An examination of the construct validity of the Hong Psychological Reactance Scale

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An Examination of the Construct Validity of the Hong Psychological Reactance Scale

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A thesis submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Master of Arts

Department of Graduate Psychology

May 2010
Acknowledgements

Without the support, guidance, and encouragement from those around me, completing this thesis would not have been possible. I would like to first offer my deepest gratitude to my advisor, Dr. Sara Finney. Throughout this process, Dr. Finney has been extremely supportive, spending countless hours reading drafts, providing incredibly detailed and specific feedback, and meeting with me to troubleshoot some technical challenges. Dr. Finney’s high expectations, unwavering support, and patient guidance has allowed me to develop both professionally, as a student and researcher, as well as personally. Thank you for being such a wonderful mentor and strong source of encouragement over the past two years.

I would also like to thank my thesis committee members, Dr. Josh Goodman and Dr. Kenn Barron for your insightful feedback and guidance. Learning about the bifactor model and different kinds of reliability from Dr. Goodman was instrumental in being able to complete this thesis project. Thank you for explaining these challenging concepts so clearly. Dr. Barron, my undergraduate advisor, has taught me the importance of clear writing and “hand-holding” your reader. Thank you for offering such thoughtful feedback, especially regarding my writing.

In addition, I would also like to thank Dr. Finney’s pervious advisees, especially Mary Johnston, Megan France, and Dr. Carol Barry. Your theses set such high standards in terms of quality of research and writing, and your advice encouraged me to work towards reaching those standards.

Finally, I would like to thank my family and friends for you support and patience throughout this process. You mean the world to me.
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Abstract

The purpose of the current study was to investigate the construct validity of a measure of trait reactance: the Hong Psychological Reactance Scale (HPRS). Investigating the functioning of this measure was particularly important, as the conclusions drawn from studies relating reactance to affect, attitudes, and behavior hinge on the legitimacy and quality of the HPRS. Using two samples of undergraduates, the current study employed structural equation modeling (SEM) to examine the factor structure of the HPRS and relate it to conformity, the Big Five personality traits, and entitlement. Results supported modeling the HPRS via a modified incomplete bifactor model. As expected, trait reactance was negatively related to conformity, agreeableness, and conscientiousness, and positively related to entitlement. Implications for using and scoring the HPRS are discussed.
CHAPTER 1

Introduction

*Psychological Reactance Theory*

According to Psychological Reactance Theory (PRT), people perceive that they have various behaviors, thoughts, and feelings they can engage in at a given time; PRT calls these *behavioral freedoms* (Brehm, 1966; Brehm & Brehm, 1981). When one or several of these behavioral freedoms are threatened with elimination or are actually eliminated, PRT argues that people will experience a motivational state aimed at protecting the threatened freedom(s) (Brehm; Brehm & Brehm). The motivation to re-establish a behavioral freedom has been termed *psychological reactance*. Reactance is typically an unpleasant experience for people and can result in anger, aggression, and hostility. In response to experiencing reactance, people may try to restore their freedom by either (1) directly engaging in the behavior (i.e., direct re-establishment) or (2) by enacting other similar freedoms (i.e., indirect re-establishment).

Consider, for example, Prohibition in the United States. From 1919 to 1933, it was illegal to produce, transport, or sell alcoholic beverages. The ban appeared to be effective at first, as evidenced by a decrease in liquor consumption and fewer arrests related to public drunkenness. However, these data did not appear to “reflect the growing disobedience toward the law and law enforcement...[That is,] the illegal production and distribution of liquor, or bootlegging, became rampant” (U.S. National Archives and Record Administration, 2009). This illegal behavior illustrates an example of psychological reactance. That is, numerous Americans likely experienced psychological reactance during Prohibition, which motivated them to restore their behavioral freedom to
drink alcohol. To do this, many Americans engaged in direct re-establishment by consuming alcoholic beverages that were illegally produced and distributed.

**Why Study Psychological Reactance?**

Originally, PRT defined reactance as a context-specific occurrence (i.e., state reactance), however theorists have expanded the theory, positing that individuals may also vary in their disposition to experience reactance independent of the context (e.g., Dowd, Milne, & Wise, 1991). In other words, researchers have theorized that people vary in how reactant they are *in general*. As such, researchers have developed measures of trait reactance to better understand the characteristics and actions of employees (Sachau, Houlihan, & Gilbertson, 1999), therapy clients (e.g., Dowd & Wallbrown, 1993), and college students (Johnson & Buboltz, 2000). For example, organizational settings that place a great deal of importance on compliance (e.g., the military or law enforcement) could use a measure of trait reactance for personnel selection. A measure of trait reactance could also be very useful in a university setting, where students are expected to adhere to the expectations and requests of faculty and administrators. Students who tend to experience reactance in response to being told what to do may be at risk for unfavorable outcomes (e.g., dropping out of school). Moreover, trait reactance has been positively associated with trait anger (Hong & Giannakopoulos, 1993; Hong & Faedda, 1996), aggression (Dowd & Wallbrown), and loneliness (Joubert, 1990), and negatively related to happiness (Joubert) and conformity (Goldsmith, Clark, & Lafferty, 2005). In addition, several researchers have examined the personality profiles of people high in trait reactance (Buboltz, Woller, & Pepper, 1999; Dowd & Wallbrown; Dowd, Wallbrown, Sanders & Yesenosky, 1994). Clearly, measuring the trait reactance of
individuals may provide insight into important quality of life variables (e.g., trait anger, loneliness, happiness), as well as the personality traits and attitudes (e.g., conformity) that influence the behavior of individuals.

Given the extensive study of reactance in relation to numerous affective, attitudinal, and behavioral variables, there is clearly an interest in using reactance to better understand individuals. In order to make accurate conclusions and inferences, however, researchers need a quality measure of trait reactance. A quality measure is developed by gathering and evaluating validity evidence.

A framework proposed by Benson (1998) is especially useful in evaluating the validity (i.e., quality) of the inferences made from test scores. Benson emphasizes the importance of theory and outlines three stages that must be undertaken in developing a measure with high construct validity: a substantive stage, a structural stage, and an external stage. In the substantive stage, the construct is defined both theoretically and empirically. Items must be written to represent the various aspects of the construct so that there is a clear link between the theory underlying the construct and the items used to represent it. During the structural stage, inter-item relationships are assessed and the observed dimensionality of the scale is compared to the theorized dimensionality. In other words, if items are functioning adequately, they should relate to one another in theoretically expected ways. Assessing the structure of the observed scores is also useful as it indicates how the measure should be scored. For example, if item scores were found to be unidimensional, then computing a total score would align with the dimensionality. In contrast, if item scores were multidimensional, then computing subscale scores to reflect each dimension would be more acceptable than computing a total score. During
the external stage, scale scores are related to measures of other theoretically related constructs. It is through the external stage that test scores become meaningful.

**The Current State of Measurement of Trait Reactance**

Although several measures of trait reactance have been developed (Merz, 1983, as cited in Tucker & Byers, 1987; Dowd et al., 1991), the Hong Psychological Reactance Scale (HPRS) appears to be the most suitable measure to study a wide range of populations. Compared to other measures of trait reactance, the HPRS has been studied the most with respect to its psychometric properties, and has been used by numerous substantive researchers. Using Benson’s (1998) construct validation process as a framework, the HPRS is evaluated below. The alternative measures will be reviewed and evaluated in Chapter 2.

**Substantive Stage**

Hong and Page (1989) developed the HPRS to address the limitations associated with the first developed measure of trait reactance: the 18-item Questionnaire for the Measurement of Psychological Reactance (QMPR, Merz, 1983, as cited in Tucker & Byers, 1987). To develop the HPRS, Hong coordinated a group of social psychology students to revise the items from the QMPR. The wording, clarity, and relevance of each item were assessed, and “modified accordingly” (Hong & Page, p. 1324). In addition, new items were written, resulting in an initial pool of 60 items. These items were subsequently evaluated according to their relevance to reactance in general. Of the 60 items, 15 were selected and presented to nine behavioral scientists for further evaluation. One additional item was removed due to redundancy, and six were reworked to improve readability, resulting in the 14-item HPRS (see Appendix A).
There are several concerns regarding the substantive stage of the HPRS. Specifically, in addition to revising the 18 items from the QMPR, 42 new items were written. However, why and how these new items were created was not explained. For example, it is unclear whether the new items were written to address Hong and Ostini’s (1989) concern that trait reactance was under-represented by the revised QMPR items. Moreover, Hong and Page (1989) did not articulate whether items were written to represent specific dimensions of reactance. This lack of detail regarding item creation could be due to the fact that the theoretical structure of trait reactance has never been explicitly stated in the literature. Thus, it is possible that the researchers, unsure about the dimensionality of the HPRS, planned to rely on empirical studies of the structure of the HPRS to inform the dimensionality of trait reactance.

Structural Stage

To date, the factor structure and reliability of the HPRS have been examined via six studies. Upon evaluating these studies, however, the need for additional study of the scale’s dimensionality becomes apparent. In the first psychometric study of the scale, Hong and Page (1989) administered the HPRS to 257 Australian undergraduates and studied the structure of the HPRS using a principle components analysis (PCA) with orthogonal rotation. Four components emerged, which the researchers labeled: *Freedom of Choice*, *Conformity Reactance*, *Behavioral Freedom*, and *Reactance to Advice and Recommendations* (see Table 1). Although Hong and Page did not explicitly define these components, an inspection of the items reveals that *Freedom from Choice* appears to represent negative attitudes toward restrictions placed on choices or decisions. *Conformity Reactance* appears to reflect a disposition to resist rules and regulations.
Behavioral Freedom appears to reflect resistance toward being influenced by others.

Reactance to Advice and Recommendations appears to represent oppositional attitudes toward the advice and recommendations offered by other people. It is important to keep in mind, however, that the researchers did not articulate whether the items were written to represent these (or other) dimensions of trait reactance. Estimates of internal consistency (\( \alpha = .77 \) and \( \omega = .82 \)) and test-retest reliability (\( r = .89 \)) were reported for the total score. Curiously, they did not report the reliabilities of the subscales defined by the four components, despite championing four orthogonal components of reactance.

Consequently, it is unclear whether Hong and Page advocated using four subscales, as the PCA would support, or a total score, which aligns with their computation of reliability.

In the second psychometric study of the HPRS, Hong (1992) administered the scale to a different population: 462 non-student participants from the general public in Australia. Hong replicated the analytic procedure used by Hong and Page (1989; PCA with orthogonal rotation). Again, a four-component solution was interpreted. Interestingly, the same labels used by Hong and Page were applied to the components, despite three items “loading” on different components (see Table 1). Again, estimates of internal consistency (\( \alpha = .81 \)) and test-retest reliability (\( r = .76 \)) were only reported for the total score.

Hong and Faedda (1996) conducted the third psychometric study of the HPRS, administering the scale to a large sample of respondents in Australia (1,423 university students and 1,660 participants from the general public). As in their previous studies, they used PCA with varimax rotation and four components emerged. However, some items represented different components across studies (see Table 1). Consequently, Hong and
Faedda modified the names of the four components to reflect the changes in structure: 
*Emotional Response Toward Restricted Choice* (the tendency to experience reactance in response to other people interfering in one’s choices or decisions), *Reactance to Compliance* (the tendency to experience reactance in response to others’ desires or expectations), *Resisting Influence from Others* (the tendency to experience reactance in response to others’ attempts to influence one’s behavior), and *Reactance Toward Advice and Recommendations* (the tendency to experience reactance in response to advice and suggestions offered by other people). In addition, Hong and Faedda (1996) stated that three items (4, 10, and 14) complicated the interpretation of the factor structure because they had either relatively low communalities or represented more than one component. These items were removed, forming an 11-item version of the HPRS. Using the same sample, Hong and Faedda conducted a PCA with varimax rotation to examine the structure of the 11 items. As expected, a four-component structure with no cross loadings emerged, paralleling the four components found for the 14 items (see Table 1). Similar to previous studies, estimates of reliability (α) were only reported for the 14- and 11-item total scores, which were .80 and .77, respectively. Hong and Faedda recommended using the 11-item version of the HPRS.

Before discussing subsequent studies of the structure of the HPRS, several limitations of the studies conducted by Hong and colleagues should be noted. First, PCA was used in all of the studies. Although PCA is an exploratory analytic technique, it does not explicitly differentiate common variance from error variance. That is, the components are created from the total variance of the items. Thus, PCA does not account for measurement error, which leads to biased parameter estimates (Benson & Nasser, 1998;
Preacher & MacCallum, 2003). As such, this technique is appropriate to use only for data reduction; it is inappropriate to use PCA for the purposes of identifying latent constructs that explain shared variance among items. The more appropriate technique to use would have been exploratory factor analysis (EFA). Unlike PCA, EFA does distinguish common variance from error variance. Thus, the factors are created from only the common variance among the items. By incorporating measurement error into the model, more accurate parameter estimates are possible (Benson & Nasser; Preacher & MacCallum). Consequently, EFA should be used instead if the goal is to explore the underlying attributes thought to drive responses to the items. Second, each study employed varimax rotation, which assumes that the components are uncorrelated (i.e., orthogonal). The use of orthogonal rotation is rarely appropriate, especially if the researcher is uncertain about the relationships among the components or factors (Preacher & MacCallum). In fact, Hong and Faedda found moderate relationships between the four subscale scores (ranging from .21 to .44), which suggests the components would also be correlated. The more appropriate technique would have been to use oblique rotation because it allows the components (or factors) to be correlated. In addition to using PCA with varimax rotation, Hong and her colleagues also only reported reliability estimates for the total score, despite finding four “orthogonal” components. Estimating reliability for the total HPRS score instead of the subscale scores communicates (and assumes) that the four subscales all measure the same thing (i.e., items are homogenous). Given the existence of four components, this method of reporting is inappropriate. Third, Hong and her colleagues championed three different structures of the HPRS but did not highlight,
much less explain, these differences across studies, which can lead to further confusion regarding the factor structure and scoring of the HPRS.

Fortunately, Thomas, Donnell, and Buboltz (2001) addressed these and other issues in the fourth psychometric study of the HPRS. They used confirmatory factor analysis (CFA) to test the four competing models proposed by Hong and colleagues (Hong, 1992; Hong & Faedda, 1996; Hong & Page, 1989). Using two different American undergraduate samples (N = 539 and 905, respectively), the factor structures of both the 11- and 14-item versions of the scale were evaluated twice: once forcing the factors to be orthogonal and once allowing them to correlate. As they anticipated, the models only had adequate fit when the four factors were allowed to correlate. Factor correlations ranged from .29 and .72 for the 11-item scale, and .30 to .81 for the 14-item scale. Of the four competing models, only Hong and Faedda’s four-factor structure for the 14- and 11-item versions of the scale was found to have adequate fit. Reliabilities for the four subscales ranged from .48 to .63 for the 14-item version and .48 to .64 for the 11-item version, which are low. Given the moderate to high correlations among the factors, Thomas et al. also evaluated whether a second-order model would represent the data. Testing a second-order model assesses whether the first-order factors are a function of an overarching factor. The second-order model did not exhibit adequate fit and thus, computing a total HPRS score in addition to the four subscales was not supported. Because of the low reliabilities of the four subscale scores, Thomas et al. advocated that the HPRS should not be used until it was studied further and improved.

Shen and Dillard (2005) conducted the fifth HPRS psychometric study of the factor structure of the HPRS with three different samples of American undergraduates.
The first two samples \((N = 188 \text{ and } 200)\) completed the 14-item version, and the third sample \((N = 233)\) completed the 11-item version. Although both versions of the scale were administered, only the 11-item version was reported for all three samples in order to be “more parsimonious” (p. 77). This is disconcerting because the three removed items may have improved reliability. Shen and Dillard found the correlated four-factor model supported by Thomas et al. (2001) fit adequately across the three different samples. Factor correlations ranged from .45 to .76, further supporting the use of oblique rotation. They also tested a second-order model and found adequate fit. Because a second-order model fit the data, a total HPRS score, in addition to the four subscale scores, could be computed. The reliabilities for the total score across the three samples were adequate \((\alpha = .75, .80, \text{ and } .79, \text{ respectively})\) and much higher than subscales reliabilities, which ranged from .45 to .71. Hence, Shen and Dillard advocated for the calculation of a total HPRS score.

In an attempt to resolve the competing recommendations concerning the scoring and use of the HPRS, Brown, Finney, and France (2009) further examined the dimensionality of the 14-item version of the HPRS. Confirmatory factor analysis (CFA) was used to test four models: a one-factor model, the four-factor model championed by Hong and Faedda (1996) and Thomas et al. (2001), a second-order model, and a bifactor model. A bifactor model is similar to a single-factor model in that all the items represent a common factor (called the general factor). However, by incorporating several specific factors, this model also accounts for shared variance among sets of items that cannot be explained by the general factor. In other words, subsets of items that share unique variance with one another over and above the general factor are modeled to represent
specific factors (Chen, West, & Sousa, 2006). Specifically, Brown et al. tested a bifactor model in which a general factor of trait reactance was used to explain common variance among all 14 HPRS items. In addition, specific factors were modeled to explain additional variance among sets of items after controlling for general trait reactance (see Figure 1). These specific factors explained additional variance among the same sets of items as Hong and Faedda’s (1996) first-order factors (see Figure 1). However, despite the fact that the specific factors and first order factors both describe variance among the same sets of items, they are not the same factors. This is because the specific factors are orthogonal to trait reactance, where as the first-order factors describe dimensions of reactance and hence, are related to reactance. To reflect this difference, Brown et al. labeled the specific factors, attempting to reflect what the items may have in common over and above trait reactance (e.g., wording, context; see Figure 1). They labeled the specific factor for the Emotional Response Toward Restricted Choice items Anger because each item referenced an emotion relating to anger (e.g., “aggravates,” “frustrated,” “irritates,” angry”). The Reactance to Compliance items specific factor was labeled Rules and Regulations because each of the items referenced resisting rules and regulations (e.g., “Regulations trigger a sense of resistance in me”). The specific factor for the Resisting Influence from Others items was labeled Independence because each item referenced seeking autonomy (e.g., “I am content only when I am acting of my own free will”). Finally, Brown et al., observed that the Reactance Toward Advice and Recommendations items seem to share additional variance because they both referenced getting advice. Thus, the name of this specific factor is Advice.
To test these models, Brown et al. (2009) administered the 14-item version of the HPRS to 1282 American undergraduates. As expected, the one-factor model did not fit well in a general sense (i.e., globally) as evidenced by Comparative Fit Index, Root Mean Square Error of Approximation, and Standardized Root Mean Residual. The model also exhibited poor fit in specific areas of the model (i.e., locally), with large standardized covariance residuals. The four-factor model fit better than the one-factor model, but global fit was still poor and there was local misfit associated with four items. Because the four-factor model did not fit, the more parsimonious second-order model would not have adequate fit either. In fact, the second-order model did not converge to an admissible solution due to a negative disturbance term associated with the Resisting Influence from Others factor.

The bifactor model fit well globally, but had local areas of misfit associated with items 3, 9, and 13. Despite representing different specific factors, all three items referred to “doing the opposite” (see Appendix A). Furthermore, none of the Independence items had significant relationships with the specific factor (i.e., non-significant pattern coefficients). That is, there was no systematic variance shared between these items over and above the general factor of reactance. Methodologists recommend modeling these types of items as simply a function of the general factor, referred to as an incomplete bifactor model (Chen, et al., 2006; see Figure 2). This incomplete bifactor model did not fit the data significantly worse than the full bifactor model, supporting the decision to remove the Independence specific factor from the model. To address the local misfit associated with items 3, 9, and 13, a new specific factor labeled Opposite was added to represent this unexplained systematic variance (see Figure 2). Brown et al. concluded that
this incomplete bifactor model with the *Opposite* specific factor fit well both globally and locally. Accordingly, they suggested modeling the HPRS responses with a general trait reactance factor, noting that systematic variance due to item context and wording must also be modeled via specific factors. Although the incomplete bifactor model with the *Opposite* specific factor adequately represented the inter-item relationships, Brown et al. acknowledged that additional study of the HPRS factor structure is warranted because model modifications were made post hoc and were assessed using the same sample (MacCallum, Rozonowski, & Necowitz, 1992). In addition, they noted that the four specific factors needed further study, specifically in how they relate to external variables to figure out whether they are substantively meaningful or simply sources of construct-irrelevant variance (i.e., method factors). For example, the *Anger* specific factor could be a method effect caused by the use of emotional words in each item. The *Rules and Regulations* specific factor may represent attitudes toward rules and regulations or a method effect due to similar wording. The *Advice* specific factor may represent attitudes toward advice and recommendations or a method effect due to similar wording. Finally, the *Opposite* specific factor seems to represent extreme non-compliance or a wording method effect.

*External Stage*

Although the factor structure, and thus the scoring of the HPRS clearly needs further study, researchers have examined the relationship between scores on the HPRS and measures of other constructs. In all but one study (Hong & Faedda, 1996), only the HPRS total score was correlated with external variables, further emphasizing the lack of consistency between the observed factor structure and the scoring of this measure. Given
this confusion, caution should be used when interpreting the relationship between the
total reactance score and external variables. Moreover, as previously stated, empirical
relationships between variables only provide external validity evidence if hypotheses
regarding these relationships are specified a priori (Benson, 1998). In order to best
evaluate the external validity evidence, the following sections will only review studies
that made a priori hypotheses, thus gathering true external validity evidence.

As predicted, the HPRS was positively related to trait anger and depression (Hong
& Faedda, 1996), loneliness (Joubert, 1990), and narcissism (Joubert, 1992), and
negatively related to happiness, “conventional mores” (conformity, conventionality, and
humility), and conformity (Joubert, 1990). In addition to studying the correlates of trait
reactance in a “testing” environment (e.g., via a battery of questionnaires), the HPRS has
also been studied in reactance-inducing situations (e.g., reading a persuasive message).
As expected, in these situations the HPRS was positively related to perceived threat to
freedom (Shen & Dillard, 2005), and negatively related to individuals’ positive attitudes
toward the message and their intention to comply (Dillard & Shen, 2005; Shen &
Dillard). Furthermore, Dillard and Shen modeled state reactance as a latent construct
comprised of anger and negative cognitions and found that people high in trait reactance
also experienced greater state reactance.

Theorists hypothesized that the HPRS would have a positive relationship with
locus of control, with higher trait reactance associated with an internal locus of control
(Brehm & Brehm, 1981). However, a positive relationship between the two variables has
not been empirically supported (Hong et al., 2001; Hong & Faedda, 1996). It was also
expected that the HPRS would be negatively related to life satisfaction because of its
documented inverse relationship with happiness (Joubert, 1990). Again, this hypothesis was not supported (Hong & Faedda; Hong & Giannakopoulos, 1994). Finally, it was predicted that the HPRS would negatively correlate with religiosity (Hong & Faedda, 1996) and church attendance (Hong, 1990), but no such relationship was found.

**Purpose of the Current Study**

Given the confusion regarding the factor structure and scoring of the HPRS and the limited external validity evidence, the purpose of the current study was to further investigate its construct validity by (1) testing the factor structure of the HPRS and thus, contributing to the structural stage, and (2) examining theoretically-expected relationships with external variables to gather external validity evidence for the external stage.

**Structural Stage: Dimensionality**

The first purpose involved testing the six CFA models specified by Brown et al. (2009): (1) a one-factor model assessing the unidimensionality of the HPRS, (2) a four-factor model representing Emotional Response Toward Restricted Choice, Reactance to Compliance, Resisting Influence from Others, and Reactance Toward Advice and Recommendations, (3) a second-order model, (4) the original bifactor model, and (5) the incomplete bifactor model, and (6) the incomplete bifactor model with the Opposite specific factor (see Figures 1 and 2). Given Brown et al.’s study, this modified incomplete bifactor model (Model 6) is hypothesized to best represent the data.

**External Stage: Nomological Network**

The second purpose of the study involved relating factors from the championed factor structure to the following theoretically-related variables: (1) general conformity,
(2) the Big Five personality traits (extraversion, agreeableness, conscientiousness, neuroticism, and openness to experiences), and (3) psychological entitlement. These variables were chosen due to their theoretically-expected relationships with reactance. Examining these relationships provides validity for the uses and inferences made from the HPRS.

**General conformity.** General conformity refers to the extent to which individuals yield to others with more power (Santor et al., 2000). Considering that reactance involves resisting pressure from others that constrains one’s freedom, trait reactance should, theoretically, be negatively related to conformity. That is, as reactance increases, conformity should decrease. This hypothesis is also supported by previous empirical findings. Scores on the HPRS were negatively correlated with a measure of conventional mores, which was described as representing conformity, conventionality, and humility traits (Joubert, 1990). The tendency to conform was also negatively correlated with the therapeutic reactance scale (TRS; Dowd et al., 1991; Goldsmith et al., 2005). Furthermore, individuals higher in trait reactance were more likely to respond that they resist rules and regulations (Dowd et al., 1994), or disregard them all together (Buboltz et al., 1999).

**The Big Five.** To date, no study has examined the relationship between trait reactance and the Big Five. However, the related construct of reactive autonomy has been related to the Big Five. *Reactive autonomy* refers to freedom from being controlled or influenced by others (Murray, 1938). Although related, reactive autonomy is different from trait reactance. Specifically, trait reactance is a tendency to experience a *motivational state* that is aroused when a freedom is threatened or eliminated, whereas
reactant autonomy refers to the actual state of being free from outside influences. In one study, reactive autonomy was regressed on the Big Five variables. Only agreeableness, openness to experience, and extraversion were significant predictors of reactive autonomy. Reactive autonomy was positively related to openness to experience and extraversion, and negatively related to agreeableness (Koestner & Losier, 1996). Conscientiousness and neuroticism were not significant predictors of reactive autonomy when controlling for the other three personality traits. Given Koestner and Loiser’s findings and the lack of studies relating trait reactance to the Big Five, hypotheses will only be made with regard to the openness to experience, extraversion, and agreeableness subscales.

People high on extraversion are characterized as being energetic, sociable, forceful, outgoing, adventurous, and enthusiastic (Costa & McCrae, 1992; as cited in John & Srivastava, 1999). Individuals high in trait reactance have been found to be aggressive, attention-seeking, dominant, assertive, and confident (Dowd & Wallbrown, 1993; Dowd et al., 1994), as well as ambitious, adventurous, and domineering (Buboltz et al., 1999). Therefore, it is hypothesized that trait reactance is positively associated with extraversion.

People high in agreeableness are characterized as trusting and forgiving, compliant, modest, sympathetic, altruistic, and undemanding (Costa & McCrae, 1992; as cited in John & Srivastava, 1999). Given that individuals high in trait reactance have been found to be more aggressive, quarrelsome, irritable, hostile, and defensive (Dowd & Wallbrown, 1993) as well as less cooperative and helpful (Buboltz et al., 1999), trait reactance is predicted to be negatively associated with agreeableness.
People high in *openness to experience* are characterized as being curious, imaginative, artistic, unconventional, excitable, and having wide-ranging interests (Costa & McCrae, 1992; as cited in John & Srivastava, 1999). Because individuals high in trait reactance have been found to be more open to new and different experiences than those low in trait reactance (Dowd & Wallbrown, 1993), it is hypothesized that trait reactance has a positive relationship with openness to experience.

*Psychological entitlement.* Psychological entitlement, a component of narcissism, refers to the perception that one is worthy of more and has the right to more compared to other people (Campbell, Bonacci, Shelton, Exline, & Bushman, 2004). As such, entitlement involves a sense of being deserving and entitled. People feel deserving when they expect a positive outcome as a result of their own actions or character. People feel entitled when they expect a positive outcome simply “as a result of a social contract” (Campbell et al., p. 31). Thus, people that feel entitled may perceive that they have more freedoms, and of greater importance. Considering that the experience of reactance depends on the characteristics of the threatened freedom (i.e., the number of freedoms threatened and the importance of those freedoms), it is hypothesized that trait reactance is positively related to psychological entitlement. That is, people that feel entitled may place a higher value on their freedoms and consequently, may be more prone to defend them when threatened. This hypothesis is also based on empirical findings. Although trait reactance has not been studied directly in relation to entitlement, it has been correlated with narcissism, which, as noted above, is associated with entitlement (Joubert, 1992).

In addition to testing a priori hypotheses, an exploratory approach will be taken to examine the relationships among the specific factors with external variables if a bifactor
model is championed. Given that the specific factors have not been studied before, doing so will help determine if they are substantively meaningful or simply method effects. Although an exploratory approach will be utilized, examining the relationships between the specific factors and external variables contributes to our understanding of the meaning (or lack of meaning) of the four specific factors.
CHAPTER 2

Review of the Literature

An Overview of Freedom

Freedom is a broad concept, but has generally been described as the ability to act without coercion or constraint (Merriam-Webster Online Dictionary, 2009). More specifically, two types of freedom have been identified: the freedom to and the freedom from (Berlin, 1958). That is, freedom can be conceptualized in a positive (i.e., freedom to) or negative (i.e., freedom from) sense. According to Berlin, positive freedoms refer to the ability to act in a self-determined way to ultimately reach one’s potential and negative freedoms refer to the ability to act without interference from other people or events.

For the past century, psychologists have used multiple perspectives to better understand freedom. For example, researchers have used the concepts of autonomy and independence to describe aspects of freedom. According to self-determination theory (SDT), a person feels autonomous when they believe that they have the ability to direct their own behavior and behave in a way congruent with one’s own needs and interests (Deci & Ryan, 2004). It is characterized by “ownership, authenticity, responsibility, and choice” (Koestner & Losier, 1996, p. 467), and seems to represent what Berlin referred to as positive freedom. In addition, several theorists have asserted that autonomy and independence (and thus freedom) are essential components of optimal functioning and well-being. For example, self-determination theory (SDT) posits that the fulfillment of the need for autonomy, in addition to competence and relatedness, increases psychological well-being (Deci & Ryan).
Although both autonomy and independence have been used to describe freedom, Deci and Ryan (2004) differentiated autonomy from independence. According to Deci and Ryan, independence refers to not relying on other people or other external sources. From this perspective, autonomy is not synonymous with independence. It is possible, for example, to be autonomously dependent (i.e., choosing to be dependent) or un-autonomously independent (i.e., being forced to be independent).

Interestingly, autonomy has not always been conceptualized in this way (i.e., the ability to direct one’s own behavior). Some theorists have described autonomy as the ability to act without being influenced or controlled by other people (e.g., Murray, 1938). This view of autonomy seems to represent what Berlin (1958) referred to as negative freedom. In contrast to SDT’s conceptualization of autonomy, this view argues that those seeking autonomy, “wish neither to lead or be led, [but] …want to go their own way, uninfluenced and uncoerced by others” (Murray, p. 151). As with Deci and Ryan’s (2004) conceptualization of autonomy, it could be argued that this second definition of autonomy is also distinct from independence. That is, it is possible to be influenced by other people (i.e., be un-autonomous), but not rely on them (i.e., be independent).

Although both conceptualizations of autonomy seem to reflect acting of one’s own will, they differ with respect to how external influences are perceived. According to SDT, a person can feel autonomous even if others influence them, as long as the person endorses that influence. Said another way, autonomy includes making decisions based on one’s own interests and values as well as on external influences. In contrast, Murray’s (1938) definition of autonomy is characterized by opposing and remaining free of all
external influences. Accordingly, the two different conceptualizations have been termed *reflective autonomy* and *reactive autonomy* respectively (Koestner & Losier, 1996).

An alternative perspective of freedom is psychological reactance theory (PRT). Psychological reactance is similar to yet distinct from reactive autonomy, with the former focusing on people’s reactions when specific behavioral freedoms that are threatened by other people or circumstances, and the latter referring to a general avoidance of being influenced.

*The Theory of Psychological Reactance*

According to PRT, when a perceived behavioral freedom is threatened with elimination, individuals will experience an arousal in motivation directed toward re-establishing the threatened freedom; that is, they will experience psychological reactance (Brehm, 1966; Brehm & Brehm, 1981). For example, college students typically only have classes on weekdays. As such, it could be argued that most students feel free to engage in activities of their own choosing over the weekend. Consider that for some reason, an instructor scheduled class one Saturday morning, which was met with resistance from several students. From the perspective of these students, having class on a Saturday threatened their freedom to do what they wanted over the weekend. In turn, these students experienced an aversive motivational state (i.e., psychological reactance) aimed at restoring their freedom to have the day “off” from school. In an attempt to restore this freedom, several of the students urged the instructor to consider moving class to an alternate day during the week. However, the instructor was not willing to reschedule the class. Consequently, some students reacted by skipping that class, presumably because they were motivated to restore their freedom.
As illustrated by the example above, psychological reactance can be conceptualized as a situational (i.e., state) experience, however it has evolved to encompass the conceptualization of reactance as a dispositional (i.e., trait) characteristic of people. Thus, there are two congruent conceptualizations of reactance: (1) as a response to a specific threatened freedom (e.g., not having Saturday “off”), and (2) as a disposition to exhibit that response. An overview of the theoretical underpinnings of how trait reactance evolved from the study of state reactance follows.

**Determinants of State Reactance**

State reactance has been conceptualized as consisting of two key antecedents: a behavioral freedom and a threat to that behavioral freedom (Dillard & Shen, 2005). From this perspective, characteristics of the freedom and the threat to that freedom determine if and how much reactance an individual will experience in a given situation.

*Behavioral freedoms.* PRT assumes individuals have a set of behaviors they are free to exercise during the present moment or in the future (Brehm, 1966; Brehm & Brehm, 1981). Accordingly, *behavioral freedoms* are defined as any imaginable act (including thoughts and beliefs) that can realistically be engaged in by an individual. For a behavior to be considered free, however, “the individual must have the relevant physical and psychological abilities to engage in them, and must know, by experience, by general custom, or by formal agreement, that he may engage in them” (Brehm, p. 4). In other words, for a behavioral freedom to exist, a person must be able to exercise the freedom and be aware that they have the ability to do so. Free behaviors may be characterized as external, observable actions or as internal processes (Brehm & Brehm). Internal processes refer to unobservable events that occur within an individual’s mind.
including one’s thoughts, feelings, and beliefs (Brehm). For example, an individual may hold a certain political belief that could potentially be threatened through persuasion. Thus, a person can engage in a behavioral freedom simply by having a particular belief, thought, or emotion.

It is important to understand certain characteristics of the threatened freedom(s) because they influence the experience of reactance. Specifically, the magnitude of reactance depends on (1) the importance of the freedom to the individual, and (2) the number (and proportion) of freedoms threatened (Brehm, 1966; Brehm & Brehm, 1981). According to PRT, the magnitude of reactance arousal will increase as a direct function of the importance of the threatened freedom. In order for a behavioral freedom to be important to an individual, it must serve some unique function with regard to satisfying a need or desire (e.g., the need to make free and independent decisions or the desire for a luxury car). It is also necessary to consider the importance of a freedom relative to the importance of other currently held freedoms. To illustrate this, consider a person that is choosing between three options: two that are moderately important and one that is very important. If one of the moderately important alternatives is threatened, PRT assumes that less reactance would be aroused compared to a situation in which all three options are moderately important. This is because the very important alternative would still available in the former scenario, leaving one to choose between a very important option and a moderately important option. In the words of Brehm, “When one’s choice alternatives are an orange, an apple, and a pear, he should experience a noticeable degree of reactance when someone swipes the apple; but when the choice alternatives are an orange, an apple, and an automobile, one will not care much about the loss of an apple,”
Hence, the magnitude of reactance is also a function of the relative importance of the behavioral freedom.

According to PRT, a person will also experience more reactance if several related freedoms are threatened, compared to if only one were threatened. Specifically, the magnitude of reactance becomes larger with increases in the number and proportion of freedoms that are threatened. The number of freedoms is simply a total count of the number of freedoms threatened, whereas the proportion of freedoms refers to the ratio of how many freedoms are threatened out of the set of freedoms a person currently holds. Although they are related (i.e., an increase in the number of freedoms threatened is also usually accompanied by an increase in the proportion of freedoms threatened), PRT differentiates between the two because reactance will increase as the number of freedoms increases, even when the proportion of freedoms threatened stays the same. Imagine, for example, that a person has four freedoms at a given point in time, and one freedom is threatened. In this case, a certain amount of reactance would be aroused, but PRT asserts that a person would experience more reactance if three freedoms out of twelve were threatened. In this example, more reactance would be experienced because more freedoms were threatened, despite holding the proportion of threatened freedoms constant at 1:4 ratio. Conversely, PRT also predicts that individuals will experience more reactance if one out of four, compared to one out of six freedoms are threatened. In this example, more reactance would be experienced because a greater proportion of freedoms was threatened, despite holding the number of freedoms threatened constant.

Finally, although PRT primarily addresses freedoms that exist in the present moment, people also perceive themselves as having freedoms that exist in the future. It is
therefore possible that current freedoms will have some impact on future freedoms. Just as a threat to one freedom can threaten other currently held freedoms, it can also threaten a future freedom, increasing the magnitude of reactance. For example, a teenager that is told they are not allowed to go to the movies with their friends on a particular night may experience more reactance if they perceive that going to the movies with their friends in the future is also threatened, compared to if the threat were only limited to the present behavioral freedom.

*Threats to behavioral freedoms.* As previously stated, psychological reactance is aroused when behavioral freedoms are threatened with elimination. A threat is a force that makes or could make a behavioral freedom more difficult to exercise (Brehm, 1966; Brehm & Brehm, 1981). This threat can range in magnitude, and can be so strong that the individual considers the freedom to be permanently eliminated.

As such, the magnitude of reactance is also a function of (1) the magnitude of the threat, (2) the number of threats, (3) the interaction between the importance of the freedom and magnitude of the threat, and (4) the context. In general, PRT predicts that reactance arousal will increase as the magnitude of the threat increases (Brehm, 1966; Brehm & Brehm, 1981). Recall that a threat is anything that increases the difficulty of exercising a behavioral freedom (Brehm & Brehm). Therefore, the magnitude of reactance is a function of the force of the threat. Consider, for example, an employee that received a company-wide memo explaining that it is no longer acceptable for employees to send personal emails during work. Although a noticeable amount of reactance would likely be experienced, the magnitude of reactance would probably be substantially greater if the memo also informed employees that their emails would be monitored and they
would be reprimanded for violations. Doing so would make it more difficult for the employee to exercise the freedom to send personal emails at work, which would increase the force of the threat and consequently, increase the magnitude of reactance. According to PRT, when the force becomes relatively great, it may reach a point where the individual no longer perceives a threat to a behavioral freedom, but rather the elimination of that freedom. This change in perception is believed to occur when the perceived magnitude of the threat becomes larger than the importance of the freedom; elimination effectively occurs when resisting the threat becomes more costly than giving up the freedom. For example, if the employee believed that sending personal emails at work was not worth the risk of being caught and reprimanded, the employee may perceive this freedom as effectively eliminated.

Thus far, we have discussed the effects of a single threat to a behavioral freedom. A freedom, however, may have several threats simultaneously. In any given situation, there may be several forces making a number of freedoms more difficult to exercise. Because multiple threats are thought to have a collective effect, reactance is thought to be greater in situations involving several threats to a freedom.

Although the magnitude of reactance arousal increases as the force of the threat increases, the magnitude of the threat also interacts with the importance of the freedom. Said differently, the importance of the freedom moderates the relationship between force of the threat and reactance (see Figures 3 and 4). For freedoms that are of low importance, only small amounts of reactance can be elicited, even for highly forceful threats. In such situations, PRT predicts that threats to relatively unimportant freedoms will result in compliance. Threats can arouse large amounts of reactance for more
important freedoms, but this may result in a negative influence (i.e., non-compliance) in which the individual engages in the free behavior despite the threat against it. If the force is great enough, however, a positive effect (i.e., compliance) will occur. This pattern is especially common for moderately important freedoms, and is termed a *boomerang effect*. The boomerang effect occurs when a force against a freedom results in non-compliance up to a certain point after which increased force results in greater compliance. In contrast, PRT asserts that there will be no boomerang effect for highly important freedoms. As the force of the threat increases, so will reactance, resulting in greater amounts of non-compliance (see Figures 3 and 4). Consider, for example, three children that were told by their parents that they would no longer be allowed to watch a certain television show. The youngest son never watched the show much (i.e., low importance freedom), and consequently did not experience much reactance, so complied with this request immediately. The middle son did like this show somewhat (i.e., moderate importance freedom), and experienced more reactance than his younger brother. At first, the middle son did not obey his parents, but he complied when they threatened to punish him for watching it (i.e., increase in threat), illustrating the boomerang effect. Unfortunately for the parents, this television show was the oldest son’s favorite (i.e., high importance freedom). As such, he experienced a great deal of reactance and continued to watch the show despite his parent’s increased threats of punishment.

Moreover, the situation surrounding the threat is believed to moderate the amount of reactance experienced. If there is a believable justification for the threat, and that justification is viewed as legitimate, then reactance may be attenuated. For example, consider a college professor that changed the due date of a paper from the day after
students returned from Spring Break to the day before the break started. In response to this, many students experienced reactance because they had less time than they had expected to complete the assignment. Furthermore, they questioned whether this alteration in due date meant that all future due dates were also subject to change. However, the level of reactance experienced by the students was lessened when the professor justified moving the due date to make it easier on the students. That is, the professor reasoned that it would be less stressful and students would enjoy their vacation more if the paper were due before Spring Break. As a result, most of the students felt less reactant and accepted this change. This justification may have attenuated the reactance aroused in the students by limiting the threat to that one specific paper, without implying that the due dates of other assignments would be altered. However, the extent to which a justification attenuates the arousal of reactance also depends on its legitimacy. In the current example, this justification would not be effective if students disagreed with the professor and instead, believed that it would be better to have the paper be due after break because they would experience less stress.

In sum, the magnitude of reactance is a function of the characteristics of the freedom and the threat. Specifically, reactance is expected to increase as the importance of the freedom increases, and as the number (and proportion) of freedoms that are threatened increases. In general, reactance will also increase as the strength of the threat increases. However, the effect of the magnitude of the threat on reactance is moderated by the importance the freedom is to the individual, and the justification for the threat.
Outcomes of State Reactance

The effects of state reactance can manifest behaviorally or attitudinally. The main behavioral outcomes as defined by PRT concern restoring threatened freedoms. These freedoms can be re-established directly or indirectly depending on the situation. Direct re-establishment of a threatened freedom occurs when an individual engages in the free behavior that is threatened. For example, talking on the cell phone may be banned in certain areas, but a person can directly re-establish this freedom by using one anyway. Brehm (1966; Brehm & Brehm, 1981) theorized that individuals are more likely to attempt direct re-establishment if the magnitude of reactance is large and the likelihood of successfully re-establishing the threatened or eliminated freedom is high. In addition, if the cost associated with direct re-establishment outweighs its benefits (e.g., the possibility of getting a fine for using the cell phone vs. the convenience of using a phone in the car), direct-re-establishment will not be attempted (Brehm & Brehm).

When direct re-establishment of a freedom is not possible, individuals may attempt indirect restoration instead. An individual may indirectly attempt to re-establish a threatened freedom by engaging in other behaviors related to the threatened freedom (Brehm, 1966). For example, one may indirectly re-establish the freedom to talk on their cell phone while driving by using a “hands-free” device in areas in which it is prohibited. Freedoms can also be indirectly restored through the actions of an external agent. For example, if a teacher told a child that they would no longer be allowed to eat lunch with her friends, the child’s parents could arrange a meeting with the teacher to restore the child’s freedom to eat with her friends.
If the freedom is irrevocably eliminated, then the chances of successfully restoring the free behavior by directly engaging in it are low. Consequently, direct re-establishment most likely will not be attempted (Brehm & Brehm, 1981). However, if the individual is unaware or uncertain that the freedom is lost permanently, they may still attempt direct restoration, but it will not be successful. Recall the example of the company memo informing its employees that they would no longer be able to send personal emails at work. Imagine that one employee knew that he was not supposed to send personal emails, but decided to try anyway only to discover that his personal email website was now blocked.

In addition to behavioral outcomes, there are also subjective effects. (Brehm & Brehm, 1981; Dillard & Shen, 2005; Quick & Stephenson, 2007; Shen & Dillard, 2005). According to Brehm and Brehm, a general feeling of discomfort and uneasiness occurs with most incidents of reactance. Depending on the magnitude of reactance, it can also manifest as anger, hostility, and aggression (Brehm & Brehm). Furthermore, researchers studying reactance in the context of persuasion found that reactance is associated with negative attitudes toward persuasive messages (i.e., disagreeing with the message’s content) and non-compliant behavioral intentions (i.e., anticipating to behave in ways that are not promoted by the message) (Dillard & Shen; Quick & Stephenson; Shen & Dillard).

In addition to aversive emotions, PRT also asserts that people perceive a threatened freedom as more attractive and consequently, will have a greater desire to engage in the free behavior (Brehm, 1966; Brehm & Brehm, 1981). For example, if a teenager is told that they are not allowed to drink alcohol, PRT would predict that some
teenagers will experience a greater desire to drink alcohol simply because it is prohibited. Likewise, if an option from a set of alternatives is no longer available, PRT asserts that the eliminated option will be more attractive to the individual.

**Trait Reactance**

PRT originated from the social psychology tradition, which focuses on how aspects of the environment influence the behavior of people. From this perspective, the determinants of reactance are context-specific. That is, the experience of reactance is primarily determined by the characteristics of the behavioral freedom and the threat to that freedom. However, PRT has expanded to include the conceptualization of trait reactance. As such, researchers have asserted that individuals may vary in their tendency to experience reactance in general, independent of the situation (Brehm & Brehm, 1981). In other words, reactance has been conceptualized to be a personality trait. According to personality theorists, a trait denotes “a disposition to behave expressing itself in consistent patterns of functioning across a range of situations” (Pervin, 1994, p. 108). Hence, trait reactance represents a disposition to experience and express reactance across situations.

Studying trait reactance may have particularly useful applications in higher education and organizations. Most universities strive to better understand their students in order to meet their needs and successfully support students while at the institution. One theory of development that is particularly relevant at this age posits that healthy college-aged individuals must undergo differentiation of self, meaning that they must develop an independent sense of self while remaining emotionally connected to their families or peers (Bowen, 1978). In order to fully differentiate from their families of origin,
individuals must be able to function autonomously, without feeling controlled by one’s family, friends, or significant others. At the same time, however, they must be able to remain emotionally connected to these individuals, “while acting from an individuated position characterized by equality” (Johnson & Buboltz, 2000, p. 94). Johnson and Buboltz used the Family System Questionnaire, a measure of self-differentiation designed specifically for college students, to predict trait reactance. They found that individuals with higher levels of trait reactance were less able to function autonomously without feeling controlled by parents or peers (i.e., intergenerational and peer individuation) and reported feeling decreased levels emotional connection with friends or significant others (i.e., peer intimacy) compared to those low in trait reactance. This suggests that highly reactant individuals struggle with self-differentiation, as they are not able to function autonomously from their family or peers and have difficulty remaining emotionally connected with their peers. Clearly, trait reactance is an important aspect to consider in understanding how young individuals thrive in a university setting.

Measuring trait reactance also has important implications in organizational settings. Because organizations vary in the degree of flexibility and autonomy offered to its employees, individuals with a great deal of trait reactance may not perform well in workplaces that depend on compliance, such as the military or law enforcement. In fact, Buboltz et al. (1999) concluded that highly reactant individuals might prefer to work in an atmosphere where they are able to work autonomously on activities of their choice without having to work closely with other people. Thus, measuring trait reactance could assist organizations in screening potential employees to ensure optimal person-environment fit, maximizing performance and productivity.
Measuring State and Trait Reactance

Now that the theoretical background of state and trait reactance has been discussed, an overview of how both state and trait reactance are operationalized and measured is presented. Because psychological reactance theory began with state reactance, it is logical to start with the measurement of state reactance followed by how it differs from the measurement of trait reactance.

Measuring State Reactance

Originally, Brehm and Brehm (1981) asserted that state reactance could not be measured directly because it “has the status of an intervening, hypothetical variable” (p. 37). Thus, the majority of early research on reactance measured the outcomes of reactance, rather than formally studying the experience of reactance itself. For instance, most empirical studies of reactance measured changes in the attractiveness of choice alternatives. In most studies, the experimental procedure had participants rate the attractiveness of four items, one of which they would later be able to keep as a gift for participating in the study. The gifts in these studies were diverse, and included music records (Brehm, Stires, Sensenig, & Shaban, 1966), candy bars (Hammock & Brehm, 1966), posters (Cherulnik & Citrin, 1974), paintings (Rhodewalt & Davison, 1983), and toys (Brehm, 1981). However, at the time that participants were supposed to pick up their gift, the experimenter informed each participant that the item they rated third highest in attractiveness would not be available after all. Following this news, the participants rated all four items on attractiveness again. In these studies, the increased attractiveness of an eliminated option was used as evidence of reactance. In general, these studies found that the attractiveness of the eliminated item increased from the first evaluation to the second,
indicating that state reactance had been elicited in response to decreased choice.

In addition to evaluating how reactance operates in decision-making situations, reactance has also been studied in the context of persuasion. In this line of research, participants were presented a persuasive message advocating for some form of healthy behavior (e.g., flossing regularly, drinking responsibly; Dillard & Shen, 2005; Quick & Considine, 2008; Quick & Stephenson, 2007; Shen & Dillard, 2005). In these studies, participants completed several questionnaires after viewing a message advocating for healthy behavior. These questionnaires assessed participants’ perceived threat to freedom (Dillard & Shen; Quick & Considine; Quick & Stephenson; Shen & Dillard), their attitudes toward the message (Dillard & Shen; Shen & Dillard), and their intention to comply with what the message was advocating (Dillard & Shen; Shen & Dillard) or the perceived persuasiveness of the message (Quick & Considine; Quick & Stephenson). These researchers viewed the strength of the threat as an antecedent variable that leads to reactance, which in turn influences the consequences of attitude toward the message, behavioral intent to comply with the message, and how persuasive participants found the message to be.

Despite Brehm and Brehm’s (1981) assertion that state reactance itself could not be measured, Dillard and Shen (2005) nonetheless attempted to operationalize state reactance and measure it. In doing so, they recognized that state reactance had been explicitly and implicitly defined in several different ways. For instance, reactance has been theoretically and operationally defined as consisting only of cognitions (i.e., counter-arguing; Petty & Cacioppo, 1986). In addition, researchers observed that reactance often leads to anger. As such, reactance has been defined as an affective
experience (Dillard & Meijenders, 2002; Nabi, 2002). Because cognitions and affect can operate at the same time (i.e., parallel processing; Leventhal, 1990), Dillard and Shen reasoned that reactance could be defined as the additive effects of both cognitions and affect, or as the “intertwined” effects of both. As such, they tested four competing models of reactance that operationally defined reactance differently: (1) the Single Process Cognitive Model, (2) the Single Process Affective Model, (3) the Dual Process Model, and (4) the Intertwined Process Model. The Single Process Cognitive Model represented reactance as a cognitive experience that drives the resulting attitudes and behaviors. In contrast, the Single Process Affective Model represented reactance solely as anger. The third model, the Dual Process Model, represented reactance as the separate effects of both affect and cognition. And finally, the Intertwined Process Model represented reactance as the entangled effects of affect and cognition (see Figure 5).

To test these models, Dillard and Shen (2005) conducted two studies using the same procedure, but with different persuasive messages. The first study used messages advocating flossing regularly and the second used messages warning participants against binge drinking, advocating drinking responsibly. For both studies, participants read a message that was either highly or minimally threatening. After reading the message, students answered a series of questions to assess their perception of the strength of the threat, level of trait reactance, anger, cognitive responses, attitude, and behavioral intention. To measure perceived threat, participants responded to four statements (e.g. “the message tried to manipulate me,” and “the message tried to pressure me”). Trait reactance was measured using the HPRS. Anger was measured by having participants indicate how irritated, angry, annoyed, and aggravated they felt. To measure cognitive
responses, participants were instructed to list the thoughts they had in response to the message. These responses were later coded for how supportive their attitudes were toward the message. Supportive thoughts consisted of responses that expressed agreement, compliance, or a positive attitude toward the message. Responses were coded as negative thoughts if they expressed disagreement, non-compliance, or a negative attitude toward the message. A neutral response consisted of statements that did not evaluate the message. In addition, participants responded to statements such as “Flossing regularly is…” using bipolar scales ranging from bad to good, foolish to wise, unfavorable to favorable, negative to positive, undesirable to desirable, unnecessary to necessary, and detrimental to beneficial. Responses to these items were analyzed to determine the extent to which they supported what the message was advocating.

Behavioral intention was measured by a single item, in which participants indicated the likelihood that they will floss regularly, or drink less than three alcoholic beverages the following week, depending on the message they viewed.

Using structural equation modeling (SEM), Shen and Dillard (2005) found that the intertwined process model best represented the data, concluding that state reactance should be conceptualized as a latent variable consisting of state anger and negative (or counter-arguing) thoughts (see Figure 5). In this model, an increase in perceived threat to freedom and higher levels of trait reactance lead to the experience of state reactance (represented by anger and negative cognitions). The experience of state reactance was also associated with less support for the message (i.e., attitude) as well as weakened behavioral intentions to comply with the message. Dillard and Shen contended that this conceptualization of state reactance appears to be consistent with the original theory,
which postulates that state reactance can result in feelings of hostility, anger, and aggression (Brehm, 1961; Brehm & Brehm). Furthermore, defining reactance as a latent variable comprised of anger and negative cognitions has since been supported by several other studies, also in the context of persuasion (Quick & Considine, 2008; Quick & Stephenson, 2007).

It is important to note, however, that Brehm (1966) explicitly states that reactance is not simply an aversive feeling that people try to reduce in any way possible (such as by directly restoring the threatened behavioral freedom). Rather, it is a motivational state to recover that freedom. Further, Dillard and Shen (2005) acknowledged that conceptualizing state reactance as the manifestation of counter-arguing and anger may not align with the original theory of reactance because counter-arguing and anger could be interpreted as outcomes of reactance, rather than reactance itself. However, Dillard and Shen argued that by interpreting the theory in this way, state reactance could not be measured, which from their perspective is undesirable. Thus, operationalizing state reactance in this way is still somewhat controversial and is still up for debate. Fortunately, trait reactance seems to be more easily measured.

*Measuring Trait Reactance*

Recall that in the Intertwined Process Model (see Figure 5), in addition to behavioral freedom and the threat to that freedom, trait reactance was specified as an additional antecedent of state reactance (Dillard & Shen, 2005). Dillard and Shen found that trait reactance had a significant positive association with the experience of state reactance. In their model, trait reactance indirectly predicted less favorable attitudes toward the persuasive message and decreased behavioral intention to comply with the
message. In a different study, trait reactance was positively correlated with perceived threat to freedom and negatively correlated with attitude and intention to comply with the message (Shen & Dillard, 2005). Thus, trait reactance appears to be an important antecedent of behavioral outcomes related to persuasion and compliance.

Evidently, conceptualizing reactance as a trait has been helped communication and marketing researchers gain insight as to why some persuasive messages have an effect opposite than what was intended (e.g., Dillard & Shen, 2005; Quick & Stephenson, 2007). It has also been used by cognitive therapists interested in better understanding difficult clients (e.g., Dowd & Wallbrown, 1993) and by industrial-organizational psychologists interested in predicting employee resistance to supervisory requests (Sachau et al., 1999).

As reviewed in Chapter 1, the HPRS is a popular measure of trait reactance. One may ask if other trait reactance measures exist and given the confusion regarding the scoring of the HPRS, if these should be used in its place. Below is a review of two popular trait reactance scales: the Questionnaire for the Measurement of Psychological Reactance (QMPR) and the Therapeutic Reactance Scale (TRS). As will be seen, both have limitations that lend support for the HPRS as a more promising measure of trait reactance.

**Questionnaire for the Measurement of Psychological Reactance (QMPR)**

**Substantive stage.** The Questionnaire for the Measurement of Psychological Reactance (QMPR) was developed by Merz (1983, as cited in Tucker & Byers, 1987) in German. Merz created 32 items to measure “key variables [including] those related to resistance, rules and regulations, boomerang-theory, and the tendency to do the opposite
to what others expect of you” (Tucker & Byers, p. 811). Four psychologists evaluated these 32 items. Six items were subsequently removed because they were considered inappropriate by two or more of the psychologists, resulting in a 26-item version of the QMPR. The resulting 26-item questionnaire was administered to 152 high school and undergraduate students who responded to each item on a scale from 1 (not at all appropriate) to 4 (extremely appropriate). In a later account of Merz’s study, however, Donnell, Thomas, and Buboltz (2001) reported that Merz used a 6-point Likert scale. Eight additional items were removed for unreported reasons, resulting in the final 18-item version of the QMPR (see Appendix B).

There are several concerns regarding the substantive stage of the QMPR. Specifically, it is unclear whether the theoretical dimensionality of trait reactance was adequately conceptualized prior to creating the QMPR. The two accounts of Merz’s (1983) study say that the items were written to represent various aspects of reactance (e.g., rules and regulations), but whether these aspects were meant to represent actual dimensions of trait reactance was never clearly articulated by Tucker and Byer (1989) nor Donnell et al. (2001). However, even though the dimensionality of the QMPR was not theoretically defined, studying its factor structure of the QMPR during the structural stage could inform the theory of trait reactance (i.e., substantive stage).

**Structural stage.** To date, four studies have examined the structure of the QMPR. In the first psychometric study, Merz (1983, as cited in Tucker & Byers, 1987) conducted a PCA with orthogonal rotation. Merz supported a four-component solution that accounted for 53% of the total variance, but did not label the components, nor report which items represented each component. Furthermore, estimates of internal consistency
test-retest reliability, and split-half reliability were only reported for the total score (.90, .86 and .84, respectively), despite empirical support for a multidimensional solution.

Unsatisfied with the lack of information regarding the structure of the QMPR reported by Merz (1983, as cited in Tucker & Byers, 1988), Tucker and Byers translated the scale to English and conducted the second psychometric study of the QMPR. They administered the 18-item English version to 218 American undergraduate students who responded to each item on a scale from 1 (not at all appropriate) to 5 (extremely appropriate). They conducted an EFA with oblique rotation to study the factor structure of the scale. In contrast to Merz’s finding of four components, a two-factor solution was interpreted, which accounted for 21% of the common variance. The two factors were labeled Behavioral Freedom (13 items) and Freedom of Choice (5 items). Behavioral Freedom appears to represent attitudes concerning free will and behavioral opposition, whereas Freedom of Choice seems to represent attitudes toward maintaining freedom in decision-making contexts. Tucker and Byers reported a correlation of .24 between the two factors, and curiously concluded that the subscales were “essentially orthogonal” (p. 814). Estimates of reliability were not reported. Based on changes in the underlying factor structure of the QMPR, Tucker and Byers concluded that it should not be used because it is psychometrically unstable.

In the third psychometric study of QMPR, Hong and Ostini (1989) administered Tucker and Byers (1987) English translation to 379 Australian undergraduate students who responded on a four-point Likert scale (anchors were not reported). They conducted EFAs with both orthogonal and oblique rotations. Unfortunately, they only presented the results of the orthogonal rotation, stating that the factor patterns were nearly identical for
both rotations and that the correlations between the oblique factors were negligible. A four-factor solution was interpreted and explained 44.1% of the common variance. Although simple structure was not achieved (i.e., items “loaded” on more than one factor), the four factors were labeled: Freedom in Decision and Behavior, Behavioral Reactance, Skepticism Towards Others’ Advice, and Conformity Reactance. Freedom in Decision and Behavior (8 items) reflects people’s attitudes toward maintaining their freedom to do what they want. Behavioral Reactance (6 items) reflects reactance that is expressed through observable behaviors. Skepticism Towards Others’ Advice (4 items) reflects reactance in response to being told what to do that manifests affectively. Conformity Reactance (3 items) reflects people’s attitudes toward following rules and regulations. Unfortunately, Hong and Ostini only reported estimates of internal consistency (α), and test-retest reliability: .80 and .77, respectively. Although both Merz (as cited in Tucker & Byers, 1988) and Hong and Ostini (1989) found four underlying dimensions of the QMPR, the lack of information about Merz’s study makes comparing the two difficult. Nevertheless, because some items loaded on more than one factor, Hong and Ostini contended that the factors were difficult to interpret and that the QMPR is psychometrically unacceptable.

In the fourth psychometric study of the QMPR, Donnell et al. (2001) administered a slightly different English translation of the questionnaire to 898 American undergraduate students who responded using a scale of 1 (does not apply at all) to 6 (always applies). They used both PCA and EFA to study the factor structure of the QMPR. A three-factor solution was interpreted, which accounted for 38.3% of the variance. The extracted factors were rotated with both orthogonal and oblique rotations.
Although both rotations resulted in similar pattern matrices, Donnell et al. interpreted the EFA with oblique rotation due to moderate correlations among the factors (which ranged from .25 to .35). Five items were removed because they had pattern coefficients less than .40. It is unclear whether the factor structure was reassessed using the remaining 13 items. Nonetheless, the three factors were labeled: *Response to Advice and Recommendations, Restriction of Freedom, and Preference for Confrontation*. *Response to Advice and Recommendations* (7 items) represents negative attitudes toward the advice and suggestions of other people. *Restriction of Freedom* (3 items) represents negative attitudes toward people that interfere with one’s choices and decisions. *Preference for Confrontation* (3 items) represents the excitement people feel when contradicting others or disregarding rules. Donnell et al. reported an internal consistency estimate for the total score ($\alpha = .76$), and stated that the subscale reliabilities were unacceptable. Unfortunately, the actual estimates of internal consistency for the subscales were not reported. Because of the changing factor structure of the QMPR and low subscale reliabilities, Donnell et al. concluded that the scale is not psychometrically sound and needs revision.

There are several limitations regarding the study of the structure of the QMPR that must be addressed. First, it is important to point out that there are two different English translations of the QMPR. Thus, three different versions of the scale were studied: the original German version (Merz, 1983; as cited in Tucker & Byers, 1987), the first translated English version (Tucker & Byers, Hong & Ostini, 1989), and a second translated English version (Donnell et al., 2001). Although the two English translations are very similar, there are slight changes in wording. In addition, the response scale
changed across studies. In Merz’s original study, participants responded on either on a 4-point (according to Tucker & Byers) or 6-point (according to Donnell et al.), with “not at all appropriate” and “extremely appropriate” as anchors. In Tucker and Byers’ study, they used a 6-point scale with the same anchors, despite reporting that Merz used a 4-point scale. Hong and Ostini, on the other hand, used the same anchors on a 4-point scale. Interestingly, Donnell et al. used a 6-point scale with “does not apply at all” and “always applies” as anchors. The differences in the scale anchors could be due to the slightly different translations across studies. Researchers may have chosen to use a 6-point scale instead of the 4-point scale because they wanted to achieve more variability in the responses. The changes in the wording of the QMPR across the three versions, as well as changes in the scale used could have affected how participants responded to the items. It is not surprising, then, that the factor structure of the items was not stable across the four studies: Merz reportedly found four dimensions, as did Hong and Ostini, whereas Tucker and Byers found two dimensions and Donnell et al. found three. Unfortunately, the empirical study of the structure of the QMPR did not provide conclusive evidence concerning the dimensionality of trait reactance, but all studies did interpret a multidimensional solution. Despite their differences, all four studies concluded that the scale should not be used because of its unstable factor structure and undesirable psychometric properties.

Furthermore, questionable techniques and reporting practices were used in these studies. First, Merz supposedly conducted a PCA to examine the structure of the QMPR (Tucker & Byers, 1988). As discussed in Chapter 1, PCA does not account for measurement error in the items, which can lead to biased parameter estimates (Benson &
Nasser, 1998; Preacher & MacCallum, 2003). Thus, EFA would have been the more appropriate technique to use. In addition, several studies used a scree plot and/or the Kaiser criterion to determine how many factors to retain (Merz as cited in Tucker & Byers; Tucker & Byers; Hong & Ostini, 1989). Because Kaiser’s criterion can lead to inaccurate conclusions, other techniques to determine the number of factors to retain such as a parallel analysis (which involves plotting the Eigenvalues of randomly generated data with the observed Eigenvalues, and seeing where the two lines intersect) should have been utilized (Preacher & MacCallum). Finally, reliability estimates for the QMPR were only reported for the total score, despite finding multiple dimensions (Merz as cited in Tucker & Byers, Hong & Ostini, Donnell et al., 2001). It would have been more justifiable to report the reliability of each subscale of the QMPR. Unfortunately, Tucker and Byers did not even report any estimates of reliability for their sample, which is critical reliability is associated with test scores and is thus, sample dependent; reliability is not an inherent property of the test.

*External stage.* Despite concluding that this measure should not be used, several researchers have studied the relationship between scores on the QMPR with measures of other constructs. Unfortunately, not one qualifies as an external validity study because (1) specific theory-based a priori hypotheses concerning the relationship between the QMPR and other variables of interest were not explicitly stated and tested, and (2) the factor structure, and thus scoring of the QMPR was questionable. These studies used the QMPR in an exploratory manner to examine possible relationships between reactance and measures of personality (Self-Directed Search, Buboltz et al., 1999; California Psychological Inventory, Dowd et al., 1994; Personality Research Form, Dowd &
Wallbrown, 1993) as well as developmental variables (Johnson & Buboltz, 2000). In addition, no gender differences have been found (Dowd et al., 1994; Dowd et al., 2001), nor any relationships with age (Dowd et al., 2001). It is important to note, however, these studies only examined the QMPR total score, possibly because of its unstable factor structure. Moreover, these studies emphasize that the QMPR is being used despite its psychometric limitations. Thus, a quality measure of trait reactance is needed.

**Therapeutic Reactance Scale (TRS).**

*Substantive stage.* Psychological reactance has been measured by therapists to better understand their clients, as it is believed to mediate counseling outcomes. To improve upon the psychometric shortcomings of the QMPR, Dowd et al. (1991) developed the Therapeutic Reactance Scale (TRS) to measure trait reactance in a therapy client population. After “careful examination of the definition of psychological reactance proposed by Brehm (1966),” two faculty members and six graduate students created an initial pool of 112 items to measure trait reactance (Dowd et al., p. 542). They defined trait reactance as a potential for reactance, or the tendency to be oppositional. Each item consisted of a statement to which participants responded using a scale of 1 (strongly disagree) to 4 (strongly agree). As with the QMPR, there are several concerns regarding the substantive stage of the TRS. Specifically, the theoretical dimensionality of trait reactance was not stated, thus, it is not clear whether the items of the TRS were written to measure specific dimensions of reactance.

*Structural stage.* To date, two studies have examined the psychometric properties of the TRS. In the first psychometric study of the scale, Dowd et al. (1991) administered the 112 items to 163 college students, and then again three weeks later, with 141
participants at both time points. They used corrected item-total correlations (the correlation between each item and the sum of the remaining items on the scale), as well as a factor analysis to select items to be retained on the final measure. Dowd et al. (1991) removed 80 with corrected item-total correlations below .30. One hundred and thirty undergraduate students then completed the resulting 32-item questionnaire. Four additional items were removed following a factor analysis of the TRS responses, resulting in the final 28-item version of the TRS (see Appendix C). The TRS was administered to 130 university students.

Dowd et al. (1991) conducted an EFA with oblique rotation to study the factor structure of the TRS. Four additional items with factor loadings below .35 were removed. It is unclear whether Dowd et al. reassessed the factor structure using only the final 28-item version of the TRS. Nonetheless, a two-factor solution was interpreted, and the factors were named Behavioral Reactance (17 items, ex. “If I am told what to do, I often do the opposite”) and Verbal Reactance (11 items, ex. “I find that I often have to question authority”). The two-factor solution accounted for 26% of the total variance. Although Dowd et al. did not explicitly define these factors, Buboltz, Thomas, and Donnell (2002) observed that Behavioral Reactance seems to represent a manifestation of reactance through observable behaviors, whereas Verbal Reactance seems to represent a verbal manifestation of reactance. Upon inspection of the items, Verbal Reactance also seems to represent attitudes toward various reactance-inducing situations (e.g., “If I receive a lukewarm dish at a restaurant, I make an attempt to let that be known”). The subscales were moderately correlated ($r = .37$). Reported values of internal consistency ($\alpha$) for Behavioral Reactance and Verbal Reactance were .81 and .75, respectively. Curiously,
the reliability of the total reactance score was also reported ($\alpha = .84$). Test-retest reliability for the total score, Behavioral Reactance subscale, and Verbal Reactance subscale was .59, .60, and .57 respectively.

In the second psychometric study of the TRS, Buboltz et al. (2002) administered the 18-item version to 833 undergraduates. They conducted an EFA using oblique rotation to study the factor structure of the TRS. Oblique rotation was used to account for the moderate correlation between the two factors reported by Dowd et al. (1991). To account for the non-continuous nature of the 4-point Likert scale Buboltz et al. computed and analyzed polychoric correlations. A polychoric correlation estimates the correlation between two observed categorical variables theorized to have an underlying continuous normal distribution. Using several criteria (a scree plot, parallel analysis, and interpretability), a four-factor solution was interpreted, which accounted for 38 % of the total variance. Buboltz et al. (2002) noted that three items (1, 13, and 17) were removed due to “low” communalities. It is unclear whether the factor analysis was reanalyzed using the remaining 25 items. The four factors were labeled according to which items had salient factor loadings ($\geq .40$). *Resentment of Authority* (items 2, 3, 4, 10, and 12) represents a person’s resistance to being controlled by powerful others. *Susceptibility to Influence* (items 7, 11, 18, and 25) represents how open a person is to being influenced by others. *Avoidance of Conflict* (items 21 and 28) represents a person’s preference to avoid conflicts by going along with others. *Preservation of Freedom* (items 5, 15, 19, and 26) represents a person’s need to state their opinion and have things go their way. Buboltz et al. (2002) reported that the four factors had low correlations, ranging from .12 to .24. Unfortunately, reliability estimates for the four factors were not reported. Instead,
estimates of internal consistency ($\alpha$) for the total score, the *Behavioral Reactance* subscale, and the *Verbal Reactance* found by Dowd et al. (1991) were computed (.65, .59, and .49, respectively). In other studies, the reliability of the total score was .77 (Buboltz et al., 1999; Dowd et al., 1994) and test-retest reliability over a one-week period was .76 (Lukin, Dowd, Plake, & Kraft, 1985). Buboltz et al. (2002) urged researchers to compute subscale scores for the TRS based on the four-factor structure they championed, despite only reporting internal consistency estimates aligned with the two-factor solution championed by Dowd et al (1991).

There are several limitations concerning the study of the structure of the TRS. First, the two studies uncovered two different multidimensional factor structures. Dowd et al. (1991) championed a two-factor solution, whereas Buboltz et al. (2002) championed a four-factor solution. Thus, there is confusion surrounding the dimensionality of this scale. Moreover, even though a multidimensional solution was reported across studies, reliability estimates for the total score were nonetheless reported (Buboltz et al., 1999; Buboltz et al. 2001; Dowd et al., 1991; Dowd et al., 1994). As previously discussed, computing the total score and its reliability suggests that the two subscales are essentially the same and ignores the multidimensional nature of the scores. Furthermore, Buboltz et al. (2002) reported reliability estimates for the two subscales found by Dowd et al. (1991), but not for the four subscales they championed. As previously mentioned it appears that Dowd et al. (1991) created the TRS to measure a unidimensional conceptualization of trait reactance. However, the two studies championed different multidimensional factor structures. It is possible that these multidimensional solutions emerged due to similar item wording or context, rather than
substantively meaningful dimensions. In addition, both psychometric studies of the TRS removed items due to “low” factor loadings or communalities, but it appears that neither reanalyzed the factor structure using the remaining items. Doing so is important because removing items could alter the factor structure. Finally, it is important to point out that this scale was developed for use with a clinical population, but was studied using an undergraduate population. This is a concern because college students may respond differently to the TRS items than individuals that are currently in counseling, which was the intended population for this measure.

External stage. To provide evidence of the external validity of the TRS, Dowd et al. (1991) referred to an unpublished doctoral dissertation (Morgan, 1986, as cited in Dowd et al., 1991) that examined the relationship between psychological reactance with several other variables. Specifically, Morgan correlated the total and subscale TRS scores with a measure of locus of control, the K scale of the Minnesota Multiphasic Personality Inventory (MMPI, which reflects a person’s desire to be socially appropriate and impress other people), and several therapy-related variables (specifically, client perceptions of counselor expertness, trustworthiness and attractiveness, no-show rates, and length of treatment). Based on theory and past research, Morgan hypothesized that higher levels of reactance would be associated with an internal locus of control (i.e., higher scores on the locus of control scale) and lower scores on the K scale of the MMPI. Morgan’s first hypothesis was partially supported. The TRS total score and Behavioral Reactance subscale were positively associated with locus of control: $r = .27$ and $r = .35$ respectively. However, the Verbal Reactance subscale did not have a statistically significant correlation and consequently, was not reported by Dowd et al. (1991). The second
hypothesis was also partially supported. The K scale of the MMPI was negatively associated with the TRS total score and Behavioral Reactance subscale: \( r = -0.48 \) and \( r = -0.43 \), respectively. Again, the correlation between the K scale and the Verbal Reactance subscale was not reported because it was not statistically significant. Because trait reactance is believed to mediate important therapy-related variables, it was hypothesized that reactance would be related to more no-shows and a slower rate of improvement, but unrelated to perceptions of counselor expertness, trustworthiness, and attractiveness. Morgan found that higher reactance was associated with more no-shows and a slower rate of improvement as measured by duration of treatment, but Dowd et al. (1991) did not report correlation values. In addition, there appeared to be no relationship between client perceptions of counselor expertness and trustworthiness (no reported correlations) and the TRS total and subscale scores. However, as the attractiveness of the counselor increased, scores on the Behavioral Reactance subscale decreased \( (r = -0.21) \). To date, the four TRS subscales (e.g., Behavioral Reactance and Verbal Reactance) found by Dowd et al. (1991) have not been studied in relation to external variables.

Several other studies have examined the relationship between the TRS and other external variables, but unlike Morgan (1986, as cited in Dowd et al., 1991) did not make any a priori hypotheses regarding how reactance should relate to these variables. Thus, these studies cannot provide strong external validity evidence, but may shed light on variables that may be relevant to the nomological network of reactance. These studies took an exploratory approach to examine the possible relationships between reactance and measures of personality (Self-Directed Search, Buboltz et al., 1999; California
Psychological Inventory, Dowd et al., 1994; Personality Research Form, Dowd & Wallbrown, 1993) as well as developmental variables (Johnson & Buboltz, 2000).

Interestingly, the TRS total scores were found to positively correlate with QMPR total scores, with correlations ranging from .50 to .58 (Buboltz et al., 1999; Dowd et al., 2001; Dowd & Wallbrown, 1993; Dowd et al., 1994). Thus, although the TRS and QMPR are both purported to measure trait reactance, they may be tapping into different aspects of it. This is not surprising considering that the TRS was developed for use with therapy clients. Nonetheless, several studies examined both scales in relation to personality variables, and found that the two scales produced similar personality profiles. The results of these studies suggest that individuals that are high in trait reactance, compared to individuals low in trait reactance, tend to be more aggressive and irritable, eager for attention, open to new experiences, independent, impulsive, easily offended, and lacking in sympathy, support and warmth for others (Dowd & Wallbrown).

Moreover, people high in trait reactance were found to be more dominant and assertive, more interested in being themselves than making a good impression, less willing to follow rules and regulations, and less able to control strong emotions compared to people low in trait reactance (Dowd et al., 1994). Similarly, other researchers have suggested that those high in reactance tend to be aggressive, persuasive, domineering, independent, adventurous, and strive for power and status (Buboltz et al.). In addition, Buboltz et al. found that they also tend to dislike interpersonal interactions, ignore rules and regulations, and think of themselves as popular, adventurous, and ambitious.

Gender, age, and ethnicity differences regarding the TRS have also been explored by researchers. In general, males have statistically significantly higher scores on the TRS
than do females (Dowd et al., 1994; Goldsmith et al., 2005; Seeman, Buboltz, Jenkins, Soper, & Woller, 2004). In addition, it appears that reactance as measured by the TRS decreases as age increases ($r = -.15$, Goldsmith et al.; $r = -.21$, Dowd et al., 2001). It has also been hypothesized that minorities have higher reactance due to negative life experiences. This finding was supported. In one study, African Americans had significantly higher scores than Caucasians on the Behavioral and Verbal Reactance subscales, as well as the total TRS total score (Seeman et al., 2004).

The Need for Additional Study of Trait Reactance Measures

To summarize, in order to study trait reactance in a general population, a quality measure is required. Three measures, the QMPR, TRS, and HPRS, were reviewed and evaluated. The QMPR was the first measure of trait reactance, but researchers concluded that it was psychometrically unsound, and recommended against using it. In response to this, two measures were created to improve upon the QMPR: the TRS and the HPRS. The TRS was developed to assess reactance in therapy clients, but was validated using college student samples. Furthermore, there have been only two psychometric studies of the TRS scale, both of which found different factor structures. For these reasons, this measure would not be appropriate for better understanding a normal population. The HPRS, on the other hand, was developed for a normally functioning population. In fact, its psychometric properties were examined internationally via six studies using undergraduates as well as samples from the general public in both Australia and the United States. However, because the six studies came to different conclusions regarding the factor structure and scoring of the HPRS, further study contributing to the structural stage is warranted. Moreover, there is a need for additional external validity evidence.
CHAPTER 3

Methods

Participants

Two independent samples of students from a mid-sized, mid-Atlantic university were used for this study. Both samples consisted of randomly selected students that participated in one of two university-wide “Assessment Days” in the fall of 2009 or spring of 2010. At this university, each incoming freshman is required to participate in Assessment Day the weekend before the start of classes in the fall, and again after they accumulate 45-75 credit hours. This second Assessment Day occurs in the spring, during students’ sophomore or junior year. Thus, one sample consisted of freshmen and the other, upperclassmen. It is important to note that these two samples were independent; that is, they consisted of different students.

A total of 1215 participants were in the freshmen sample. Of these students, approximately 64% were female, 84% were White non-Hispanic, 5% were Asian, 3.5% were Black, 2% were Hispanic, .1% were Native American, and 5% did not specify their ethnicity. The average age was 18.43 (SD = .40). A total of 876 participants were in the upperclassmen sample. Approximately 65% of these students were female, 77% were White non-Hispanic, 7% were Asian, 3% were Black, 2.5% were Hispanic, less than 1% were Native American, and 9% did not specify their ethnicity. The average age was 20.11 (SD = .93).

The freshmen sample was utilized to assess if Brown et al.’s (2009) results could be replicated. As previously mentioned, Brown et al. modified the originally hypothesized bifactor model in two ways: (1) removing the Independence specific factor
and (2) adding an *Opposite* specific factor. Because modified models can result in improved fit simply due to capitalizing on the characteristics of the particular sample used in the study, it was necessary that these modified models be fit to responses from different, independent samples (MacCallum et al., 1992). Given that Brown et al. studied the HPRS using a freshmen sample, an upperclassmen sample was used to evaluate the generalizability of the model to a slightly different population. Finally, a set of external variables was administered to both samples in order to collect external validity evidence. The procedures used for both samples are described in detail below.

**Procedure**

On Assessment Day, participants were randomly assigned to a testing room monitored by trained proctors, where they completed a set of six tests (both cognitive and noncognitive) that take approximately three hours to complete. In the current study, the room sizes for both Assessment Days ranged from approximately 100 to 300 students.

After providing informed consent, participants completed a series of tests designed to measure content knowledge specific to the general education program (e.g., scientific and quantitative reasoning) as well as noncognitive characteristics and attitudes (e.g., personality and motivation). Tests were administered one at a time and directions were read to the participants before they completed each test. All participants completed the same test at the same time, and were only allowed to move on to the next test once everyone had finished the previous test. Administering the assessments in this way helped to ensure that participants took their time when responding to each test and engaged in good effort. The HPRS was the last of five tests administered for both samples. In addition to the HPRS, participants completed the General Conformity Scale
(GCS), the Big Five Inventory (BFI), and the Perceived Entitlement Scale (PES)\(^1\) earlier in the testing session.

**Measures**

*Hong Psychological Reactance Scale (HPRS; Hong & Page 1989)*

The HPRS is a 14-item, self-report measure that was created to assess one’s tendency to experience psychological reactance (i.e., trait reactance, see Appendix A for items). Participants were asked to respond to each statement using a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores are indicative of higher levels of trait reactance.

*General Conformity Scale (GCS)*

The GCS (Santor et al., 2000) is a unidimensional, six-item, self-report measure that was created to assess one’s tendency to conform to authority in general. Participants were asked to respond to each statement using a scale of 1 (*not at all true of me*) to 7 (*very true of me*). Two of the six items are negatively worded and are reversed scored before obtaining scale scores. Scale scores are computed by summing all of the items, with higher scores indicative of higher levels general conformity. An example item from the GCS is, “I usually do what I am told” (see Appendix D for items). Santor et al. advocated for the unidimensionality of the scale using item-total correlations, however a factor analytic study has yet to be conducted. Santor et al. also provided convergent and discriminant validity evidence of the scale. Cronbach’s alpha for the Santor et al. sample was .81. In the current study, Cronbach’s alpha for both samples was .82.
Big Five Inventory (BFI)

The BFI (John & Srivastava, 1991) is a 44-item, multidimensional measure used to assess the Big Five personality traits. Specifically, there are five subscales, each with eight to ten items used to assess different dimensions of personality: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experiences. Participants were asked to respond to each statement using a scale of 1 (disagree strongly) to 5 (agree strongly). Of the 44 items on the scale, 16 items are negatively worded and thus reversed scored before obtaining subscale scores (see Appendix E for items). Subscale scores are computed by summing all of the items within the subscale; higher scores on the subscales are indicative of higher levels of each dimension of personality. Although the entire scale was administered, the current study only had specific hypotheses concerning relationships between reactance and the extraversion, agreeableness, and openness to experiences subscales. An example item from the extraversion subscale is “I see myself as someone who is outgoing, sociable”; and an example item from the agreeableness subscale is “I see myself as someone who is considerate and kind to almost everyone.” An example item from the openness to experience subscale is “I see myself as someone who is curious about many different things.” Although there are no a priori hypotheses concerning the relationship between reactance and the conscientiousness and neuroticism subscales, they will nonetheless be explored. An example item from the conscientiousness subscale is “I see myself as someone who makes plans and follows through with them”; and an example item from the neuroticism subscale is “I see myself as someone who is worries a lot.” Previous research examining the factor structure of the BFI has generally supported the five-factor structure (e.g., Benet-Martinez & John, 1998;
John & Srivastava) and evidence of convergent and discriminant validity with other scales measuring the Big Five personality traits has been collected (e.g., John & Srivastava, 1999). For the extraversion subscale, Cronbach’s alpha was .87 for the freshmen sample and .86 for the upperclassmen sample. For the agreeableness subscale, Cronbach’s alpha was .78 for the freshmen sample and .80 for the upperclassmen sample. For the conscientiousness subscale, Cronbach’s alpha was .78 for both samples. For the neuroticism subscale, Cronbach’s alpha was .78 for the freshmen sample and .80 for the upperclassmen sample. For the openness to experience subscale, Cronbach’s alpha was .78 for the freshmen sample and .79 for the upperclassmen sample.

Perceived Entitlement Scale (PES)

The PES (Campbell et al., 2004) is a unidimensional, nine-item, self-report measure that was created to assess one’s tendency to feel entitled in general (i.e., psychological entitlement). Participants were asked to respond to each statement using a scale of 1 (strong disagreement) to 7 (strong agreement). One item is negatively worded and is reversed scored before obtaining scale scores, which are computed by summing all of the items. Accordingly, higher scores are indicative of higher levels of psychological entitlement. An example item from the PES is, “I honestly feel I’m just more deserving than others” (see Appendix F for items). Campbell et al. supported the unidimensionality of the PES via EFA and CFA studies, and provided external validity evidence (i.e., convergent and discriminant validity). Cronbach’s alpha was .85 in that study. In the current study, Cronbach’s alpha was .87 for the freshmen sample.
Data Analysis Procedures

The data analysis for this study will consist of two phases congruent with the two purposes of the study. In Phase 1, to study the factor structure of the HPRS, a series of factor models will be tested via CFA using each sample separately. Specifically, the six models tested by Brown et al. (2009) will be re-tested in the current study: a one-factor model, four-factor model, second-order model, bifactor model, incomplete bifactor model, and an incomplete bifactor model with the added Opposite specific factor (see Figures 1 and 2). Testing competing models in CFA is aligned with best practices, as there are often alternative models that can explain the inter-item relationships equally well or better than a model that is said to fit the data. Thus, pitting one’s theoretical model against other alternative models allows one to effectively test and possibly rule out alternative explanations, which can foster greater support for the championed theoretical model than if it had just been tested alone (Loehlin, 1998). In Phase 2, to gather external validity evidence for the HPRS, the relationships between the championed HPRS factor structure from Phase 1 and theoretically-related variables will be examined via full (SEM).

Phase 1: Confirmatory Factor Analysis

Model 1. One-factor model. The first model that was tested is the unidimensional model in which all 14 items represent one, overall factor of trait reactance (see Figure 1). In a one-factor model, the common variance among the 14 items is explained by one factor. This model had 77 degrees of freedom, with 28 parameters (14 direct paths, 14 error variances) estimated from 105 observations. Estimating this model empirically tests whether all the items represent a unidimensional conceptualization of trait reactance (i.e.,
whether the items are homogeneous). This was important to evaluate because, as previously discussed, most researchers using the HPRS calculate a total score and report its reliability, despite championing a multidimensional factor structure. If this unidimensional model represented the data well, the computation of a total score and its reliability would be defensible. However, based on Brown et al.’s (2009) findings, it was hypothesized that this one-factor model would not fit the data. If this hypothesis were supported, computing a composite total score and corresponding reliability (e.g., coefficient alpha or omega) would not be justified.

**Model 2. Four-factor model.** In addition to the one-factor model, the oblique four-factor model championed by Thomas et al. (2001) was also tested (see Figure 1). The four-factor model specifies that the HPRS is multidimensional, meaning that inter-item correlations within subsets of items (i.e., dimensions) are higher than the inter-item correlations across subsets of items. This model had 71 degrees of freedom, with 34 parameters (14 direct paths, 14 error variances, 6 covariances) estimated from 105 observations. Evaluating this model tests whether four correlated first-order factors best explain the relationships among the 14 items. If this model fit the data, it would not be appropriate to calculate a total score. Rather, the four subscale scores would need to be reported as a “profile” of trait reactance. In Brown et al.’s (2009) study, the four-factor model did not represent the data well. Thus, it was hypothesized that this model would not adequately represent the inter-item relationships in the current study either.

**Model 3. Second-order model.** The third model evaluated was the second-order model, which is similar to the four-factor model, with the exception that a second-order factor explains the correlations among the first-order factors (see Figure 1). Thus, the key
element of the second-order model is that there is a hierarchy of factors, such that the second-order factor is superordinate (i.e., at a higher level) compared to the four first-order factors (Gignac, 2008). The second-order model had 73 degrees of freedom, with 32 parameters (18 direct paths, 14 error variances) estimated from 105 observations. Because this model is more parsimonious (i.e., has more degrees of freedom) than the four-factor model (which has 71 degrees of freedom), it would fit the data equally well or worse that the four-factor model, but not better. If the four-factor model did not fit the data, the second-order model would not fit the data either since it is more parsimonious than the four-factor model. Because the second-order model would not converge to an admissible solution in Brown et al.’s (2009) study due to a negative disturbance term associated with the Resisting Influence from Others factor, it was hypothesized that the same would occur in the current study.

Model 4. Bifactor model. The bifactor model has been primarily used by intelligence researchers (e.g., Gustafson & Balke, 1993), but has increasingly been employed to better understand noncognitive constructs (Chen et al., 2006; Gignac, 2007; 2008; Muliak & Quartetti, 1997; Yung, Thissen, & McLeod, 1999; Reise, Morizot, & Hays, 2007; Reise, Waller, & Comrey, 2000). A bifactor model is very similar to a one-factor model in that common variance among all the items is explained by a general factor. However, the bifactor model also includes specific factors that explain additional variance among subsets of items after controlling for the general factor (see Figure 1). To describe this further, imagine a correlation matrix among items in which all the item correlations are moderate to high and of approximately the same magnitude. In such a case, a one-factor model would fit the data well. Now, imagine that in addition to
moderately high correlations among the items, there are “pockets” of items with even higher inter-item correlations. This describes a scenario in which the bifactor model would explain the inter-item correlations well.

To reiterate, the specific factors of the bifactor model explain shared variance among items over and above what can be accounted for by the general factor (i.e., controlling for the general factor); thus, the specific factors and the general factor are orthogonal. The specific factors are not related to the general factor because by definition, they represent what cannot be explained by the general factor. These specific factors can be substantive and meaningful, or they can represent method or nuisance effects (e.g., variance shared by negatively-worded items). For the current study, it is important to keep in mind that these specific factors do not represent dimensions of general trait reactance. Rather, the specific factors represent common variance shared among sets of items after removing variance common to the general reactance factor. Thus, although tempting, one should not refer to these specific factors using the same names applied to the first-order factors. To reinforce this idea, Brown et al. (2009) gave the specific factors different labels than their “respective” first order factors (e.g., Anger).

In the current study, there were only two indicators representing the Advice specific factor. Accordingly, their unstandardized factor loadings on Anger were constrained to be equal so that this part of the model is identified² (see Figure 1). All other factor loadings and all error terms were freely estimated. Factor correlations were fixed to zero representing the orthogonal nature of the general and specific factors. The bifactor model had 64 degrees of freedom, with 41 parameters (27 direct paths, 14 error variances) being estimated from 105 observations.
Model 5. Incomplete bifactor model. The incomplete bifactor model (with the Independence specific factor removed) was also tested in the current study. This model is more parsimonious than the original bifactor model, and specifically tests the necessity of the Independence specific factor. That is, it assesses if this particular set of items shares variance after controlling for the general reactance factor. Testing this model assesses whether these items are unidimensional and only represent general trait reactance, or whether they are multidimensional, and need multiple factors (i.e., general and specific) to explain their common variance. Given Brown et al.’s (2009) results, it was hypothesized that this model would fit as well as the full bifactor model, thus supporting the removal of the Independence specific factor. However, it was also hypothesized that there will be local misfit associated with the three items that have “opposite” wording. This model had 68 degrees of freedom, with 37 parameters (23 direct paths, 14 error variances) being estimated from 105 observations.

Model 6. Incomplete bifactor model with opposite specific factor. The last model tested was the incomplete bifactor model with an added Opposite specific factor. This model tests if items 3, 9, and 13 share additional variance, after controlling for reactance as well as their respective specific factors. As previously mentioned, this Opposite specific factor appears to represent a method effect due to common wording concerning “doing the opposite.” Another possible explanation for the inter-correlations among the three items is that all three items tend to be extreme (e.g., “When something is prohibited, I usually think, “That’s exactly what I am going to do”). This model had 65 degrees of freedom, with 40 parameters (26 direct paths, 14 error variance) being estimated from 105 observations. Given that this was the model championed by Brown et al. (2009), it
was hypothesized that it would also adequately explain the responses of both samples in the current study.

**Phase 2: External Validity**

SEM was used to estimate the relationships between the external variables and each HPRS factor from the championed CFA model. The external variables include general conformity, extraversion, agreeableness, conscientiousness, neuroticism, openness to experience, and entitlement\(^1\). The relationship between the HPRS and conscientiousness and neuroticism were also explored. Relating the HPRS factors to each external variable within an SEM framework estimates the relationship at the latent level, which controls for measurement error. This is advantageous compared to relating the variables at the observed level (i.e., bivariate correlations) where error variance is not removed. Furthermore, if a bifactor model were found to best represent scores on the HPRS, it would not be appropriate to compute a total observed “reactance” score, as it would contaminate the reactance variance with specific factor variance. Instead, the general reactance factor from the bifactor model (with the effects of the specific factors removed) would need to be related to the external variables via full SEM. In order to assess the external validity evidence of the HPRS, latent correlations between the external variable factors and the championed HPRS factor(s) were evaluated for their alignment with a priori hypotheses.
CHAPTER 4

Results

Data Screening and Descriptive Statistics

Both datasets were screened for missing data, out-of-range responses, univariate and multivariate outliers (based on Mahalanobis distances), as well as univariate and multivariate normality before conducting any analyses. Participants with missing data, out-of-range responses, or atypical data (i.e., outliers) on any of the variables (including the external variables) were removed from the dataset.

For the freshmen sample, a total of 1305 participants completed the HPRS and the external variable measures administered on Assessment Day. Of these participants, 1218 had valid responses (i.e., no missing data or out-of-range responses) on all of the measures. Three cases were flagged as multivariate outliers and subsequently removed due to clear response sets, resulting in a final freshmen sample size of 1215 participants.

For the upperclassmen sample, a total of 911 participants were administered the HPRS and the external variable measures, of which 876 had complete data on all of the variables under study. The final number of participants in the upperclassmen sample consisted of 872 participants (four multivariate outliers were removed).

Descriptive statistics (means, standard deviations, skewness, kurtosis, and inter-item correlations) for the two samples are presented in Table 2. Overall, scores tended to fall in the middle, with means ranging from 2.08 to 3.55 for the freshmen and 1.97 to 3.47 for the upperclassmen. All correlations were low to moderate, indicating an absence of multicollinearity. According to the skewness and kurtosis indices associated with the 14 HPRS items, there did not appear to be any extreme deviation from univariate
normality, as there were no values greater than $|2|$ for skewness or $|7|$ for kurtosis for either sample (Finney & DiStefano, 2006). However, the data did appear to deviate from multivariate normality, as Mardia’s normalized multivariate kurtosis index was 27.55 for the freshmen sample and 21.57 for the upperclassmen sample, which exceeds most recommended cutoffs (Finney & DiStefano).

**Estimation Method**

For all CFAs, a 14 X 14 covariance matrix was analyzed using LISREL 8.72 (Jöreskog & Sörbom, 2005). Maximum likelihood (ML) estimation was utilized to produce parameter estimates and fit indices. ML estimation was used instead of generalized least squares (GLS) because it is more sensitive to model misspecification (Olsson, Foss, Troye, & Howell, 2000). However, because the assumption of multivariate normality was violated, it was necessary to utilize the Satorra-Bentler (SB) scaling method (Satorra & Bentler, 1994). The SB scaling method uses the degree of multivariate kurtosis present in the data to adjust the $\chi^2$ statistic, several fit indices, and the standard errors of the estimated parameters so that they are less biased.

**Assessing Model-Data Fit**

How well each hypothesized model fit the data was evaluated in several ways. First, the global (overall) fit of the model was assessed. Although there are numerous fit indices that provide information regarding overall fit, most fall into one of two categories: absolute or incremental fit indices. Absolute fit indices represent how well the model-implied covariance matrix aligns with the observed covariance matrix. In the current study, three absolute fit indices were examined: the SB-scaled chi-square ($\chi^2_{SB}$),
the standardized root mean square residual (SRMR), and the SB-scaled root mean error of approximation (RMSEASB).

The $\chi^2_{SB}$ statistically tests the fit of the model to the data. Specifically, it tests the null hypothesis that the model-implied covariance matrix is equal to the observed covariance matrix. Because one hopes that the model adequately reproduces the observed covariances and variances, failure to reject the null hypothesis lends support for the fit of the theoretical model to the data. However, this test is affected by sample size such that large samples can lead to increased Type I errors in which the null is rejected due to trivial differences between the two covariance matrices. Moreover, it is a test of exact, as opposed to approximate, fit. However, making a dichotomous decision regarding the fit of a model may not be entirely useful (Marsh, Hau, & Wen, 2004). Nonetheless, the $\chi^2$ test is still commonly reported out of convention.

Another index of absolute fit is the SRMR, which reflects the average absolute value of the correlation residuals. Thus, lower values are indicative of better fit. Hu and Bentler (1999) recommended this index always be reported because it is most sensitive to misspecified factor covariances, moderately sensitive to misspecified factor loadings, and is minimally affected by distribution and sample size.

The RMSEASB reflects the discrepancy between the model-implied covariance matrix and the population covariance matrix (i.e., error of approximation). This index is adjusted for parsimony such that it “rewards” parsimonious models (i.e., models with more degrees of freedom). Furthermore, this index is recommended because it is most sensitive to misspecified pattern coefficients, relatively unaffected by the estimation method used except in small samples, and less sensitive to sample size and non-normality
compared other fit indices (Hu & Bentler, 1998). Because the RMSEA$_{SB}$ is a measure of the discrepancy between the model-implied and population covariance matrices, values close to zero are desirable.

Although absolute fit indices such as the ones described above are useful in understanding how well the theoretical model reproduces the covariance matrix, it is important to note that a model can have good absolute fit due to low correlations among the observed variables. That is, low correlations are somewhat easy to reproduce and will often result in absolute fit indices that appear to be adequate (Hu & Bentler, 1998). Incremental fit indices, on the other hand, are sensitive to low correlations. Specifically, incremental fit indices assess the relative improvement in fit of a theoretical model compared to a baseline (null) model in which all of the observed variables are uncorrelated. That is, if there are substantial inter-item correlations and the theoretical model adequately represents them, then the theoretical model should fit substantially better than the null model. The SB-scaled comparative fit index (CFI$_{SB}$) is a ratio of the lack of fit of the theoretical model to the lack of fit of the baseline model, subtracted from 1. Because one would hope that the theoretical model fits substantially better than the baseline model, one would also hope that the lack of fit associated with the theoretical model is much less than that of the baseline model, making their ratio very small. Thus, CFI values close to 1 are preferred.

Guidelines to evaluate the magnitude of these fit indices have been developed (Hu & Bentler, 1998; 1999). For example, Hu and Bentler suggest that for normally distributed data, adequate fit is evidenced by SRMR values less than .08, RMSEA values less than .06, and CFI values greater than .95. For non-normal data, the Satorra-Bentler
scaled fit indices have slightly different “cutoffs”. According to Yu and Muthén (2002), SRMR values less than .07, RMSEA values less than .05, and CFI values greater than .95 are indicative of good fit. It is important to note that the use of cutoffs to evaluate fit indices has been debated in the literature. Specifically, Marsh et al. (2004) questioned Hu and Bentler’s (1999) logic of establishing cutoffs to make dichotomous decisions regarding fit. They argued that the original purpose of goodness-of-fit indices was to evaluate approximate fit, not to make dichotomous decisions regarding whether the model fits perfectly (which is what the $\chi^2$ statistic tests). Thus, using a hypothesis testing paradigm to establish cutoffs is questionable because it forces the researcher to make a dichotomous decision regarding the fit of a model when the real goal is to assess the degree of fit. Accordingly, it is recommended that these cutoffs be interpreted as guidelines rather than strict cutoffs (Marsh et al.). In line with this recommendation, the guidelines established by Yu and Muthén for non-normal data (i.e., SRMR < .07, RMSEA$_{SB}$ < .05, CFI$_{SB}$ > .95) will be used as the “upper-bound” of fit in the current study. Furthermore, a model will be judged to have adequate fit if it reaches the cut-offs commonly used by researchers prior to the more stringent cutoffs suggested by Hu and Bentler (SRMR < .08, RMSEA$_{SB}$ < .08, CFI$_{SB}$ > .90). Table 3 contains the global fit indices associated with each model.

Although global fit indices can be informative for evaluating how well a model fits the data in general, they can mask areas of “local” misfit. Examining how well the model reproduces covariances between individual pairs of items is useful for diagnosing local misfit, and can be evaluated by examining the standardized covariance residuals. Specifically, standardized covariance residuals represent the discrepancy between each
model-implied inter-item covariance and the corresponding observed inter-item covariance. Thus, values close to zero are preferred. Because standardized covariance residuals are on a z-score metric, values greater than $\pm 4$ signify that the model did not adequately reproduce the relationship between the two items. Positive residuals indicate that the relationship was underestimated, whereas negative residuals indicate that the relationship was overestimated.

Sample 1: Freshmen Sample

Phase 1: Confirmatory Factor Analysis

Model-data fit. The fit indices associated with each model appear in Table 3. As suspected, the one-factor model (Model 1) did not represent the data well globally or locally (21 areas of local misfit). Importantly, the pattern of standardized covariance residuals aligned with Brown et al.’s (2009) championed bifactor model (Model 6). For example, the largest residual (9.60) was between two items (6 and 8) representing the Anger specific factor in Model 6, indicating that after controlling for the general reactance factor, these two items share additional variance not explained by the one-factor model. The relationship between two items representing the Opposite specific factor of Model 6 (3 and 9) was also underestimated, as were the relationships between various items representing the Rules and Regulations and Anger specific factors.

Because Model 2 is a multidimensional model, it was better able to represent the relationships among items than the simpler Model 1. Although the four-factor model (Model 2) reproduced the data fairly well in a global sense, there were eight areas of local misfit. The pattern of standardized covariance residuals still aligned with Model 6. Recall that in Model 2, there is not an overall factor to represent the common variance across all
14 items. The relationships between several items representing different factors (e.g., 1 and 4, 5 and 7, 13 and 14) were underestimated, suggesting the need for an overall reactance factor to help account for these relationships. Thus, these data appear to need both an overall general factor, as well as several specific factors to adequately represent the inter-item relationships.

As was found by Brown et al. (2009), the second-order model (Model 3) did not converge to an admissible solution due to a negative disturbance term (Heywood Case) associated with the Resisting Influence from Others factor. The negative disturbance term suggests that the Resisting Influence from Others items only represent the second-order factor. Thus, the data appear to be over-factored when modeling this first-order factor (Chen et al., 2006). As with Model 3, the bifactor model (Model 4) also did not converge to an admissible solution due to a negative error variance associated with the Independence specific factor. Because the same items (10, 11, 12, and 13) that represented the Resisting Influence from Others first-order factor in Model 3 represented the Independence specific factor in Model 4, it appears that these items are being over-factored in both models. Taken together, this suggests that these items are unidimensional; that is, they do not share any additional variance with each other after controlling for general reactance.

When the Independence specific factor was removed to form the incomplete bifactor model (Model 5), it resulted in adequate global fit, but there were 11 areas of local misfit. In particular, the relationship between items 3 and 9 remained underestimated, highlighting the need of the Opposite specific factor specified by Model 6. The Opposite specific factor was added, however, this model (Model 6) would not
converge to an admissible solution. In order to explore why this model did not converge to an admissible solution, the errors of the three *Opposite* items (3, 9, and 13) were allowed to correlate. The error correlations between item 13 and both items 3 and 9 were minimal (.08 and .02, respectively), indicating that after controlling for the general reactance factor, item 13 did not share additional variance with either item 3 or 9, resulting in the *Opposite* factor being empirically under-identified. Thus, a modified version of Model 6 in which item 13 did not represent the *Opposite* specific factor was tested (Model 6-revised). Because the *Opposite* factor subsequently has only two indicators, the two factor pattern coefficients were constrained to be equal, as was done with the *Advice* specific factor in Model 4. This model has 67 degrees of freedom, with 38 parameters (24 direct paths, 14 error variances) estimated from 105 observations. Model 6-revised resulted in adequate global fit, but had six areas of local misfit. These areas of local misfit were not severe, however, with all of the standardized covariance residuals falling between -5.69 and 5.25. Furthermore, there reasons for these areas of local misfit were not obvious; that is, they were not easily explainable. Given that the local misfit appears to be mild, this modified version of Model 6 was championed for the freshmen sample.

*Parameter estimates and reliabilities.* Given the adequate fit of the incomplete bifactor model with the *Opposite* specific factor (Model 6-revised), the pattern coefficients and error terms from this model were examined (see Table 4). This bifactor model includes items that represent only one factor (i.e., unidimensional items) as well as items that represent multiple factors (i.e., multidimensional items). For unidimensional items (such as item 10), an unstandardized pattern coefficient represents the amount of
change in an item for every one standard deviation increase in the underlying factor, whereas a standardized pattern coefficient represents the standard deviation change in the item for every one standard deviation increase in the factor. Furthermore, the squared standardized pattern coefficient represents the amount of variance in an item that can be explained by the latent factor. For example, item 10 only represents the general reactance factor, and has a standardized pattern coefficient of .63, meaning that for every one standard deviation increase in the factor, the item increases by .63 standard deviations, and approximately 40% of the variance in item 10 can be explained by the general reactance factor (.63^2 = .40). Ideally, at least 50% of the variance in an item would be explained by the underlying factor structure.

The interpretation of parameter estimates is slightly different for multidimensional items (such as item 4). An unstandardized pattern coefficient represents the unit change in an item for every standard deviation increase in the underlying factor, controlling for the other underlying factors. Likewise, a standardized pattern coefficient represents the standard deviation change in an item for every one standard deviation increase in the factor, controlling for the other underlying factors. For example, item 4 represents both general reactance, as well as Anger. The standardized pattern coefficient of item 4 on the general reactance factor is .41, indicating that for every standard deviation increase in general reactance, item 4 increases by .41 standard deviations, controlling for Anger. Because all factors in the championed model are orthogonal, the total variance explained (R^2) for any particular item is simply the sum of the squared standardized loadings of its associated factors. For example, the standardized factor loading of item 4 on Anger is .27, so approximately 24% the variance in item 4 can be
explained by the general reactance factor and the *Anger* specific factor together \((.41^2 + .27^2 = .24)\). Standardized pattern coefficients can also be used to compare the relative strength of factors in explaining variance in each item. Because the HPRS is hypothesized to be primarily a measure of general reactance, it is preferable for items to have higher standardized pattern coefficients on the general reactance factor than on their respective specific factors.

After inspecting the parameter estimates associated with Model 6-revised, several important patterns emerged. First, all of the unstandardized pattern coefficients were statistically significant \((p < .05)\). Second, all of the items had higher standardized pattern coefficients associated with the general reactance factor than with their associated specific factor(s), with the exception of item 6. The larger coefficients associated with the general factor are an important finding, considering that this scale was most likely designed to measure reactance in general. Third, only two items (3 and 6) had more than 50% of their variance explained by the factor structure, indicating that most items still have a large amount of unexplained variance.

An additional way to assess the utility of the championed model is to calculate Coefficient H for the general reactance factor. Coefficient H represents the reliability of a latent factor (Hancock & Mueller, 2001), and is a sum of each item’s information, calculated using the following formula:

\[
H = \frac{\left(\sum_{i=1}^{p} \lambda_i \right)^2}{\left(\sum_{i=1}^{p} \lambda_i \right)^2 + \left(\sum_{i=1}^{p} (1 - \lambda_i^2) \right)},
\]

where \(\lambda\) represents *standardized* path coefficients.
A useful way to conceptualize Coefficient H is to imagine regressing the latent factor on its indicators. Coefficient H is equivalent to the variance in the latent factor ($R^2$) attributable to an “optimum linear composite” of its indicators (Hancock & Mueller). Coefficient H for the freshmen sample was .85. Thus, the 14 items of the HPRS explain 85.4% of the variance in the general reactance latent factor. Coefficient H can also be calculated for each of the specific factors, using only their associated indicators. For the specific factors, Coefficient H was .38 for Rules and Regulations, .55 for Anger, .24 for Opposite, and .34 for Advice. These values are low, indicating that the specific factors may not be meaningful on their own. That is, the items do not seem to adequately “inform” the specific factors.

Phase 2: External Validity Evidence

Relationships with the general reactance factor. In order to collect external validity evidence for the HPRS and assess its nomological network, the general reactance factor was correlated with seven external variables (general conformity, extraversion, agreeableness, openness to experiences, conscientiousness, neuroticism, and psychological entitlement). This was conducted at the latent level for two reasons: (1) it allows one to take measurement error into account, and (2) it allows one control for construct irrelevant variance due to the specific factors. With respect to the former, each external variable was modeled as a latent factor by using a single composite indicator and fixing its error variance, based on its reliability (see Figure 6). The composite variable was created by summing the items representing that particular scale or subscale. Of course, using a single indicator assumes that a unidimensional structure underlies the measure’s scores. The unidimensionality of each of these scales has been empirically
supported (see Methods Section); thus, the use of single-indicator models was justified.

The error variance of each composite was calculated using the following equation:

\[(1 - r_{xx}) \times \text{var}(x),\]

where \(r_{xx}\) is Cronbach’s coefficient alpha and \(\text{var}(x)\) is the variance of the total composite scores. When modeling this via SEM, the unstandardized error variance of the composite indicator was fixed to this value. The latent factor representing the external variable was then allowed to freely correlate with the reactance general factor and the specific factors.

Factor correlations with the external variables are presented in Table 5. As predicted, trait reactance had a positive relationship with entitlement \((r = .25, p < .01)\) and negative relationships with conformity \((r = -.46, p < .01)\) and agreeableness \((r = -.43, p < .01)\). Contrary to what was predicted, trait reactance did not have a significant positive relationship with extraversion or openness to experience. Although no specific hypothesis was made regarding the relationship between trait reactance and conscientiousness, the two constructs were negatively correlated \((r = -.25, p < .01)\).

Although no hypotheses regarding the relationship between neuroticism and trait reactance were stated, there was no observed relationship between these two constructs \((r = .08, p > .05)\). Thus, highly reactant individuals tend to be more entitled, less willing to conform, and less agreeable in general, compared to those low on this construct. There is also preliminary evidence to suggest that reactant individuals may also be less conscientious than those that are less reactant. There was no previous research linking these two constructs, but it is not surprising that individuals that are more reactant, more entitled, less willing to conform, and less agreeable would also be less conscientious.

Furthermore, past research has found that those high in trait reactance tend to be
somewhat careless about duties and obligations, resist rules and regulations, and are not as interested in making a good impression as being themselves (Dowd et al., 1994). It is important to examine this hypothesis with the upperclassmen sample to see if the negative relationship between trait reactance and conformity replicates.

*Relationships with specific factors.* In addition to examining the factor correlations with the general reactance factor, the relationships between external variables and the specific factors were also explored (see Table 5). Because the specific factors were orthogonal to the general reactance factor, the following correlations represent the unique relationship between the specific factors and external variables. In other words, the squared correlations represent variance in the external variables attributable to the specific factors, not the general reactance factor. The *Rules and Regulations* specific factor was negatively correlated with conformity \( (r = -.45, p < .01) \), agreeableness \( (r = -.33, p < .01) \), and conscientiousness \( (r = -.29, p < .01) \); the *Advice* specific factor was also negatively correlated with agreeableness \( (r = -.37, p < .01) \) and positively correlated with neuroticism \( (r = .18, p < .01) \); the *Opposite* specific factor was negatively correlated with conformity \( (r = -.46, p < .01) \) and conscientiousness \( (r = -.19, p < .01) \); and the *Anger* specific factor was not statistically significantly correlated with any of the external variables. The fact that the specific factors correlate with some of the external variables indicates that the HPRS represents multiple sources of systematic variance. The majority of this systematic variance is due to the general factor, trait reactance. The specific factors are also associated with systematic variance, but their low reliabilities limit their usefulness. Perhaps the specific factors are best conceptualized as *method effects* that are substantive, but can wreak havoc on correlations between
reactance and external variables, if not controlled for by using a bifactor model. Furthermore, without removing these unwanted sources of systematic variance, there would be a large amount of construct-irrelevant variance contaminating the observed HPRS scores. Thus, in order to obtain a purified measure of trait reactance using the HPRS, it appears that the use of a bifactor model (Model 6-revised) is necessary.

Sample 2: Upperclassmen Sample

As previously stated, an upperclassmen sample was used to determine if the same factor structure would be championed in a slightly different population of undergraduates. In addition, it was important to test a new hypothesis derived from the results from the freshmen sample: that reactance and conscientiousness have a negative relationship.

Phase 1: Confirmatory Factor Analysis

Model-data fit. The fit indices associated with each model appear in Table 3. As with the freshmen sample, the one-factor model (Model 1) did not represent the data well globally or locally, with 14 areas of local misfit that aligned Brown et al.’s (2009) championed bifactor model (Model 6). For example, the largest residual (7.83) was between two items (6 and 7) that represent the Anger specific factor in Model 6. Furthermore, the relationships among three items representing the Rules specific factor of Model 6 (1, 2, and 3) were also consistently underestimated.

The four-factor model (Model 2) fit well globally, but had two areas of local misfit. Specifically, the relationships between items 5 and 7, as well as 12 and 14 were underestimated (residuals = 4.47 and 4.58, respectively). As with the freshmen sample, the pattern of standardized covariance residuals aligned with Model 6 such that both
residuals were between items representing different factors. This suggests the need for a
general reactance factor to help account for these relationships.

The second-order model (Model 3) did not converge to an admissible solution due
to a negative disturbance term (Heywood Case) associated with the Resisting Influence
from Others factor, which also occurred with the freshmen sample. Likewise, the bifactor
model (Model 4) did not converge to an admissible solution due to a negative error
variance associated with the Independence specific factor. As pointed out above, the
same items that represented the Resisting Influence from Others first-order factor in
Model 3 also represented the Independence specific factor in Model 4, indicating that
these items are being over-factored in both models for the upperclassmen sample.

The incomplete bifactor model in which the Independence specific factor was
removed (Model 5) resulted in adequate global fit, but there were 3 areas of local misfit,
again between items represented by different specific factors. Specifically, the
relationships between two items on the Anger specific factor (items 6 and 8) and item 9
on the Advice specific factor were overestimated (residuals = -4.44 and -5.42,
respectively), and the relationship between items 6 (of Anger) and 10 (which only
represented the general reactance factor) was underestimated (residual = 4.29). Although
this pattern of standardized residuals does not highlight the need of the Opposite specific
factor contained in Model 6 per se, adding this specific factor did result in better global
fit, and there was only one area of local misfit between items 8 and 9, which was quite
minor (residual = -4.84). Thus, Model 6 was championed for the upperclassmen sample.

Parameter estimates and reliabilities. Given the adequate fit of the incomplete
bifactor model with the Opposite specific factor (Model 6), the pattern coefficients and
error terms of this model were examined (see Table 4). After inspecting the parameter estimates associated with this model, the same three patterns that emerged for the freshman sample were also present in the results from the upperclassmen sample: (1) all of the unstandardized path coefficients were statistically significant \( (p < .05) \), (2) all of the items had higher standardized path coefficients associated with the general reactance factor than with their associated specific factor(s), with the exception of items 3, 4, 5, and 6, and (3) only three items (3, 6, and 9) had more than 50% of their variance explained by the factor structure, indicating that most items still have a large amount of unexplained variance. In addition, it is important to emphasize that the pattern coefficients associated with the \textit{Opposite} specific factor were all statistically significant and of a moderate magnitude, suggesting that even though the pattern of standardized covariance residuals from Model 5 did not suggest the need for the specific factor, it is still necessary to include this factor in the model.

Coefficient H for the upperclassmen sample was .847, indicating that the 14 items of the HPRS explain 84.7% of the variance in the latent factor of general reactance. For the specific factors, Coefficient H was .48 for \textit{Rules and Regulations}, .56 for \textit{Anger}, .25 for \textit{Opposite}, and .44 for \textit{Advice}. These low Coefficient H values indicate that the specific factors may not be meaningful on their own and do not seem to adequately “inform” the specific factors.

\textit{Phase 2: External Validity Evidence}

\textit{Relationships with the general reactance factor}. The general reactance factor was correlated at the latent level with six external variables (general conformity, extraversion, agreeableness, openness to experiences, conscientiousness, and neuroticism). Factor
correlations with the external variables are presented in Table 5. As predicted, trait reactance had negative relationships with conformity ($r = -.46, p < .01$), agreeableness ($r = -.37, p < .01$), and conscientiousness ($r = -.29, p < .01$), and a positive relationship with openness to experiences ($r = .17, p < .01$). Contrary to what was predicted, trait reactance did not have a significant positive relationship with extraversion. In fact, it had a significant negative relationship with extraversion ($r = -.19, p < .01$). In addition, although no relationship between trait reactance and neuroticism was explicitly hypothesized, the two constructs were positively correlated ($r = .17, p < .01$) for the upperclassmen sample. Thus, the data from the upperclassmen sample suggest that highly reactant individuals tended to be less willing to conform, less agreeable, and less conscientious and more open to experiences in general, compared to those with low levels of trait reactance. This data also suggests that reactant individuals may be more neurotic and less extraverted, though the magnitudes of these correlations were quite small.

*Relationships with specific factors.* In addition to examining the factor correlations with the general reactance factor, the relationships between external variables and the specific factors were also explored (see Table 5). The *Rules and Regulations* specific factor was negatively correlated with conformity ($r = -.41, p < .01$), agreeableness ($r = -.45, p < .01$), and conscientiousness ($r = -.33, p < .01$) and positively related to extraversion ($r = .25, p < .01$); the *Advice* specific factor was also negatively correlated with agreeableness ($r = -.40, p < .01$) and positively correlated with neuroticism ($r = .15, p < .01$); the *Opposite* specific factor was positively correlated with agreeableness ($r = -.31, p < .01$); and the *Anger* specific factor was positively correlated
with extraversion ($r = .19, p < .01$), conscientiousness ($r = .17, p < .01$), and openness to experiences ($r = .29, p < .01$). Again, these correlations indicate that the HPRS items represent multiple sources of systematic variance, not just variance due to trait reactance. Thus, without removing these unwanted sources of systematic variance, a large amount of construct-irrelevant variance would contaminate observed HPRS scores.

**Implications of Using the Championed Bifactor Model in Practice**

**Advantages of the Bifactor Model**

The championed factor structure entails modeling a general reactance factor and several specific factors. Modeling responses on the HPRS using a bifactor model is advantageous for several reasons. First, as previously mentioned, SEM allows for constructs to be modeled at the latent level, which takes measurement error into account. Without controlling for measurement error, the observed correlations between reactance and external variables would be attenuated. Second, modeling the inter-item relationships of the HPRS using a bifactor model allows one to partial out the effects of construct irrelevant variance by modeling specific factors. Without removing these sources of construct irrelevant variance, the relationships between reactance and external variables could be biased. The advantages of the championed bifactor model are highlighted below via a demonstration in which the HPRS and external variables are correlated using three different methods.

To illustrate the effects of not controlling for measurement error or construct irrelevant variance, the scores on the HPRS were correlated with the external variables using two alternative methods. One method (Method I) computed correlations between the HPRS total scores and total scores on external variables (i.e., Pearson product
moment correlations). The other method (Method II) correlated the latent general reactance factor (assuming a unidimensional model) with the latent external variables. Method II is an improvement over Method I because it takes the measurement error of both reactance and the external variables into account, allowing for correlations to be disattenuated. However, neither Method I nor II controls for construct irrelevant variance; that is, the assumed (Method I) or specified (Method II) unidimensional factor structure of reactance is wrong. To illustrate the advantages of the bifactor model, both of these methods were compared to the correlations obtained using the bifactor model (Method III), which controls for both measurement error and construct irrelevant variance. Table 6 contains the correlations obtained via these three methods.

An examination of the correlations presented in Table 6 reveals several important effects. First, a comparison of the correlations obtained when using observed versus latent variables (Method I vs. Method II, respectively) clearly reveals the predicted effects of measurement error. Specifically, virtually all of the observed correlations between the external variables and the HPRS (Method I) are smaller than their respective latent correlations (Method II) for both samples. More interesting is the comparison of Method II (which only controls for measurement error) to Method III (which controls for both measurement error and construct irrelevant variance via the bifactor model). For both samples, the correlations of reactance with conformity, agreeableness, and conscientiousness are noticeably smaller when estimated using Method III vs. Method II. Inspection of the correlations between the specific factors and these external variables sheds light on this finding (see Table 5). For example, in the freshman sample, the correlation between conformity and trait reactance, as represented by a one-factor model,
is -.57. This correlation drops to -.46 when correlating conformity with the purified
general reactance factor (Model 6-revised). The latent correlation from the
unidimensional reactance model was overestimated in Method II most likely because the
_Opposite_ and _Rules and Regulations_ specific factors both have negative relationships
with conformity. That is, the shared variance between conformity and the _Opposite_ and
_Rules and Regulations_ factors confound the shared variance between trait reactance and
conformity when _Opposite_ and _Rules and Regulations_ are not modeled as separate
factors. On the other hand, the relationship between entitlement and reactance remains
approximately the same in magnitude from Method II to Method III. The stability in the
magnitude of the correlation from Method II to Method III is likely due to the fact that
none of the specific factors have a significant relationship with entitlement. Thus, this
relationship was neither over-, nor underestimated when using the one-factor model. This
demonstration clearly shows that when sources of systematic variance (represented by the
specific factors) are not controlled for, they biased the correlation between reactance and
extraversion upward (i.e., less negative).

_Scoring of the HPRS_

Although the bifactor model clearly represents the data most accurately, it
complicates the creation of an observed composite score of reactance. One might
erroneously conclude that because there is an overall general reactance factor, calculating
a total score on the HPRS would be appropriate. The negative implications of ignoring
sources of systematic variance was illustrated above. By partialling out the variance
attributable to _Anger, Rules and Regulations, Advice_, and _Opposite_, the general reactance
factor is a purified measure of trait reactance. Unfortunately, there is not a clear-cut way
to obtain and model observed scores representing this purified reactance factor; SEM is necessary.

If one were to insist on using a total HPRS score, one could evaluate how well it represents the purified reactance factor by calculating $\omega_H$. $\omega_H$ is a reliability index equivalent to the squared correlation between the observed total scores on the HPRS and the general reactance factor from the bifactor model (McDonald, 1999; Zinbarg, Revelle, Yovel, 2007; Zinbarg, Revelle, Yovel, & Li, 2005). Specifically, $\omega_H$ is the ratio of systematic variance due only to the general reactance factor (not including variance attributable to the specific factors) to the total variance in the items:

$$\omega_H = \frac{\left(\sum_{i=1}^{p} \lambda_i^{REACTANCE}\right)^2}{\left(\sum_{i=1}^{p} \lambda_i^{REACTANCE}\right)^2 + \left(\sum_{i=1}^{p} \lambda_i^{ANGER}\right)^2 + \left(\sum_{i=1}^{p} \lambda_i^{RULES}\right)^2 + \left(\sum_{i=1}^{p} \lambda_i^{OPPOSE}\right)^2 + \left(\sum_{i=1}^{p} \lambda_i^{ADVICE}\right)^2 + \sum_{i=1}^{p} \text{var}(E_i)},$$

$\lambda$ represents the unstandardized factor loadings and $\text{var}(E_i)$ represents the error variances of each item. For the current study, $\omega_H$ was .793 for the freshmen sample and .768 for the upperclassmen sample. Although approximately 78-79% of the variance in total HPRS scores is attributable to the general reactance factor (which is a considerable amount of overlap), it is important to keep in mind that the total observed score does not take measurement error nor construct irrelevant variance into account. As illustrated above, not controlling for these two sources of variance can bias estimates of the relationship between trait reactance and other external variables. Thus, it is clearly preferred to model responses on the HPRS using the championed bifactor model within an SEM framework.
CHAPTER 5

Discussion

Numerous researchers have used the HPRS as a measure trait reactance, but have scored it in a variety of ways. For example, most researchers computed a total score for the HPRS (e.g., Hong, 1990; Hong et al., 2001; Joubert, 1990, 1992; Shen & Dillard, 2005), and some researchers also computed four subscale scores (e.g., Hong & Faedda, 1996). These variations in scoring are most likely due to the conflicting conclusions obtained from psychometric studies of the scale, as well as a lack of theory regarding the dimensionality of trait reactance. As a result of these inconsistencies in scoring, any external validity evidence collected in support of the scale is questionable. Given the confusion regarding the factor structure and scoring of the HPRS, as well as the limited external validity evidence, the purpose of the current study was to further investigate the construct validity of the HPRS using Benson’s (1998) framework. Specifically, the current study focused on the last two stages of this processes. First, the dimensionality of the HPRS was further investigated to inform Benson’s structural stage of construct validation. Then, the relationships between the championed HPRS factor structure and theoretically related external variables were examined to gather external validity evidence for Benson’s external stage. The results and implications of the current study are discussed below.

Structural Stage: CFA Results

In an attempt to replicate Brown et al.’s (2009) investigation of the factor structure of the HPRS, the current study tested the same six models with two independent samples of undergraduates. As expected, Models 1 through 5 did not adequately represent
the data in either sample. Interestingly, the pattern of residuals associated with the one-factor model suggested the need for several specific factors, whereas the pattern of residuals associated with the four-factor model suggested the need for an overall reactance factor. Thus, for both samples, a general reactance factor as well as several specific factors were required to adequately represent the responses to the HPRS. When the second-order model and original bifactor model were tested, they failed to converge to an admissible solution in both samples. Both models appeared to have over-factored the data by modeling a factor to represent the shared variance among items 10 through 13. The failure of either model to converge to an admissible solution suggests that these items only represent the overall general reactance factor. That is, the Resisting Influence from Others factor from the second-order model and the Independence specific factor from the bifactor model are not needed to represent the interitem correlations.

The incomplete bifactor model (with the Independence factor removed) had adequate global fit, but had several areas of local misfit in both samples. For the freshmen sample, there were 11 areas of local misfit, and the pattern seemed to highlight the need for the Opposite specific factor (there was a large residual between items 3 and 9). When this Opposite specific factor was added for the freshmen sample (Model 6), the model did not converge to an admissible solution. The Opposite factor was empirically under-identified because item 13 did not share any additional variance with items 3 or 9 after controlling for the general reactance factor. Thus, item 13 was not specified as an indicator of the Opposite specific factor (Model 6-revised). This model was championed for the freshmen sample. For the upperclassmen sample, on the other hand, there were only three areas of local misfit associated with the incomplete bifactor model that were
not easily explained and did not indicate the need for the *Opposite* specific factor. However, when Model 6 (with the *Opposite* specific factor added) was fit to the upperclassmen sample, the model fit well globally and locally. Although the pattern of residuals did not suggest the need for the *Opposite* specific factor, the improvement in local fit and the significant relationships between the *Opposite* factor and items 3, 9 and 13 suggested that this factor is nonetheless needed in the model. Despite the slight inconsistencies across the two samples regarding the *Opposite* specific factor, there is evidence to indicate that the results from the two samples were highly congruent overall. Moreover, an examination of Table 4 reveals that the unstandardized pattern coefficients are very similar across the two samples. The largest difference between the two samples was minor (0.14), and the rest of the unstandardized pattern coefficients were within .10 of each other. In addition, the results of the current study also align with Brown et al.’s (2009) findings. Taken together, these results support modeling the HPRS using an incomplete bifactor model with an *Opposite* specific factor.

For both samples, the construct reliability (Coefficient H) of the general reactance factor was high (approximately .85), suggesting that the 14 items adequately “informed” or “saturated” the latent factor of reactance. Construct reliability for the specific factors, however, were quite low across both samples, ranging from .24 to .56. These low reliabilities indicate that the specific factors are not meaningful on their own. That is, if a researcher is interested in measuring a construct represented to some extent by a specific factor, it is suggested that a high quality scale created to measure the construct be used instead of the specific factor. For example, the *Anger* specific factor may measure anger to some extent, but given the low construct reliability of this factor, if one wanted to
study anger it would make more sense to administer a scale specifically designed to measure anger, rather than trying to represent anger with the specific factor from the HPRS bi-factor model.

By investigating the dimensionality of the HPRS, the current study contributes to our understanding of trait reactance by informing the substantive stage of construct validation. As previously discussed, whether psychological reactance is unidimensional or multidimensional was never clearly articulated in the literature. In particular, the current study illustrates that the HPRS is a unidimensional construct, but can become multidimensional when it is operationalized via the HPRS. This is most likely because trait reactance is a conceptually broad construct that requires a diverse set of items to adequately represent its breadth (Reise et al., 2007). An examination of the HPRS items (Appendix A) reveals that this scale contains sets of items to assess various aspects of reactance. These sets of context-specific items could explain why a four-factor solution emerged during the EFAs conducted by Hong and colleagues. Reise et al. noticed that

It is challenging to determine whether an item set is multidimensional because there are relatively independent substantive dimensions that affect item variance, or whether additional factors are due to a ‘bloated specific’ emerging due to the semantic similarity among a subset of the items (p. 21).

The current study is able to provide insight into this matter, with regard to the HPRS. Given that the construct reliability was high for the general factor and low for the specific factors, there is strong evidence suggesting that the HPRS measures a substantively broad conceptualization of trait reactance, and that the specific factors are really “bloated specifics.” That is, Anger, Rules and Regulations, Opposite, and Advice are trivial factors
that only emerged because of similarities in item wording. Hence, they are not meaningful distinct dimensions of trait reactance as previously suggested by the four-factor solution championed by Hong and colleagues. Rather, trait reactance is a conceptually broad unidimensional construct that, when operationalized, is multidimensional due to similar item phrasing. Utilizing the bifactor model allows researchers to isolate the general factor of reactance, which is of most interest, while partialling out the nuisance effects of the specific factors.

*External Stage: Relationships with External Variables*

External validity evidence for the championed incomplete bifactor model with the *Opposite* specific factor was collected by examining relationships with seven external variables: general conformity, extraversion, agreeableness, conscientiousness, neuroticism, openness to experience, and entitlement. It was originally hypothesized that trait reactance would be positively associated with extraversion, openness to experience, and entitlement, and negatively associated with general conformity and agreeableness. However, after finding a positive relationship between reactance and conscientiousness with the freshmen sample (which made logical sense), a positive relationship between these two variables was then hypothesized for the upperclassmen sample.

The hypotheses that reactance is negatively related to general conformity, agreeableness, and conscientiousness was supported, with moderate to strong negative relationships across both samples. In addition, the hypothesis that reactance is positively associated with entitlement was supported in the freshmen sample (this variable was not administered to the upperclassmen sample). These findings align with previous research linking psychological reactance to resisting rules and regulations (Buboltz et al., 1999;
Dowd et al., 1994), nonconformity (Dowd et al., 1991; Joubert, 1990) aggressiveness, irritability, hostility, and defensiveness (Dowd & Wallbrown, 1993), narcissism (Joubert, 1992), as well as a tendency to be uncooperative and unhelpful (Buboltz et al.).

The hypotheses that reactance is positively associated with openness to experience was partially supported. There was no relationship found between these two variables for the freshmen sample, but a statistically significant positive relationship was found for the upperclassmen sample. However, the relationship between reactance and openness to experience was small in magnitude and was not much different than the correlation obtained with the freshmen sample ($r = .07$ vs. $r = .17$). Thus, previous research that found that those high in trait reactance are more open to new and different experiences than those low in trait reactance (Dowd & Wallbrown, 1993) was not strongly supported in the current study. One possible reason why the current study did not align with Dowd and Wallbrown’s findings is that different measures were administered across the two studies. Instead of using the HPRS, Dowd and Wallbrown measured trait reactance using the QMPR and TRS. In addition, they did not use the BFI to measure openness to experience. Rather, the Personality Research Form (PRF; Jackson, 1984) was administered and the Change subscale was used to measure how much individuals prefer new and different experiences. Furthermore, trait reactance as measured by the TRS had a significant positive relationship with Change ($r = .13$), whereas the QMPR had a negative relationship with Change ($r = -.13$). Thus, changes in instrumentation are likely contributing to the differences observed across studies.

The current study also did not support the hypothesis that reactance is positively related to extraversion. Moreover, a significant negative association between reactance
and extraversion \((r = -.19)\) was found with the upperclassmen sample. These results do not support previous research linking psychological reactance to traits typically associated with extraversion such as attention-seeking, dominance, assertiveness, and confidence (Buboltz et al., 1999; Dowd & Wallbrown; Dowd et al., 1994). As with openness to experiences, the lack of support for this hypothesis could be due to the different measures used across the studies. That is, Buboltz et al., Dowd and Wallbrown, and Dowd et al. all measured trait reactance using the QMPR and TRS, not the HPRS. In addition, neither of them measured extraversion directly using the BFI. Dowd and Wallbrown, for example, administered the PRF, which includes several subscales related to extraversion: dominance and exhibition (attention-seeking). A study that correlated each of the PRF subscales to the Big Five personality traits found that dominance and exhibition had low-to-moderate positive correlations with extraversion \((r = .38\) and .65, respectively; Stumpf, 1993). However, several other subscales on the PRF had moderate-to-large positive correlations with extraversion, namely: affiliation \((r = .83)\) and nurturance \((r = .49)\). Dowd and Wallbrown found that reactance (as measured by the TRS) had statistically significant negative relationships with affiliation \((r = -.17)\) and nurturance \((r = -.19)\). Thus, in previous research reactance seems to have had a positive relationship with the forceful aspect of extraversion, and a negative relationship with the sociable aspect of extraversion. Upon examination of the BFI extraversion subscale (which was used in the current study), most items tend to represent the sociable and energetic aspect of extraversion, with only one item representing the more forceful aspect (“I see myself as someone who has an assertive personality”). The differences in the measurement of both reactance and extraversion appear to account for these differences.
Finally, no hypothesis was made regarding the relationship between trait reactance and neuroticism. The two constructs were unrelated with the freshmen sample, but had a significant positive relationship with the upperclassmen sample. Still, the magnitudes of the relationships found across the two samples were not all that different ($r = .08$ vs. $r = .17$). Thus, the relationship between reactance and neuroticism is weak at best. It is possible that the differences in the relationships of reactance with openness to experience, extraversion, and neuroticism across the two samples were due to the fact that the upperclassmen are a slightly older population than then freshmen. It is also plausible that the slightly different factor structure championed for the two samples (Model 6-revised vs. Model 6) could have affected these differences. Nonetheless, the pattern of relationships between the external variables and reactance was quite similar across the two samples.

Despite the fact that the hypotheses concerning the relationships between reactance and openness to experiences and extraversion were not supported, the current study still sheds light on the nature of these relationships. It is important to recognize that these hypotheses were created based on past research that used different measures of personality and reactance itself. Furthermore, no previous study used a bifactor model to isolate the general factor of reactance, controlling for sources of construct irrelevant variance common to measures of broad constructs such as trait reactance. In addition, reactance (as measured by the HPRS, TRS, or QMPR) has never been studied in relation to the Big Five personality traits. Therefore, the results of the current study still add to our understanding of the nomological network of trait reactance. The fact that the general reactance factor was negatively related to conformity, agreeableness, and
conscientiousness, and positively related to entitlement provides strong evidence that the HPRS does indeed measure trait reactance.

The specific factors were also correlated with these external variables, but no specific hypotheses were made regarding the nature of these relationships. Given the extremely low construct reliabilities (Coefficient H), it is inappropriate to interpret the specific factors as substantively meaningful. That said, the common factor variance did relate to external variables, some moderate in value, highlighting the potential dangers of not modeling these specific factors. With the low reliability, these correlations with external variables may change from sample to sample. It is important to point out, however, that for the current study, the changing correlations between the specific factors is most likely due to the change in the *Opposite* specific factor across samples (the *Opposite* factor is represented by only items 3 and 9 for the freshmen sample, compared to items 3, 9, and 13 for the upperclassmen sample). The fact that *Anger* (the only factor unaffected by the *Opposite* specific factor) had fairly stable relationships with external variables across samples lends support for this argument. That is, *Anger* was unaffected by the change in the *Opposite* specific factor because none its items cross-loaded on the *Opposite* specific factor. Furthermore, the relationships that changed the most were with the *Opposite* specific factor itself and the two other factors that were represented by items that were also representing the *Opposite* specific factor.

*Limitations and Future Research*

In attempt to highlight the need for future research, it is important to acknowledge limitations of the current study. The primary limitation of the current study was that only two samples of college-aged students were used to examine the structure of the HPRS.
Recall that Brown et al. (2009) championed a modified bifactor model. Because it is possible that this modified model was overfit to the idiosyncrasies of that particular sample, it was important to test whether these results would replicate with an independent sample (MacCallum et al., 1992). Although the current study did test all six hypothesized factor models using two independent samples, the samples are still very similar to the original sample used by Brown et al. Specifically, all of the participants attended the same public university, which is very homogeneous itself, which could limit the generalizability of these results to other populations. Future researchers should test the same six factor structures using more diverse samples. If the incomplete bifactor model with the *Opposite* specific factor fits well in other populations, then this model would be more plausible for use across general populations. In addition, it would be useful to examine the external validity of the HPRS with other populations by relating it to the external variables used in the current study, as well as to other theoretically-related variables such as trait anger.

Alternatively, future research could focus on revising or rewriting the HPRS items. Although the same factor model was championed for both samples and the general reactance factor had adequate reliability, most items still had a large amount of unexplained variance. Specifically, only two items for the freshmen sample (3 and 6) and three items for the upperclassmen sample (3, 6, and 9) had more than 50% of their variance explained by the factor structure. It is possible that issues in item wording contributed to the observed error variance. Nearly all of the items could benefit by simplifying the language. For example, item 2 reads, “I find contracting others stimulating.” A possible way to revise this item would be to modify the wording so that it
reads, “I find disagreeing with others exciting.” Likewise, item 9 (“Advice and recommendations usually induce me to do just the opposite”) could also benefit from a change of wording. A possible revision could be, “Advice usually makes me feel like doing the opposite.” Thus, future research could focus on increasing the readability of the HPRS in an effort to decrease possible sources of confusion and thus, measurement error.

Another alternative for future research would be to return to Benson’s substantive phase and create all new items, with more time spent linking the empirical domain (i.e., items) to the theoretical domain of trait reactance. As previously discussed, many issues associated with the HPRS seem to stem from a lack of substantive content concerning the dimensionality of the HPRS. The current study contributes to the substantive stage by providing evidence that trait reactance is a unidimensional construct. However, the HPRS is currently multidimensional due to construct irrelevant variance. Thus, future research could focus on creating a homogeneous set of items to measure trait reactance.

On the other hand, researchers could create a unidimensional measure of trait reactance that covers the breadth of the construct by selecting only one item per factor of the HPRS to retain on the scale. However, more study of the HPRS would be required before deciding which items to remove.

Conclusion

The current study used Benson’s (1998) framework to evaluate the construct validity of the HPRS, and made several contributions to the understanding of the functioning of this scale, as well as to trait reactance in general. First, the current study replicated Brown et al.’s findings by championing the same model specifying an overall general reactance factor as well as several specific factors. This, in turn, has contributed
the theoretical conceptualization of trait reactance. As pointed out in the introduction, the dimensionality of trait reactance has never been explicitly theorized in the literature. Most researchers computed a total HPRS score, indicating that they were most interested in a unidimensional conceptualization of trait reactance. The current study provided support for this conceptualization, and helped clarify why a multidimensional solution emerged in previous psychometric studies of the HPRS. Specifically, because trait reactance is a broad construct, sources of construct irrelevant variance emerged as specific factors when this construct is operationalized in the form of the HPRS. Finally, the current study makes a third major contribution by illustrating that the general reactance factor correlated as expected with theoretically-related external variables. Most importantly, trait reactance is negatively correlated with conformity, agreeableness, and conscientious, and positively correlated with entitlement.

In sum, the championed HPRS model appeared to represent the broad construct of trait reactance, while controlling for sources of construct-irrelevant variance. However, even though a unidimensional factor representing trait reactance is included in the model, it is important to emphasize that it is not appropriate to calculate a total HPRS score as it would not control for the construct irrelevant variance represented by the specific factors. As previously demonstrated, failing to control for construct irrelevant variance, as well as measurement error, can lead to biased correlations with external criteria. Techniques such as CFA and SEM should be utilized to control for the effects of construct irrelevant variance and, in turn, obtain more accurate estimates of relationships between trait reactance and other constructs of interest.
Footnotes

1 The Perceived Entitlement Scale (PES) was only administered to the freshman sample.

2 Without this constraint, this part of the model would have four parameters (two direct loadings and two error variances) estimated from only three observations (two variances and one covariance); thus, this part of the model would be underidentified (df = -1). Adding the equality constraint of the factor loadings means that only one direct loading needs to be estimated, making this part of the model just-identified (df = 0).

3 Given that the bifactor model specifies the existence of a general factor and as well as specific factors, there are several different ways to index reliability. One way to conceptualize reliability is as the proportion of total variance in a set of items that is systematic, which estimates how stable test scores are across repeated administrations (Revelle & Zinbarg, 2009; Sijtsma; 2009b). The proportion of systematic variance can be indexed by ω (McDonald, 1999). However, the most commonly reported estimate of reliability is Cronbach’s coefficient alpha, which is equivalent to ω when the items are unidimensional, essentially tau-equivalent (equivalent relationships between the items and the factor), and have uncorrelated errors. Alpha is biased, however, when these assumptions are violated (which is often). For example, when items are not tau-equivalent, alpha tends to underestimate ω (Sijtsma, 2009a; Zinbarg et al., 2007). Conversely, alpha will overestimate ω when items have correlated error terms, meaning that the scale is multidimensional (Bentler, 2009). In the case of the bifactor model, the items are somewhat unidimensional in that they all represent a general factor, but sets of
items share additional variance beyond this general factor; that is, the items have correlated errors that can be represented by specific factors.

It is important to note that $\omega$, like Cronbach’s alpha, estimates the proportion of systematic variance, regardless of its source. Systematic variance includes variance attributed to the general factor as well as the specific factors. This is the case even if the general factor is of greatest interest to the researcher and hence, the systematic variance due to the specific factor is unwanted.

The proportion of variance attributed to just the general factor can be estimated using $\omega_H$. The difference between $\omega$ and $\omega_H$ can be summarized by the following statement made by Sijtsma (2009b):

$$\text{CTT } [\omega] \text{ assesses test-score reliability as the proportion of true-score variance, without considering the composition of the true score. SEM reliability } [\omega_H], \text{ however, is concerned with the composition of the true score. SEM approaches to reliability decompose the true-score variance into different variance components, and the researcher has to decide which variance components contribute to test-score reliability (p. 170).}$$

Thus, $\omega_H$ will always be smaller than $\omega$, unless the scale scores are unidimensional, in which case the two indices will be equivalent (Zinbarg et al., 2006); if the scores are also tau-equivalent, then $\omega_H$ and $\omega$ will also equal Cronbach’s alpha (Revelle & Zinbarg, 2009). For the freshmen sample, $\omega = .881$ and $\omega_H = .794$. For the upperclassmen sample, $\omega = .888$ and $\omega_H = .776$. Thus, it can be derived that 8.7% (.881-.794) and 11.2% (.888-.776) of the variance in total reactance scores is due to the construct irrelevant variance captured by the specific factors.
Whereas $\omega_H$ and $\omega$ estimate the reliability associated with observed scores, Coefficient H indexes the reliability of a construct. That is, rather than estimating the proportion of variance in observed scores that can be explained by systematic variance (however, systematic variance is defined by the researcher), Coefficient H estimates the proportion of variance in a latent variable that can be explained by its indicators; it is how well a set of indicators represents or saturates a construct. Unlike reliability estimates associated with composite scores (e.g., Cronbach’s alpha, $\omega_H$, and $\omega$), the magnitude of Coefficient H is never less than the best individual item’s reliability (standardized $\lambda^2$); additional items can only increase factor reliability. Conceptually, one could visualize a venn diagram where trait reactance factor variance is shared with trait reactance item variance. Coefficient H is the aggregate of those overlapping areas between each item and the factor. If one conceptualizes H in this manner, as one adds items, shared variability will only increase. Thus, Coefficient H could be markedly different than $\omega_H$ or $\omega$ because Coefficient H does not decrease due to “bad” items that share little variance with the construct.

For the specific factors, $\omega_H$ is calculated using the following equation:

$$\omega_H = \frac{\left( \sum_{i=1}^{n} \lambda_{\text{specific factor}} \right)^2}{\left( \sum_{i=1}^{n} \lambda_{\text{specific factor}} \right)^2 + \left( \sum_{i=1}^{n} \lambda_{\text{reactance}} \right)^2 + \sum_{i=1}^{n} \text{var}(E_i)}$$

where $\lambda$ represents the unstandardized factor loadings and $\text{var}(E_i)$ represents the error variances of each item that represents the particular specific factor. For the current study, for the freshmen and upperclassmen samples, respectively, $\omega_H$ was .21 and .27 for Rules and Regulations, .38 and .37 for Anger, .38 and .19 for Opposite, and .38 and .27 for Advice.
Table 1

*Factor Structure of the Hong Psychological Reactance Scale Across Studies*

<table>
<thead>
<tr>
<th>Model</th>
<th>Factor 1 items</th>
<th>Factor 2 items</th>
<th>Factor 3 items</th>
<th>Factor 4 items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1: Hong &amp; Page (1989)</td>
<td>4, 6, 8, 10</td>
<td>1, 2, 3</td>
<td>11, 12, 13, 14</td>
<td>5, 7, 9</td>
</tr>
<tr>
<td></td>
<td>Freedom of Choice</td>
<td>Conformity Reactance</td>
<td>Behavioral Freedom</td>
<td>Reactance to Advice &amp; Recommendations</td>
</tr>
<tr>
<td>Model 2: Hong (1992)</td>
<td>4, 6, 7, 8</td>
<td>1, 2, 3</td>
<td>5, 9, 10, 11</td>
<td>12, 13, 14</td>
</tr>
<tr>
<td></td>
<td>Freedom of Choice</td>
<td>Conformity Reactance</td>
<td>Reactance to Advice &amp; Recommendations</td>
<td>Behavioral Freedom</td>
</tr>
<tr>
<td>Model 3: Hong &amp; Faedda (14 items; 1996)</td>
<td>4, 6, 7, 8</td>
<td>1, 2, 3, 14</td>
<td>10, 11, 12, 13</td>
<td>5, 9</td>
</tr>
<tr>
<td></td>
<td><em>Emotional Response Toward Restricted Choice</em></td>
<td><em>Reactance to Compliance</em></td>
<td><em>Resisting Influence from Others</em></td>
<td>Reactance toward Advice &amp; Recommendations</td>
</tr>
<tr>
<td>Model 4: Hong &amp; Faedda (11 items; 1996)</td>
<td>6, 7, 8</td>
<td>1, 2, 3</td>
<td>11, 12, 13</td>
<td>5, 9</td>
</tr>
<tr>
<td></td>
<td><em>Emotional Response Toward Restricted Choice</em></td>
<td><em>Reactance to Compliance</em></td>
<td><em>Resisting Influence from Others</em></td>
<td>Reactance toward Advice &amp; Recommendations</td>
</tr>
</tbody>
</table>
Table 2

**Correlation Matrices and Descriptive Statistics of the HPRS for Both Samples**

<table>
<thead>
<tr>
<th>HPRS Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshmen Sample (n = 1215)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3.02</td>
<td>1.05</td>
<td>-.132</td>
<td>-.445</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SD</td>
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<td>1.10</td>
<td>.022</td>
<td>-.808</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewness</td>
<td>2.18</td>
<td>1.03</td>
<td>.592</td>
<td>-.315</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kurtosis</td>
<td>3.38</td>
<td>1.10</td>
<td>-.311</td>
<td>-.563</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Upperclassmen Sample (n = 872) | | | | | | | | | | | | | | |
| M | 2.86 | 2.68 | 2.06 | 3.49 | 1.99 | 3.47 | 3.48 | 3.51 | 1.97 | 2.76 | 2.76 | 2.46 | 2.60 | 2.27 |
| SD | 1.07 | 1.10 | 0.95 | 1.10 | 0.83 | 1.02 | 1.07 | 1.01 | 0.84 | 0.98 | 0.99 | 1.05 | 0.96 |
| Skewness | -.08 | .14 | .74 | -.39 | .83 | -.50 | -.46 | -.51 | .97 | .20 | .24 | .57 | .36 | .64 |
| Kurtosis | -.70 | -.87 | .17 | -.67 | .79 | -.34 | -.62 | -.35 | 1.33 | -.39 | -.53 | -.10 | -.55 | .13 |

*Note. Correlations for the freshman sample are below the diagonal, whereas correlations for the upperclassmen sample are above the diagonal.*
Table 3

*Fit Indices of the Tested Models*

<table>
<thead>
<tr>
<th>Model</th>
<th>( \chi^2 )</th>
<th>df</th>
<th>CFI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sample 1: Freshmen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1: One-factor Model</td>
<td>1013.73</td>
<td>77</td>
<td>.89</td>
<td>.10</td>
<td>.069</td>
</tr>
<tr>
<td>Model 2: Four-factor Model</td>
<td>381.49</td>
<td>71</td>
<td>.96</td>
<td>.06</td>
<td>.045</td>
</tr>
<tr>
<td>Model 3: Second-order Model</td>
<td>Did not converge to admissible solution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 4: Bifactor Model</td>
<td>Did not converge to admissible solution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 5: Incomplete Bifactor Model</td>
<td>427.86</td>
<td>68</td>
<td>.96</td>
<td>.07</td>
<td>.048</td>
</tr>
<tr>
<td>Model 6: Incomplete Bifactor Model w/<em>Opposite</em> Factor</td>
<td>Did not converge to admissible solution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 6-revised: Incomplete Bifactor Model w/<em>Opposite</em> Factor (items 3 &amp; 9 only)</td>
<td>371.44</td>
<td>67</td>
<td>.96</td>
<td>.06</td>
<td>.045</td>
</tr>
<tr>
<td><strong>Sample 2: Upperclassmen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 1: One-factor Model</td>
<td>810.96</td>
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<td>.87</td>
<td>.10</td>
<td>.072</td>
</tr>
<tr>
<td>Model 2: Four-factor Model</td>
<td>282.69</td>
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<tr>
<td>Model 3: Second-order Model</td>
<td>Did not converge to admissible solution</td>
<td></td>
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</tr>
<tr>
<td>Model 4: Bifactor Model</td>
<td>Did not converge to admissible solution</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Model 5: Incomplete Bifactor Model</td>
<td>245.35</td>
<td>68</td>
<td>.97</td>
<td>.05</td>
<td>.043</td>
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<tr>
<td>Model 6: Incomplete Bifactor Model w/<em>Opposite</em> Factor</td>
<td>200.78</td>
<td>65</td>
<td>.98</td>
<td>.05</td>
<td>.039</td>
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Table 4

Unstandardized Factor Pattern Coefficients (Completely Standardized Coefficients), and Unstandardized Error Variances for Incomplete Bifactor Model with Opposite Specific Factor

Sample 1: Freshmen

<table>
<thead>
<tr>
<th>Item</th>
<th>Reactance</th>
<th>Anger</th>
<th>Rules</th>
<th>Advice</th>
<th>Opposite</th>
<th>Error Variances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.52* (.49)</td>
<td>.35* (.33)</td>
<td></td>
<td></td>
<td></td>
<td>.72</td>
</tr>
<tr>
<td>2</td>
<td>.57* (.52)</td>
<td>.38* (.34)</td>
<td></td>
<td></td>
<td></td>
<td>.74</td>
</tr>
<tr>
<td>3</td>
<td>.57* (.56)</td>
<td>.45* (.44)</td>
<td>.35* (.35)</td>
<td></td>
<td></td>
<td>.40</td>
</tr>
<tr>
<td>4</td>
<td>.45* (.41)</td>
<td>.30* (.27)</td>
<td></td>
<td></td>
<td></td>
<td>.91</td>
</tr>
<tr>
<td>5</td>
<td>.48* (.52)</td>
<td></td>
<td>.42* (.45)</td>
<td></td>
<td></td>
<td>.45</td>
</tr>
<tr>
<td>6</td>
<td>.49* (.46)</td>
<td>.72* (.68)</td>
<td></td>
<td></td>
<td></td>
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<td>8</td>
<td>.49* (.50)</td>
<td>.41* (.42)</td>
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<td></td>
<td>.24</td>
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<tr>
<td>9</td>
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<td>.42* (.46)</td>
<td>.35* (.39)</td>
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<td>.42</td>
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<tr>
<td>10</td>
<td>.62* (.63)</td>
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<td></td>
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<td>.59</td>
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<tr>
<td>11</td>
<td>.44* (.42)</td>
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<td></td>
<td></td>
<td></td>
<td>.91</td>
</tr>
<tr>
<td>12</td>
<td>.58* (.57)</td>
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<td></td>
<td></td>
<td>.67</td>
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<tr>
<td>13</td>
<td>.74* (.67)</td>
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<td>.65</td>
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<tr>
<td>14</td>
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<td>.24* (.24)</td>
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<td>.56</td>
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</table>

Sample 2: Upperclassmen

<table>
<thead>
<tr>
<th>Item</th>
<th>Reactance</th>
<th>Anger</th>
<th>Rules</th>
<th>Advice</th>
<th>Opposite</th>
<th>Error Variances</th>
</tr>
</thead>
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<tr>
<td>1</td>
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<td>.49* (.45)</td>
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<td></td>
<td></td>
<td>.61</td>
</tr>
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<td>.52* (.48)</td>
<td>.42* (.39)</td>
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<td>.75</td>
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<tr>
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<td>.53* (.57)</td>
<td>.33* (.35)</td>
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<td>.40* (.36)</td>
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<tr>
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<td>.44* (.53)</td>
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<td>.67* (.66)</td>
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<td>7</td>
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<td>.43* (.43)</td>
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<td>.44* (.53)</td>
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<td>.57</td>
</tr>
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<td>.13* (.13)</td>
<td></td>
<td></td>
<td></td>
<td>.54</td>
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</tbody>
</table>
Table 5

Factor Correlations between HPRS Factors and the External Variables

<table>
<thead>
<tr>
<th>HPRS Factors</th>
<th>Conformity</th>
<th>Extraversion</th>
<th>Agreeableness</th>
<th>Conscientiousness</th>
<th>Neuroticism</th>
<th>Openness</th>
<th>Entitlement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample 1: Freshmen</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Reactance</td>
<td>-.46*</td>
<td>-.06</td>
<td>-.43*</td>
<td>-.25*</td>
<td>.08</td>
<td>.07</td>
<td>.25*</td>
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<td>.14</td>
<td>.07</td>
<td>.15</td>
<td>.02</td>
<td>.21</td>
<td>-.14</td>
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<td>-.29*</td>
<td>-.15</td>
<td>.10</td>
<td>.03</td>
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<td>Advice</td>
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<td>-.16</td>
<td>-.37*</td>
<td>-.06</td>
<td>.18*</td>
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<tr>
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<td>.13</td>
<td>.08</td>
<td>-.19*</td>
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<td>-.22*</td>
<td>-.09</td>
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</table>

Sample 2: Upperclassmen

<table>
<thead>
<tr>
<th>HPRS Factors</th>
<th>Conformity</th>
<th>Extraversion</th>
<th>Agreeableness</th>
<th>Conscientiousness</th>
<th>Neuroticism</th>
<th>Openness</th>
<th>Entitlement</th>
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<tbody>
<tr>
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<td>-.19*</td>
<td>-.37*</td>
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<td>.17*</td>
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<td>.01</td>
<td>.17*</td>
<td>-.04</td>
<td>.29*</td>
<td>-</td>
</tr>
<tr>
<td>Rules</td>
<td>-.41*</td>
<td>.25*</td>
<td>-.45*</td>
<td>-.33*</td>
<td>.01</td>
<td>.11</td>
<td>-</td>
</tr>
<tr>
<td>Advice</td>
<td>-.04</td>
<td>-.10</td>
<td>-.40*</td>
<td>-.07</td>
<td>.15*</td>
<td>-.14</td>
<td>-</td>
</tr>
<tr>
<td>Opposite</td>
<td>-.08</td>
<td>.08</td>
<td>.31*</td>
<td>-.08</td>
<td>-.08</td>
<td>-.03</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 6

*Effects of Not Taking Measurement Error or Construct Irrelevant Variance into account when Estimating Correlations among Variables*

<table>
<thead>
<tr>
<th>Method of Computing Correlations</th>
<th>Sample 1: Freshmen</th>
<th>Sample 2: Upperclassmen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conformity</td>
<td>Extraversion</td>
</tr>
<tr>
<td>Method I: Observed Scores</td>
<td>-.43</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>-.39</td>
<td>-.36</td>
</tr>
<tr>
<td></td>
<td>-.22</td>
<td>-.25</td>
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<tr>
<td></td>
<td>.05</td>
<td>.14</td>
</tr>
<tr>
<td></td>
<td>.08</td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>.19</td>
<td>.17</td>
</tr>
<tr>
<td>Method II: Latent Unidimensional Factors</td>
<td>-.57</td>
<td>-.03</td>
</tr>
<tr>
<td></td>
<td>-.51</td>
<td>-.47</td>
</tr>
<tr>
<td></td>
<td>-.31</td>
<td>-.35</td>
</tr>
<tr>
<td></td>
<td>.07</td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>.23</td>
<td>.21</td>
</tr>
<tr>
<td>Method III: Bifactor Model (HPRS) and Latent Unidimensional Factors (External Variables)</td>
<td>-.46</td>
<td>-.06</td>
</tr>
<tr>
<td></td>
<td>-.43</td>
<td>-.19</td>
</tr>
<tr>
<td></td>
<td>-.25</td>
<td>-.37</td>
</tr>
<tr>
<td></td>
<td>.14</td>
<td>.17</td>
</tr>
<tr>
<td></td>
<td>.17</td>
<td>.17</td>
</tr>
</tbody>
</table>
Figure 1. Brown et al.'s (2009) a priori models

Model 1: One-Factor Model

Model 2: Four-Factor Model

Model 3: Second-Order Model

Model 4: Bifactor Model

Note. Emotional Response Toward Restricted Choice is ERTC, Reactance Toward Compliance is RTC, Resising Influence from Others is RIO, and Reactance Toward Advice and Recommendations is RAR. In Model 4, the unstandardized path coefficients of items 5 and 9 on the Advice specific factor are constrained to be equal as it is only represented by two indicators (items 5 and 9) and thus, would not be identified.
Figure 2. Brown et al.’s (2009) ancillary models

Model 5: Incomplete Bifactor Model

Model 6: Incomplete Bifactor Model with Opposite Specific Factor

Note. As in the original bifactor model, the unstandardized path coefficients of items 5 and 9 on the Advice specific factor are constrained to be equal as it is only represented by two indicators (items 5 and 9) and thus, would not be identified in this model without this constraint.
Figure 3. Interaction between force of threat and importance of threat on the experience of reactance.
Figure 4. Influence of the interaction between force of threat and importance of threat on resultant tendency (conformity or non-conformity).
Figure 5. Dillard and Shen’s (2005) intertwined process cognitive-affective model
Figure 6. Single indicator model for evaluating factor correlations with external variables
Appendix A

Hong’s Psychological Reactance Scale

The following statements concern your general attitudes. Read each statement and please indicate how much you agree or disagree with each statement. If you strongly agree mark a 5. If you strongly disagree, mark a 1. If the statement is more or less true of you, find the number between 5 and 1 that best describes you. Realize that students do not feel the same nor are they expected to feel the same. Simply answer how you feel. There are no right or wrong answers. Just answer as accurately as possible.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree nor Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

1. Regulations trigger a sense of resistance in me.
2. I find contradicting others stimulating.
3. When something is prohibited, I usually think, “That’s exactly what I am going to do”.
4. The thought of being dependent on others aggravates me.
5. I consider advice from others to be an intrusion.
6. I become frustrated when I am unable to make free and independent decisions.
7. It irritates me when someone points out things which are obvious to me.
8. I become angry when my freedom of choice is restricted.
9. Advice and recommendations usually induce me to do just the opposite.
10. I am content only when I am acting of my own free will.
11. I resist the attempts of others to influence me.
12. It makes me angry when another person is held up as a role model for me to follow.
13. When someone forces me to do something, I feel like doing the opposite.
14. It disappoints me to see others submitting to standards and rules.
Appendix B

Questionnaire for the Measurement of Psychological Reactance

1. Regulations and duties trigger a sense of resistance in me. ^
   I react strongly to duties and regulations. ^

2. It stimulates me to contradict others.
   I get a “kick” out of contradicting others.

3. In my behavior, I rarely consider the thoughts of others.
   I seldom behave according to others’ standards.

4. When something is prohibited, I react against it by thinking: “That’s exactly what I am going to do.”
   When I am told not to do something, my reaction is “Now I’ll do it for sure.”

5. The thought of being dependent on others is unpleasant to me.
   The thought of being dependent on others is very unpleasant to me.

6. I consider advice from others to be patronizing.
   When I get advice, I take it more as a demand.

7. Making free and independent decisions is more important to me than it is for most people.
   To make free and independent decisions is more important to me than to most people.

8. It makes me angry when someone points out things which are obvious to me.
   It makes me angry when someone points out something that I already know.

9. I often do not feel like doing something simply because others expect me to.
   Often I lose enthusiasm for doing something just because others expect me to do it.

10. I react strongly when someone tries to restrict my personal freedom of choice.
    I get very irritated when someone tries to interfere with my freedom to make decisions.

11. Advice and recommendations easily induce me to do just the opposite.
    Suggestions and advice often make me do the opposite.

12. Only those things which I do out of free will really agree with me.
    I only succeed in doing things well if I do them.

13. I resist the attempts of others to influence me.
    I strongly resist people’s attempts to influence me.

14. It makes me angry when another person is presented as a role model.
    I get annoyed when someone else is put up as an example for me.

15. When someone forces me to do something, I say to myself: “Now that’s exactly what I don’t want to do.”
    When I am pushed to do something, I often tell myself, “For sure, I won’t do it.”

16. It pleases me to see how others submit to social norms and constraints (R)
    It pleases me when I see how others disobey social norms and obligations.

17. Strong praise makes me skeptical.
    Excessive praise makes me suspicious.

18. I react negatively when someone tries to tell me what I should or should not do.
    I get very irritated when somebody tells me what I must or must not do.


Appendix C

Therapeutic Reactance Scale

1. If I receive a lukewarm dish at a restaurant, I make an attempt to let that be known.
2. I resent authority figures who tell me what to do.
3. I find that I often have to question authority.
4. I enjoy seeing someone else do something that neither of us is supposed to do.
5. I have a strong desire to maintain my personal freedom.
6. I enjoy seeing play “devil’s advocate” whenever I can.
7. In discussions, I am easily persuaded by others (R)
8. Nothing turns me on as much as a good argument!
9. It would be better to have more freedom to do what I want on a job.
10. If I am told what to do, I often do the opposite.
11. I am sometimes afraid to disagree with others. (R)
12. It really bothers me when police officers tell me what to do.
13. It does not upset me to change my plans because someone in the group wants to do something else. (R)
14. I don’t mind other people telling me what to do. (R)
15. I enjoy debates with other people.
16. If someone asks a favor of me, I will think twice about what this person is really after.
17. I am not very tolerant of others’ attempts to persuade me.
18. I often follow the suggestions of others. (R)
19. I am relatively opinionated.
20. It is important to me to be in a powerful position relative to others.
21. I am very open to solutions to my problems from others. (R)
22. I enjoy “showing up” people who think they are right.
23. I consider myself more competitive than cooperative.
24. I don’t mind doing something for someone even when I don’t know why I’m doing it. (R)
25. I usually go along with others’ advice. (R)
26. I feel it is better to stand up for what I believe than to be silent.
27. I am very stubborn and set in my ways.
28. It is very important to me to get along with the people I work with. (R)
Appendix D

General Conformity Scale

The following statements concern your attitudes or behaviors. Not all students feel or behave the same nor are they expected to feel or behave the same. Simply answer how you feel or behave.

There are no right or wrong answers. Just answer as accurately as possible. Item responses are aggregated across all student respondents in order to better understand the “average” JMU student.

Read each statement and please indicate how true each statement is of you. If you think the statement is very true of you, mark a 7. If a statement is not at all true of you, mark a 1. If the statement is more or less true of you, find the number between 7 and 1 that best describes you.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all true of me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Very true of me</td>
</tr>
</tbody>
</table>

1. If a teacher asks me to do something, I usually do it.
2. I usually do what I am told.
3. I usually obey my parents.
4. I follow my parents’ wishes even when it means not doing something I want to do.
5. Even when I disagree with my parents’ wishes, I usually do what I am told.
6. I break rules frequently. *R*
7. I rarely follow the rules. *R*

Note: *R* indicates that the item needs to be reversed scored.
Appendix E

Big Five Inventory

Below are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who “likes to spend time with others”? Please bubble in the number from 1 to 5 that indicates the extent to which you agree or disagree with that statement. Please take your time and answer thoughtfully.

I See Myself as Someone Who...

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Is talkative</td>
<td>23. Tends to be lazy</td>
</tr>
<tr>
<td>2. Tends to find fault with others</td>
<td>24. Is emotionally stable, not easily upset</td>
</tr>
<tr>
<td>3. Does a thorough job</td>
<td>25. Is inventive</td>
</tr>
<tr>
<td>4. Is depressed, blue</td>
<td>26. Has an assertive personality</td>
</tr>
<tr>
<td>5. Is original, comes up with new ideas</td>
<td>27. Can be cold and aloof</td>
</tr>
<tr>
<td>6. Is reserved</td>
<td>28. Perseveres until the task is finished</td>
</tr>
<tr>
<td>7. Is helpful and unselfish with others</td>
<td>29. Can be moody</td>
</tr>
<tr>
<td>8. Can be somewhat careless</td>
<td>30. Values artistic, aesthetic experiences</td>
</tr>
<tr>
<td>10. Is curious about many different things</td>
<td>32. Is considerate and kind to almost everyone</td>
</tr>
<tr>
<td>11. Is full of energy</td>
<td>33. Does things efficiently</td>
</tr>
<tr>
<td>12. Starts quarrels with others</td>
<td>34. Remains calm in tense situations</td>
</tr>
<tr>
<td>13. Is a reliable worker</td>
<td>35. Prefers work that is routine</td>
</tr>
<tr>
<td>14. Can be tense</td>
<td>36. Is outgoing, sociable</td>
</tr>
<tr>
<td>15. Is ingenious, a deep thinker</td>
<td>37. Is sometimes rude to others</td>
</tr>
<tr>
<td>16. Generates a lot of enthusiasm</td>
<td>38. Makes plans and follows through with them</td>
</tr>
<tr>
<td>17. Has a forgiving nature</td>
<td>39. Gets nervous easily</td>
</tr>
<tr>
<td>18. Tends to be disorganized</td>
<td>40. Likes to reflect, play with ideas</td>
</tr>
<tr>
<td>19. Worries a lot</td>
<td>41. Has few artistic interests</td>
</tr>
<tr>
<td>20. Has an active imagination</td>
<td>42. Likes to cooperate with others</td>
</tr>
<tr>
<td>21. Tends to be quiet</td>
<td>43. Is easily distracted</td>
</tr>
<tr>
<td>22. Is generally trusting</td>
<td>44. Is sophisticated in art, music, or literature</td>
</tr>
</tbody>
</table>
Appendix F

Perceived Entitlement Scale

Please respond to the following items using the number that best reflects your own beliefs. There are no right or wrong answers. Just answer as honestly as possible. Notice the change in response scale below (1= Strong Disagreement, 7=Strong Agreement).

1 = strong disagreement
2 = moderate disagreement
3 = slight disagreement
4 = neither agreement nor disagreement
5 = slight agreement
6 = moderate agreement
7 = strong agreement

1. I honestly feel I’m just more deserving than others.
2. Great things should come to me.
3. If I were on the Titanic, I would deserve to be on the first lifeboat!
4. I demand the best because I’m worth it.
5. I do not necessarily deserve special treatment. R
6. I deserve more things in my life.
7. People like me deserve an extra break now and then.
8. Things should go my way.
9. I feel entitled to more of everything.

Note: R indicates that the item needs to be reversed scored.
References


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Zinbarg, R. E., Revelle, W., Yovel, I. & Li, W. (2005). Cronbach’s $\alpha$, Revelle’s $\beta$, and McDonald’s $\omega_H$: Their relations with each other and two alternative conceptualizations of reliability. *Psychometrika, 70*, 123-133.