute.
- Fossati, A., Maffei, C., Bagnato, M., Donati, D., Namia, C., & Novella, L. (1999). Latent structure analysis of DSM-IV borderline personality disorder criteria. *Comprehensive Psychiatry, 40*(1), 72-79.
- Giesen-Bloo, J. H., Arntz, A., van Dijck, R., Spinhoven, Ph., & van Tilburg, W. (2001). Outpatient treatment of borderline personality disorder: Analytical psychotherapy versus cognitive behavior therapy. Paper presented at the World Congress of Behavioral and Cognitive Therapies, July 17–21, 2001, Vancouver.
- Giesen-Bloo, J. H., Wouters, L. M., Schouten, E., & Arntz, A. (2010). The Borderline Personality Disorder Severity Index-IV: Psychometric evaluation and dimensional structure. *Personality and Individual Differences, 49*, 136-141.
- Grilo, C. M., Añez, L. M., & McGlashan, T. H. (2003). The Spanish-Language Version of the Diagnostic Interview for DSM-IV Personality Disorders: Development and

- initial psychometric evaluation of diagnoses and criteria. *Comprehensive Psychiatry*, 44(2), 144-161.
- Hurt, S. W., Clarkin, J. F., Widiger, T. A., Fyer, M. R., Sullivan, T., Stone, M. H., & Frances, A. (1990). Evaluation of DSM-III decision rules for case detection using joint conditional probability structures. *Journal of Personality Disorders*, 4(2), 121-130.
- Koenigsberg, H. W., Siever, L. J., Lee, H., Pizzarello, S., New, A. S., Goodman, M., . . . Prohovnik, I. (2009). Neural correlates of emotion processing in borderline personality disorder. *Neuroimaging*, 172, 192-199.
- Linehan, M. M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: The Guilford Press.
- Livesley, W. J., & Schröder, M. L. (1991). Dimensions of personality disorder: The DSM-III-R cluster B diagnoses. *Journal of Nervous and Mental Disease*, 179, 320-328.
- Loranger, A. W., Susman, V. L., Oldham, J. M., & Russakoff, M. (1988). *Personality Disorder Examination (PDE) manual*. Yonkers, NY: DV Communications.
- Morey, L. C. (1991). *Personality assessment inventory: Professional manual*. Odessa, FL: Psychological Assessment Resources.
- New, A. S., Triebwasser, J., & Charney, D. S. (2008). The case for shifting borderline personality disorder to Axis I. *Society of Biological Psychiatry*, 64, 653-659.

- Sanislow, C. A., Grilo C. M., McGlashan, T. H. (2000). Factor analysis of the DSM-III-R borderline personality disorder in psychiatric inpatients. *American Journal of Psychiatry*, *157*(10), 1629-1633.
- Sanislow, C. A., Grilo, C. M., Morey, L. C., Bender, D. S., Skodol, A. E., Gunderson, J. G., . . . McGlashan, T. H. (2002). Confirmatory factor analysis of DSM-IV criteria for borderline personality disorder: Findings from the Collaborative Longitudinal Personality Disorders Study. *American Journal of Psychiatry*, *159*(2), 284-290.
- Zanarini, M. C., Gunderson, J., Frankenburg, F. T., & Chauncey, D. L. (1989). The revised diagnostic interview for borderlines: Discriminating BPD from other axis II disorders. *Journal of Personality Disorders*, *3*, 10-18.

APPENDICES



## Appendix A. The BPD Checklist items.

During last month, to what extent were you troubled by:		Not at all	Slightly	Moderately	To a large degree	Extremely
1	Impulsive spending of too much money, that you cannot afford to spend	1	2	3	4	5
2	Quick changes of mood	1	2	3	4	5
3	Tantrums	1	2	3	4	5
4	Not feeling oneself anymore, like an outside observer of yourself, or experiencing yourself as in a movie or dream (not because of drugs)	1	2	3	4	5
5	Hitting others or throwing things at others	1	2	3	4	5
6	Injuring yourself on purpose (cutting, pricking, hitting, burning)	1	2	3	4	5
7	Not knowing whether you actually feel attracted to men or women	1	2	3	4	5
8	Gambling	1	2	3	4	5
9	The urge to kill yourself	1	2	3	4	5
10	Uncertainty about who you really are	1	2	3	4	5
11	Feeling bored or empty inside	1	2	3	4	5
12	Drinking too much	1	2	3	4	5
13	Fear that others will leave you	1	2	3	4	5
14	Being so different in various situations or with other people that you don't know who you are anymore	1	2	3	4	5
15	Uncertainty about what your life should look like	1	2	3	4	5
16	Being convinced that others are treating you unfairly	1	2	3	4	5
17	Drug use	1	2	3	4	5
18	Strong changes in feelings for other people	1	2	3	4	5
19	Distrusting other people	1	2	3	4	5
20	Not daring to recognize the bad sides of yourself	1	2	3	4	5

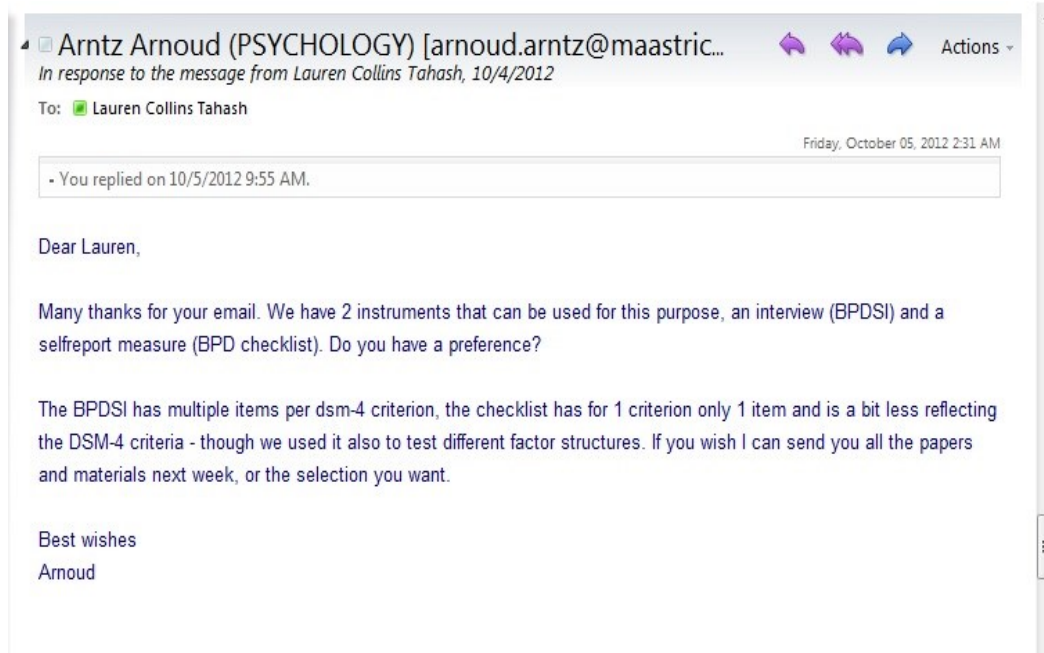
During last month, to what extent were you troubled by:

	Not at all	Slightly	Moderately	To a large degree	Extremely
21 The idea that if others really get to know you, they will reject you	1	2	3	4	5
22 Reckless driving (car, motor, bike)	1	2	3	4	5
23 Observing or experiencing the world around you totally differently so that it seems very odd or unreal to you (eg others look unfamiliar or like 'robots'; not because of drugs)	1	2	3	4	5
24 The tendency to act in life threatening ways (eg in traffic)	1	2	3	4	5
25 Feelings of despair	1	2	3	4	5
26 Trying to kill yourself	1	2	3	4	5
27 Losing your senses because you are convinced/think that somebody who's important to you, will leave you	1	2	3	4	5
28 Threatening other people that you will injure or kill yourself	1	2	3	4	5
29 Binge eating	1	2	3	4	5
30 Finding yourself a bad and unacceptable person	1	2	3	4	5
31 Being convinced that others have it in for you (that you're being persecuted)	1	2	3	4	5
32 Not knowing what friends or loved ones you want to have	1	2	3	4	5
33 Feelings that are unacceptable to you	1	2	3	4	5
34 Not knowing what is actually important to you	1	2	3	4	5
35 Shoplifting	1	2	3	4	5
36 Sudden anxieties, depressions or irritability	1	2	3	4	5
37 Becoming so angry that you lose control and break things	1	2	3	4	5
38 Not being able to remember important things (not because of drugs)	1	2	3	4	5
39 Being very suspicious	1	2	3	4	5

During last month, to what extent were you troubled by:

	Not at all	Slightly	Moderately	To a large degree	Extremely
40 Feeling terribly disappointed in someone you first admired or loved	1	2	3	4	5
41 Acting on an impulsive sexual contact you later regretted	1	2	3	4	5
42 Suddenly losing trust in other people	1	2	3	4	5
43 The conviction that you're not able to deal with life on your own	1	2	3	4	5
44 Hating yourself, everybody and the world	1	2	3	4	5
45 Frantically trying to prevent others from leaving you	1	2	3	4	5
46 Uncertainty about what your true standards and values are	1	2	3	4	5
47 Not knowing anymore what you have done or where you are (not because of drugs)	1	2	3	4	5

Appendix B. Email correspondence concerning permission to use  
the BPD Checklist



Arntz Arnoud (PSYCHOLOGY) [arnoud.arnutz@maastricht...]  
*In response to the message from Lauren Collins Tahash, 10/4/2012*

To: Lauren Collins Tahash

Friday, October 05, 2012 2:31 AM

- You replied on 10/5/2012 9:55 AM.

Dear Lauren,

Many thanks for your email. We have 2 instruments that can be used for this purpose, an interview (BPDSI) and a selfreport measure (BPD checklist). Do you have a preference?

The BPDSI has multiple items per dsm-4 criterion, the checklist has for 1 criterion only 1 item and is a bit less reflecting the DSM-4 criteria - though we used it also to test different factor structures. If you wish I can send you all the papers and materials next week, or the selection you want.

Best wishes  
Arnoud

## Appendix C. Relationship between the BPD Checklist items and DSM-IV criteria.

DSM-IV criteria	BPD Checklist Items
1. Fear of Abandonment:	13, 18, 21, 27, 28, 43, 45
2. Unstable Relationships:	32, 40, 42
3. Unstable Identity/Self-concept:	7, 10, 14, 15, 20, 30, 34, 46
4. Impulsivity:	1, 8, 12, 17, 22, 24, 29, 35, 41
5. Parasuicidal Behavior:	6, 9, 26
6. Emotional Instability:	2, 25, 33, 36
7. Emptiness or Boredom:	11
8. Uncontrolled Anger:	3, 5, 37, 44
9. Stress-related Paranoid/Dissociation:	4, 16, 19, 23, 31, 38, 39, 47

## Appendix D. Bootstrap estimates for the unidimensional model.

<i>Item Labels</i>	<i>Bootstrap</i>				
	<i>SMC Means</i>	<i>Bias</i>	<i>Factor Loading<sup>a</sup></i>	<i>Means</i>	<i>Bias</i>
Unidimensional Factor					
Q34 Unsure what is important to you	.57	.000	.75	.000	
Q46 Uncertainty about standards and values	.57	-.001	.75	-.001	
Q10 Uncertainty about identity	.52	.001	.72	.000	
Q25 Feelings of despair	.50	-.001	.71	-.001	
Q44 Hating self, others, and world	.51	.002	.71	-.001	
Q11 Bored or empty inside	.50	.002	.70	.000	
Q36 Sudden anxieties, depression, irritability	.49	.001	.70	.000	
Q15 Uncertainty about life	.48	.000	.69	-.001	
Q21 Rejection by others if known	.48	.002	.69	.000	
Q30 Bad and unacceptable	.46	.001	.68	-.001	
Q32 Unsure about keeping friends/loved ones	.45	.003	.67	-.001	
Q43 Believes cannot deal with life on own	.45	-.003	.67	-.004	
Q14 Being different in situations	.42	.002	.65	.000	
Q33 Unacceptable feelings	.43	-.002	.65	-.003	
Q42 Sudden lost of trust in others	.38	.002	.62	-.002	
Q13 Fear that others will leave	.38	.000	.61	-.002	
Q27 Thinks someone important will abandon	.38	-.004	.61	-.008	
Q18 Changes in feelings for others	.36	.000	.60	-.002	
Q45 Frantically preventing others from leaving	.31	.004	.55	-.007	
Q2 Quick changes in mood	.25	-.001	.50	-.004	
Q29 Binge eating	.22	.002	.47	-.002	
Q20 Not seeing bad sides of self	.21	.003	.46	-.001	
Q40 Disappointed in someone admired	.19	.003	.43	-.001	
Q9 Urge to commit suicide	.19	.007	.43	.003	
Q24 Life threatening actions to self	.17	.006	.41	.000	
Q3 Tantrums	.14	.002	.38	-.002	
Q1 Impulsive spending	.14	-.001	.37	-.006	
Q22 Reckless driving	.14	.002	.36	-.004	
Q37 Breaking things out of anger	.11	.005	.32	.002	
Q41 Sexual impulsivity later regretted	.12	.007	.32	-.006	
Q12 Drinking too much	.10	.006	.31	-.004	
Q5 Hitting or throwing things at others	.06	.009	.23	-.006	
Q7 Unsure about attraction to men or women	.06	.002	.23	-.003	
Q6 Injuring self on purpose	.04	.009	.20	.008	
Q8 Gambling	.04	.005	.19	.000	
Q17 Drug use	.03	.006	.15	.004	
Q26 Trying to commit suicide	.03	.008	.13	.001	

Note. SMC = squared multiple correlation.

<sup>a</sup>Factor loadings are the standardized regression weights.

## Appendix E. Bootstrap estimates for the Clarkin et al. (1993) four-factor model.

<i>Item Labels</i>	<i>Bootstrap</i>			
	<i>SMC Means</i>	<i>Bias</i>	<i>Factor Loading<sup>a</sup></i>	<i>Means Bias</i>
Factor 1				
Q34 Unsure what is important to you	.67	.001	.82	.000
Q46 Uncertainty about standards and values	.66	-.001	.81	-.001
Q15 Uncertainty about life	.64	.002	.80	.001
Q10 Uncertainty about identity	.62	.001	.78	.000
Q11 Bored or empty inside	.58	.002	.76	.001
Q21 Rejection by others if known	.57	.001	.75	.000
Q30 Bad and unacceptable	.54	.000	.73	-.001
Q32 Unsure about keeping friends/loved ones	.54	.001	.73	-.001
Q43 Believes cannot deal with life on own	.53	-.003	.73	-.004
Q14 Being different in situations	.52	.001	.72	-.001
Q27 Thinks someone important will abandon	.47	-.007	.68	-.009
Q42 Sudden lost of trust in others	.46	.001	.68	-.003
Q13 Fear that others will leave	.46	-.001	.67	-.003
Q18 Changes in feelings for others	.45	.000	.67	-.002
Q45 Frantically preventing others from leaving	.39	-.001	.61	-.011
Q20 Not seeing bad sides of self	.27	.002	.52	-.002
Q40 Disappointed in someone admired	.24	.003	.49	-.002
Q7 Unsure about attraction to men or women	.08	.003	.28	-.003
Factor 2				
Q36 Sudden anxieties, depression, irritability	.72	.002	.85	.001
Q25 Feelings of despair	.70	-.002	.84	-.002
Q33 Unacceptable feelings	.56	-.006	.74	-.006
Q2 Quick changes in mood	.42	-.006	.64	-.007
Q9 Urge to commit suicide	.30	.009	.55	.004
Q6 Injuring self on purpose	.07	.016	.24	.012
Q26 Trying to commit suicide	.04	.012	.17	.004
Factor 3				
Q22 Reckless driving	.47	.033	.67	.013
Q24 Life threatening actions to self	.40	.024	.62	.007
Q12 Drinking too much	.21	-.003	.44	-.022
Q41 Sexual impulsivity later regretted	.22	.005	.44	-.022
Q8 Gambling	.16	-.001	.38	-.015
Q1 Impulsive spending	.14	-.019	.36	-.037
Q29 Binge eating	.15	-.007	.36	-.038
Q17 Drug use	.13	.007	.34	-.009
Factor 4				
Q44 Hating self, others, and world	.60	.004	.77	.000
Q3 Tantrums	.19	-.007	.43	-.016
Q37 Breaking things out of anger	.15	.009	.38	.004
Q5 Hitting or throwing things at others	.09	.019	.26	-.001

*Note.* SMC = squared multiple correlation.

<sup>a</sup>Factor loadings are the standardized regression weights.

## Appendix F. Bootstrap estimates for the Clarkin et al. (1993) three-factor model.

<i>Item Labels</i>	<i>Bootstrap</i>				
	<i>SMC Means</i>	<i>Bias</i>	<i>Factor Loading<sup>a</sup></i>	<i>Means</i>	<i>Bias</i>
Factor 1					
Q34 Unsure what is important to you	.66	.001	.82		.000
Q46 Uncertainty about standards and values	.66	.000	.81		-.001
Q15 Uncertainty about life	.64	.002	.80		.001
Q10 Uncertainty about identity	.61	.001	.78		.000
Q11 Bored or empty inside	.58	.002	.76		.001
Q21 Rejection by others if known	.57	.001	.75		.000
Q30 Bad and unacceptable	.53	.000	.73		-.001
Q32 Unsure about keeping friends/loved ones	.53	.002	.73		-.001
Q43 Believes cannot deal with life on own	.53	-.003	.73		-.004
Q14 Being different in situations	.52	.001	.72		-.001
Q27 Thinks someone important will abandon	.46	-.006	.68		-.008
Q13 Fear that others will leave	.45	-.001	.67		-.002
Q42 Sudden lost of trust in others	.46	.002	.67		-.002
Q18 Changes in feelings for others	.44	-.001	.66		-.002
Q45 Frantically preventing others from leaving	.38	.000	.61		-.010
Q20 Not seeing bad sides of self	.27	.003	.52		-.001
Q40 Disappointed in someone admired	.24	.003	.49		-.001
Q7 Unsure about attraction to men or women	.08	.003	.28		-.003
Factor 2					
Q36 Sudden anxieties, depression, irritability	.70	.001	.84		.001
Q25 Feelings of despair	.66	-.003	.81		-.003
Q44 Hating self, others, and world	.60	.004	.77		.001
Q33 Unacceptable feelings	.55	-.005	.74		-.005
Q2 Quick changes in mood	.40	-.006	.63		-.007
Q9 Urge to commit suicide	.30	.008	.54		.003
Q3 Tantrums	.20	.002	.44		-.004
Q37 Breaking things out of anger	.15	.007	.39		.003
Q5 Hitting or throwing things at others	.07	.010	.25		-.008
Q6 Injuring self on purpose	.07	.015	.24		.011
Q26 Trying to commit suicide	.04	.011	.17		.002
Factor 3					
Q22 Reckless driving	.48	.028	.68		.011
Q24 Life threatening actions to self	.41	.018	.63		.003
Q12 Drinking too much	.21	.000	.44		-.019
Q41 Sexual impulsivity later regretted	.22	.008	.44		-.018
Q8 Gambling	.15	.001	.38		-.013
Q1 Impulsive spending	.14	-.016	.36		-.033
Q17 Drug use	.13	.007	.35		-.007
Q29 Binge eating	.14	-.004	.35		-.034

Note. SMC = squared multiple correlation.

<sup>a</sup>Factor loadings are the standardized regression weights.



## Appendix G. Bootstrap estimates for the Sanislow et al. (1993) three-factor model.

<i>Item Labels</i>	<i>Bootstrap</i>			
	<i>SMC Means</i>	<i>Bias</i>	<i>Factor Loading<sup>a</sup></i>	<i>Means Bias</i>
<b>Affective Dysregulation</b>				
Q36 Sudden anxieties, depression, irritability	.67	.003	.82	.002
Q25 Feelings of despair	.62	-.001	.79	-.001
Q44 Hating self, others, and world	.60	.000	.78	-.001
Q43 Believes cannot deal with life on own	.58	-.004	.76	-.003
Q33 Unacceptable feelings	.56	-.002	.75	-.003
Q21 Rejection by others if known	.55	.000	.74	.000
Q13 Fear that others will leave	.50	-.001	.71	-.002
Q27 Thinks someone important will abandon	.49	-.007	.70	-.009
Q18 Changes in feelings for others	.46	.000	.68	-.002
Q45 Frantically preventing others from leaving	.42	-.002	.64	-.011
Q2 Quick changes in mood	.38	-.001	.61	-.003
Q3 Tantrums	.21	.002	.46	-.003
Q37 Breaking things out of anger	.14	.007	.37	.003
Q5 Hitting or throwing things at others	.09	.012	.27	-.009
<b>Behavioral Dysregulation</b>				
Q24 Life threatening actions to self	.47	.034	.67	.014
Q22 Reckless driving	.42	.010	.64	-.004
Q9 Urge to commit suicide	.23	.010	.47	-.007
Q12 Drinking too much	.17	-.014	.40	-.035
Q29 Binge eating	.17	-.007	.38	-.037
Q41 Sexual impulsivity later regretted	.16	-.003	.37	-.034
Q1 Impulsive spending	.14	-.016	.36	-.034
Q17 Drug use	.13	-.003	.34	-.021
Q8 Gambling	.12	-.005	.33	-.026
Q6 Injuring self on purpose	.10	.021	.29	.006
Q26 Trying to commit suicide	.11	.038	.27	.007
<b>Disturbed Relatedness</b>				
Q34 Unsure what is important to you	.70	.001	.84	.000
Q46 Uncertainty about standards and values	.68	-.001	.83	-.001
Q11 Bored or empty inside	.67	.003	.82	.001
Q10 Uncertainty about identity	.65	.001	.81	.000
Q15 Uncertainty about life	.60	.001	.78	.000
Q30 Bad and unacceptable	.55	.000	.74	-.001
Q14 Being different in situations	.54	.000	.74	-.001
Q32 Unsure about keeping friends/loved ones	.54	.001	.73	-.001
Q42 Sudden lost of trust in others	.47	.001	.68	-.002
Q20 Not seeing bad sides of self	.28	.002	.53	-.002
Q40 Disappointed in someone admired	.23	.003	.48	-.002
Q7 Unsure about attraction to men or women	.09	.003	.30	-.004

Note. SMC = squared multiple correlation.

<sup>a</sup>Factor loadings are the standardized regression weights.

## Appendix H. IRB approval letter.

**Institutional Review Board**  
 P.O. Box 134  
 Middle Tennessee State University  
 Murfreesboro, Tennessee 37132  
 Office: (615) 898-5005



November 8, 2012

**Micheal Hein**  
 Psychology Department  
 michael.hein@mtsu.edu

**Protocol Title: Psychometric Properties of Two Scales**  
**Protocol Number: 13-104**

Dear Investigator(s),

The MTSU Institutional Review Board (IRB), or a representative of the IRB, has reviewed the research proposal identified above and determined that the study poses minimal risk to participants. The proposal qualifies for an expedited review under 45 CFR 46.110 Category 4.

Approval is granted for one (1) year from the date of this letter using participants for the Psychology Research Pool.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance (Box 134) before they begin work on the project. Any change to the protocol must be submitted to the IRB before implementation.

Please note that any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918.

Upon completion of the study you will need to submit an end-of-project report to the Office of Compliance. The report form can be found on the IRB website. Complete research means that you have finished collecting and analyzing data. Should you not finish your research within the one (1) year period, you must submit a Progress Report and request a continuation prior to the expiration date. Please allow time for review and requested revisions. Your study expires **November 9, 2013**.

Also, all research materials must be retained by the PI or faculty advisor (if the PI is a student) for at least three (3) years after study completion. Should you have any questions or need additional information, please do not hesitate to contact me 615-898-5878 or [andrew.owusu@mtsu.edu](mailto:andrew.owusu@mtsu.edu).

Sincerely,

A handwritten signature in black ink, appearing to read "Andrew Owusu".

**Andrew Owusu Ph.D.**  
 Associate Professor  
 Department of Health and Human Performance  
 Middle Tennessee State University  
 P.O. Box 96  
 Murfreesboro, TN 37132

