When Life Gives You Lemons, Squeeze Them in People's Eyes: Humor Styles in Adaptive and Maladaptive Contexts

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Abstract

The present series of investigations focused on an assessment of four humor styles—two positive styles (affiliative, self-enhancing), and two negative styles (aggressive, self-defeating)—individual differences in which are measured using the Humor Styles Questionnaire (HSQ). These styles of humor stand in contrast to the traditional concept of sense of humor, which has been shown to be vague and ultimately incapable of differentiating between positive and negative manifestations of humor. Across the investigations, the humor styles were assessed in relation to adaptive and maladaptive constructs to clarify the extent to which these functions of humor relate to indicators of adjustment and psychological well-being. Specifically, the variables were tested in conjunction with the intrapersonally adaptive construct of mental toughness, reflecting individual differences in resiliency and measured using the Mental Toughness 48 Inventory. They were also examined in relation to the Dark Triads traits (Machiavellianism, narcissism, psychopathy), representing interpersonally malevolent social strategies and assessed using three measures: the MACH-IV, the Narcissistic Personality Inventory, and the Self-Report Psychopathy Scale. The humor styles were also tested in relation to two models of personality: the six-factor HEXACO model measured using the HEXACO 60, and a tripartite trait-temperament model assessed via the Schedule for Nonadaptive and Adaptive Personality Self-Report Form. The goal of these latter investigations was to situate the humor styles within personality models that provide an alternative framework to contemporary five-factor structures, and to further assess the construct validity of the HSQ. Results revealed that the two positive humor styles are largely adaptive, reflecting tendencies toward greater mental toughness, convivial social strategies, proactivity, and positive affect. In contrast, the negative humor styles are predominantly maladaptive, correlating with poor mental toughness, avid interpersonal exploitation, diminished reciprocal altruism, and a propensity toward negativity affectivity and poor impulse control. Further, all four humor styles exhibited interpretable associations with the two alternative models, thereby demonstrating the construct validity of the HSQ. At the same time, the HEXACO model was deemed to be more effective than five-factor models in reliably capturing the nuances of adaptive and maladaptive humor styles in an etiologically informative manner.
Keywords

humor, humor styles, mental toughness, Dark Triad, Five Factor Model, HEXACO, twin study, behavioral genetics, traits, temperament, personality
Co-Authorship Statement

The dissertation author was the primary investigator and author on all studies contained within the present submission. The investigations would not have been possible, however, without the assistance and mentorship of a number of co-authors, who contributed to the research efforts at various stages of the research process.

The contents of chapter 2, 3 and 4 in the present dissertation represent research that has been published in peer-reviewed journals. The references for these publications are below, listed in the order in which the corresponding study appears within the dissertation.


Across these three investigations, Philip A. (Tony) Vernon and Rod A. Martin provided guidance and direction in helping to shape the direction of the hypotheses developed. They further reviewed the author’s manuscripts at various stages of completion. Julie Schermer provided support and insights during the statistical analysis of the data.

With regards to the collection of data: Tony Vernon provided access to his database of adult twins residing in North America for the first two investigations, thereby creating an opportunity to gather data from a large and diverse sample of participants. Additionally, Lynn F. Cherkas and Tim D. Spector worked with the dissertation author during the third investigation to oversee data collection from a large sample of adult twins through the Department of Twin Research and Genetic Epidemiology at King’s College London in England, UK.
The contents of chapter 4 within the present dissertation represent new material and analyses that have not yet been submitted for publication. The dissertation author completed all components of this study independently, including the preliminary research, data collection, analysis, and writing of the final manuscript under the supervision of Tony Vernon.
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Chapter 1

1 Introduction

The study of humor has had an eventful history, proving elusive to define and operationalize, and therefore challenging to examine systematically and empirically (Martin, 1998). While references to humor in the context of academic enquiry can be traced back to the Greeks, who proposed that emotional and physical well-being could be achieved through a balance in bodily fluids, or humors (Bastien, 1989), contemporary psychological research has focused primarily on the concept of sense of humor, broadly reflecting individual differences in behaviors, experiences, attitudes, and abilities related to amusement and laughter (Martin, 1998). The scope of this definition has yielded varied lines of research that have characterized humor as a cognitive ability reflecting the production of humorous material (Feingold & Mazzella, 1993), as an esthetic response centering upon the appreciation of humorous material (Ruch & Hehl, 1998), and as a habitual pattern of conduct defined by a propensity to engage in humor-related behaviors (Craik, Lampert, & Nelson, 1996). Sense of humor has further been defined as an affective trait representing a habitual display of moods such as cheerfulness (Ruch, W., & Köhler, G. (1998), as an attitude characterized by a positive and optimistic outlook (Svebak, 1996), and as a coping mechanism involving the reliance on humor in times of difficulty (Martin & Lefcourt, 1984). Many of these conceptualizations have themselves been proposed as multi-part frameworks, and are subsequently described as comprising a number of humor-related components. With its continuously expanding definition and its varied applications, therefore, sense of humor continues to be acknowledged as a multi-faceted construct in the study of personality (Martin, 2003).

Across the various representations of sense of humor, the construct has generally been deemed to be an advantageous trait, capable of enhancing one’s overall well-being. In particular, it has been suggested that individuals with a greater sense of humor enjoy more fulfilling interpersonal relationships, improved physical health, and hardiness in the face of adversity (Martin, 2003). This notion is, in part, rooted in numerous case-study narratives of the benefits of humor, as evidenced by the published personal account of
Cousins (1979), who partly attributed his recovery from ankylosing spondilitis to laughter. Further supporting this depiction of sense of humor as a wholly positive trait are the results of empirical investigations using traditional self-report humor scales, which appear to suggest that humor may act as a buffer against stressors, and is therefore a protective factor in the face of negative life events (e.g., Hudak, Dale, Hudak, & DeGood, 1991; Martin & Dobbin, 1988; Martin & Lefcourt, 1983; Nezu, Nezu, & Blissett, 1988). A critical analysis of these humor studies, however, has revealed that, relative to other constructs pertinent to mental health, such as self-esteem and dispositional optimism, sense of humor is a relatively weak indicator of psychological well-being (Kuiper & Martin, 1998). It has further been shown that sense of humor is not reliably associated with indicators of sound physical health, including longevity, illness symptoms, blood pressure, and immune-system function (Martin, 2001).

To account for these findings, it has been proposed that the conventional measures that have been designed to assess individual differences in sense of humor, such as the Situational Humor Response Questionnaire (SHRQ; Martin & Lefcourt, 1984), the Sense of Humor Questionnaire (SHQ; Svebak, 1996), and the Multidimensional Sense of Humor Scale (MSHS; Thorson & Powell, 1993), do not distinguish accurately between its adaptive and maladaptive functions (Kuiper & Martin, 1998; Martin, 2001). That is, these scales focus on the extent to which individuals engage in laughter, take enjoyment in humorous situations, and create humorous material, but they do not assess explicitly the varying potential uses of humor. Consequently, they are unable to differentiate, for instance, between the role of hostile or antagonistic humor versus friendly and innocuous humor in the endorsement of humor-scale items stipulating that an individual is regularly able to make others laugh (Martin, 2003). This apparent oversight in the inclusion of various functions of humor is at odds with the theoretical work of researchers such as Allport (1961) and Maslow (1954), who stressed the importance of a mature and convivial sense of humor in the maintenance of psychological health, while clarifying that specific styles of humor, including sarcastic and disparaging humor, may ultimately lead to negative outcomes.
In light of the inconsistencies and limitations identified in studies relying on broadly defined sense of humor, Martin, Puhlik-Doris, Gray, and Weir (2003) developed the Humor Styles Questionnaire (HSQ; Appendix A). This measure was designed to assess individual differences in four humor styles, representing the varying uses or functions of humor in everyday situations: affiliative, self-enhancing, aggressive, and self-defeating. Affiliative humor represents a non-hostile form of humor aimed at solidifying interpersonal ties and building relationships with others. It entails the telling of jokes or engaging in light-hearted witty banter in order to amuse others or to alleviate situations of tension. Self-enhancing humor is described as the use of humor in self-regulation and coping in times of distress or adversity. This style of humor may be used outside of social contexts as it is predominantly focused on the maintenance of an optimistic and positive outlook. Aggressive humor is defined by the use of sarcastic, belittling, or even degrading expressions of humor. This form of humor entails the telling of jokes without regard for the feelings of others or for the social context in which it they are told. It may be used to exert one’s dominance or to manipulate others. This largely antisocial form of humor is not well captured by traditional humor scales. Lastly, self-defeating humor, is characterized by the use of humor to ridicule the self or by the tendency to allow oneself to be ridiculed in an effort to gain social approval. Individuals who employ this style of humor may also use it as a form of defensive denial in order to avoid or mask negative feelings. Though this type of humor may allow individuals to embed themselves within a social group, it is ultimately deleterious in that it creates a disengagement from one’s emotional experiences (Martin et al., 2003; Silk, Steinberg, Morris, 2003). Like the aggressive humor style, self-defeating humor has not been represented effectively in traditional measures of humor. The descriptions of the four humor styles are summarized briefly in Table 1.

In outlining these styles, Martin et al. clarified that these functions of humor may not necessarily be selected or enacted consciously, but may instead represent a habitual pattern of responses to life events—a conceptualization that is in line with the notion that humor is an individual difference variable relevant to the study of personality (Martin, 1998). Martin et al. further broadly identified affiliative and self-enhancing humor as representing positive humor styles, while defining aggressive and self-defeating humor as
reflecting negative humor styles, given the overarching characteristics defining these functions of humor. However, the researchers stressed that the positive versus negative humor styles do not inevitably reflect a dichotomy in humor use. Instead, individuals may regularly employ multiple styles, even within a single interaction. In support of this idea are the results of investigations that have found that these styles of humor tend to be positively intercorrelated (e.g., Chen & Martin, 2007; Martin et al., 2003, Taher, Kazarian & Martin, 2008).

Table 1: Humor Styles Questionnaire (HSQ) Scales and Descriptions

<table>
<thead>
<tr>
<th>HSQ scales</th>
<th>Description of high scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliative</td>
<td>• congenial</td>
</tr>
<tr>
<td></td>
<td>• interpersonal</td>
</tr>
<tr>
<td></td>
<td>• aimed at ensuring social cohesion</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>• optimistic</td>
</tr>
<tr>
<td></td>
<td>• intrapersonal</td>
</tr>
<tr>
<td></td>
<td>• aimed at coping and alleviating stressors</td>
</tr>
<tr>
<td>Aggressive</td>
<td>• disparaging</td>
</tr>
<tr>
<td></td>
<td>• interpersonal</td>
</tr>
<tr>
<td></td>
<td>• aimed at manipulating others</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>• ingratiating,</td>
</tr>
<tr>
<td></td>
<td>• interpersonal/intraperson</td>
</tr>
<tr>
<td></td>
<td>• aimed at gaining social approval and masking negative emotions</td>
</tr>
</tbody>
</table>

1.1 Relating Humor Styles to Adaptive and Maladaptive Outcomes

Since the introduction of the four humor styles to the empirical community, these constructs have been assessed in relation to numerous existing personality traits via the HSQ (Martin et al., 2003). Through these investigations, researchers have not only been able to clarify the nature of the various humor styles, but they have also been able to obtain a more thorough understanding of the manner in which these styles relate to psychological and physical health outcomes (e.g., Chen & Martin, 2007; Martin et al., 2003). In particular, the researchers have found that differentiating between the various functions of humor in everyday use, rather than amalgamating these functions into a
unified albeit multidimensional construct, does indeed allow for a more lucid understanding of their larger role in overall well-being. With a growing understanding of this link between humor and outcomes is a greater need to clarify the process by which humor may have an impact on health through associated adaptive versus maladaptive tendencies—general propensities toward behaviors that are positive, productive, and constructive rather than negative, unproductive, and destructive. In such a clarification, both intrapersonal factors and interpersonal factors should be considered in acknowledgement of the relevance of humor in social but also individual scenarios (Martin et al., 2003). Although some efforts have been made to investigate humor in conjunction with relevant constructs—namely personal resiliency and social competence (e.g., Erickson & Feldstein, 2007; Yip & Martin, 2005)—in an effort to contribute to the development of a theory of humor styles and health, the results have not provided a thorough picture of the connections between these variables. As a result, although humor styles are pertinent to well-being, it continues to be unclear why and how this is the case. In recognition of these limitations, more empirical work is needed in this area.

1.1.1 Humor Styles and Well-Being

Although there is a long-standing history of investigations linking concepts relevant to humor with well-being (Martin, 2003), it has also been shown that traditional humor measures may have confounded various uses or functions of humor, thereby obscuring the association between humor and positive outcomes. Consequently, it is not surprising that, following the introduction of the concept of humor styles, and the development of the HSQ (Kuiper & Martin, 1998), numerous studies have opted to re-examine the relation between humor and well-being by assessing the extent to which these humor styles relate to various indicators of psychological and physical health. Across these assessments, the HSQ has proven helpful in differentiating between adaptive and maladaptive forms of humor, and has allowed for the clarification of the link between humor and well-being.

In first developing the HSQ, Martin et al. (2003) assessed the scale in relation to a variety of instruments intended to measure well-being, reporting that the affiliative and self-enhancing humor styles were significantly negatively correlated with indicators of
psychological difficulties, including anxiety and depression. These two humor styles were further positively associated with overall well-being, as measured by the Ryff (1989) scale—a self-report instrument containing items reflecting autonomy, positive social relationship, a sense of purpose, personal growth, and environmental mastery. In contrast, the aggressive and self-defeating humor styles exhibited positive correlations with aggression and hostility. Self-defeating humor further related positively with anxiety and depression, and negatively with self-esteem, and overall well-being. These initial findings appear to show that, indeed, when one distinguishes between functions of humor, there is greater clarity in the extent to which humor may be predictive of improved health. Specifically, the positive humor styles appear to be related to psychological well-being, whereas the negative humor styles tend to exhibit an inverse relation with variables reflective of psychological well-being. These findings have largely been replicated by subsequent assessments of humor styles in relation to similar constructs (e.g., Erickson & Feldstein, 2007; Freeman & Ventis, 2010; Kazarian & Martin, 2006).

To obtain a clearer understanding of the association between humor styles and mental health, Chen and Martin (2007), assessed the four humor styles in relation to the Symptom Checklist-90 (SCL-90; Derogatis, 1977), which is intended to assess nine symptoms of psychopathology: somatization, obsessive-compulsive tendencies, interpersonal sensitivity, anxiety, depression, hostility, phobic anxiety, paranoid ideation, and psychoticism. The researchers found that self-enhancing humor was negatively correlated with all psychopathology scales with the exception of hostility, with which it was not significantly correlated, whereas self-defeating humor was correlated positively with all of the nine symptoms. Additionally, affiliative and aggressive humor correlated with a subset of these symptoms, with affiliative humor yielding negative correlations with the symptoms, and aggressive humor exhibiting positive correlations. These latter coefficients were notably smaller than were the coefficients pertaining to the remaining two humor styles and the SCL-90 scales. These results further illustrate that, even in considerations of specific psychopathologies, the HSQ is effective in differentiating between adaptive and maladaptive forms of humor, while also demonstrating that the
positive humor styles tend to be related to greater well-being, while the negative humor styles yield diminished well-being.

Fewer studies have been carried out to assess the relation between the four humor styles and physical health. In those that have examined these sets of constructs, researchers have observed that the humor styles do not appear to add significantly to the prediction of indicators of physical health if one controls for the effects of additional relevant variables, such as positive affect and stress (Freeman & Ventis, 2010; Kuiper & Harris, 2009). Consequently, it would appear that the humor styles are primarily influential in their effects on psychological rather than physical well-being.

1.1.2 Humor Styles in an Intrapersonal Context: Resiliency

To explore the manner in which humor may be tied to greater well-being, a small body of work has been carried out, in which the four humor styles are assessed in conjunction with variables pertaining to coping and resiliency, reflecting individuals’ capacity to overcome adversity and to recover from difficulties. The relevance of these adaptive variables to humor research stems from the observation that, like positive humor styles, coping and resiliency have been linked to psychological well-being and positive outcomes (e.g., Lightsey, 2006; Tugade & Fredrickson, 2007). Further, on a conceptual level, these adaptive variables appear to reflect the intrapersonal components of the humor-styles framework, in which self-enhancing humor has been defined as representing an ability to find amusement in times of distress, whereas self-defeating humor involves the denial of negative affect and cognitions in favour of appearing undeterred by adversity (Martin et al., 2003). Both of these definitions bear resemblance to contemporary representations of resiliency and coping.

In their development of the HSQ, Martin et al. (2003) aimed to provide initial insight into the association between the humor styles and coping, by assessing the scales of the HSQ in relation to two measures of coping humor: the Coping Humor Scale (CHS; Martin & Lefcourt, 1983) and the Humor Coping subscale of the Coping Orientations to Problems Experienced Scale (COPE; Carver, Scheier, & Weintraub, 1989). Both of these instruments evaluate the extent to which an individual employs humor under trying
circumstances. Coping, as measured by the CHS, exhibited positive associations with the affiliative, self-enhancing, and aggressive humor styles. It was not significantly correlated with self-defeating humor. In contrast, all humor styles were positively correlated with coping humor, as assessed via the COPE. Given these findings, the researchers suggested that the CHS and the COPE could be poor measures of coping, given that both appear unable to distinguish sufficiently between adaptive and maladaptive styles of humor. Despite these criticisms, the CHS has continued to be used in cross-cultural validations of the HSQ. In a study of Chinese participants (Chen & Martin, 2007), the CHS exhibited significant positive correlations with the two adaptive humor styles. It was not significantly correlated with the two negative humor styles. In a later study of Lebanese participants (Taher et al., 2008), the CHS was found to correlate significantly and positively with all humor styles, with the exception of the aggressive function of humor, with which it was not significantly associated. Although these results were taken as evidence of the fact that the HSQ is able to measure humor styles relatively consistently across cultures, they also further illustrated the psychometric limitation of the CHS in assessing coping and coping humor.

Although there are psychometric justifications and advantages to assessing the CHS in relation to the HSQ (Martin et al., 2003), the instrument is ultimately not a direct measure of individuals’ overall ability to exhibit effective coping or of their capacity for resiliency. Rather, more explicit measures of coping are needed to clarify the relevant associations. Unfortunately, investigations of the humor styles in relation to such measures are rare. In fact, to date, only one study has carried out such an assessment. Erickson and Feldstein (2007) conducted an investigation that examined the humor style in relation to specific coping strategies. Specifically, they differentiated between an approach strategy and an avoidance strategy. The approach strategy is defined by a habitual acknowledgement of stressors, as opposed to a denial of these stressors, paired with efforts to address and alter the stressors directly (Herman-Stabl, Stemmler, & Petersen, 1995; Roth & Cohen, 1986). In contrast, avoidance coping is characterized by a withdrawal from stressors, and by efforts to avoid the negative affect and cognitions associated with those stressors (Herman-Stabl et al., 1995; Roth & Cohen, 1986). Existing research has noted that approach coping tends to be associated with adaptive
adjustment, whereas avoidance coping exhibits relations with less adaptive adjustment (e.g., Ebata Moos, 1991; Recklitis & Noam, 1999). Erickson and Feldstein observed that approach coping was positively correlated with the self-enhancing humor style, and negatively correlated with aggressive humor. Avoidance coping was positively associated with the self-defeating humor style only. These results broadly indicate that the positive humor styles may reflect typically adaptive tendencies that facilitate resiliency, whereas the negative humor styles are associated with problematic responses to adversity.

Due to the limited availability of empirical investigations assessing humor styles in the context of resiliency, additional research in the area is certainly warranted. A potential fruitful avenue of investigation may be the examination of humor styles in conjunction with mental toughness, representing one’s ability to remain relatively unaffected by adverse events (Clough, Earl, & Sewell, 2001; Crust, 2008). The construct of mental toughness emerged from research pertaining to the related concept of hardiness (Kobasa, 1979). While the construct of hardiness posits that human resiliency is characterized by three components—Challenge, Commitment, and Control—mental toughness comprises four distinct factors, which can be measured using the Mental Toughness 48 Inventory (MT48; Clough et al., 2001). Specifically, the broad construct of mental toughness is defined by the same three components as hardiness, as well as by the additional factor of Confidence. In this framework, Challenge represents the ability to view adversity as a challenge that can be overcome through personal effort rather than as a threat to one’s well-being. Commitment is defined by the tendency to work steadfastly and with dedication toward a goal. Control represents the conviction that one is influential in personal and life events. This factor subsumes the facets of Emotional Control, signifying a capacity to regulate one’s emotions, and Control over Life, reflecting a feeling of control over the direction of one’s existence. Lastly, Confidence represents a general feeling of self-belief and self-reliance. Like the Control factor, this scale is defined by two facets: Confidence in Abilities, which is characterized by feelings of self-efficacy in completing tasks, and Interpersonal Confidence, which reflects self-assurance in social contexts. Empirical assessments of hardiness and mental toughness have suggested that the two variables are moderately related (Golby & Sheard, 2004). Studies have also shown that mental toughness is positively related to approach coping and optimism, and
negatively related to avoidance coping (Kaiseler, Polman, & Nicholls, 2009; Nicholls, Polman, Levy, & Backhouse, 2008). That is, the construct appears capable of differentiating between adaptive versus maladaptive strategies, while also correlating with variables that have been deemed to be salient in analyses of humor styles and resiliency. Due to these strengths, mental toughness is a good candidate for future assessments of the intrapersonal and adaptive features of the humor styles.

1.1.3 Humor Styles in an Interpersonal Context: Social Strategy

In the conceptual representation of the humor styles, there is a strong emphasis on the manner in which these humor styles pertain to interpersonal contexts. Although the affiliative and aggressive humor styles appear to be especially pertinent to the social expression of humor, given that these styles are enacted in the direction of others and for the purpose of attaining social goals (Martin et al., 2003), self-enhancing and self-defeating humor are also relevant to interpersonal settings. Outward expressions of optimism—a component of self-enhancing humor—have been linked to greater social support, greater relationship satisfaction, and longer friendship duration (e.g., Brissette, Scheier, & Carver, 2002; Campbell, Martin, & Ward, 2008; Geers, Reilley, & Dember, 1998; Srivastava, McGonigal, Richards, Butler, & Gross, 2006). Further, self-defeating humor is, in part, employed to gain social acceptance, and therefore it too has interpersonal relevance (Martin et al., 2003). Due to the centrality of social variables to the humor styles, it is not surprising that these styles have been examined in conjunction with a variety of interpersonally relevant constructs. Through these efforts, researchers have aimed to assess whether these social variables can elucidate the link between humor styles and indicators of well-being.

In validating the HSQ, Martin et al. (2013) examined the four humor styles in relation to the construct of social intimacy, measured using the Miller Social Intimacy Scale (MSIS; Miller & Lefcourt, 1982), and assessing the maximum level of closeness that an individual experiences with another person. The researchers also examined correlations between the humor styles and individuals’ level of satisfaction with their perceived level of social support from others, as measured using the Social Support Questionnaire (SSQ; Sarason, Levine, Basham, & Sarason, 1983). Martin et al. found that self-enhancing
humor correlated positively with both social measures, which suggests that those who employ this humor style tend to report greater intimacy with others and tend to feel that they have a strong social network in times of difficulty. In contrast, self-defeating humor correlated negatively with these measures. An additional significant positive relation was noted between affiliative humor and ratings of social support. While these results provide insight into the unique social perceptions of individuals who make use of different functions of humor—a good start in the assessment of the interpersonal component of humor styles—they ultimately do not shed light on the manner in which these individuals socially engage with others.

Findings pertaining to enacted social tendencies were reported by Yip and Martin (2006), who conducted an investigation to clarify the relations between humor styles and indicators of social competence, as measured by the Interpersonal Competence Questionnaire (ICQ; Buhrmester, Furman, Wittenberg, & Reis, 1988). The ICQ is designed to produce scores pertaining to five different domains of social competence: initiating relationships, personal disclosure, negative assertion, emotional support, and conflict management. Results of the study revealed that those who exhibit positive humor styles tend to initiate relationships and take part in social activities avidly (relationship initiation), while also being willing to speak intimately about the self to others (personal disclosure). This preference for sociability by individuals who use positive humor styles has been echoed in other assessments of humor in a social context (e.g., Çeçen, 2007; Vernon et al., 2009). Those with high scores on aggression were found to be less willing to help others in times of adversity or emotional need (low emotional support), and were less adept at navigating interpersonal conflicts successfully (low conflict management). Lastly, individuals prone to using the self-defeating humor style reported being less willing to express dissent in an interpersonal setting (low negative assertion). These results support the notion that the positive humor styles tend to be associated with prosocial tendencies. They further clarified the social disengagement and hostility that defines the aggressive humor style, while illustrating the acquiescent interpersonal preferences of those who use self-defeating humor.
To obtain an understanding of the underlying emotional factors that contribute to overt social behaviors enacted by individuals with varying humor styles, Yip and Martin (2006) and later Vernon et al. (2009) examined the four humor styles in relation to emotional intelligence, broadly representing one’s capabilities in perceiving and understanding emotional reactions. Specifically, Yip and Martin employed the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEI; Mayer, Salovey, & Caruso, 2002) to assess ability emotional intelligence (ability EI), while Vernon et al. administered the Trait Emotional Intelligence Questionnaire (TEIQue; Petrides, 2009) examining trait emotional intelligence (trait EI). In assessments of emotional intelligence, ability EI defines emotional intelligence as a set of distinct abilities, whereas trait EI conceptualizes it as an individual difference variable (Petrides, Furnham, & Mavroveli, 2007). Although Yip and Martin did not report significant correlations between the four humor styles and ability EI, Vernon et al. found that the positive humor styles correlated significantly and positively with trait EI, while the negative humor styles correlated negatively with this construct. Vernon et al. obtained these findings across two independent samples. Therefore, if considered as a disposition, emotional intelligence appears to be characteristic of individuals who employ positive humor styles, and atypical for those who employ negative humor styles.

These initial investigations have proven beneficial in identifying the extent to which the humor styles correlate with adaptive interpersonal constructs: social intimacy, social support, social competence, and emotional intelligence. The studies carried out to date, however, have not examined thoroughly the manner in which the humor styles relate to maladaptive social variables in general, and to maladaptive social strategies in particular. The direct assessment of maladaptive tendencies in the context of the humor styles seems warranted, given the existing results indicating that the negative humor styles—aggressive and self-defeating—appear to exhibit negative relations or simply non-significant correlations with typically prosocial variables. Findings of this nature tell us about the behaviors that are not applicable to those who habitually engage in negative uses of humor. However, more research is needed to clarify the qualities that these individuals do possess and the social tendencies that they exhibit. Elucidating this link
will provide a more thorough understanding of the manner in which interpersonal constructs characteristic of specific humor styles contribute to well-being or lack thereof.

A promising candidate for these proposed investigations is the Dark Triad of personality (Paulhus & Williams, 2002). The Dark Triad is made up of three related but ultimately distinct subclinical variables—Machiavellianism, narcissism, and psychopathy—that reflect a general propensity toward disagreeableness and duplicity. Specifically, Machiavellianism is defined by manipulative tendencies and a cynicism toward conventional morality. Machiavellian individuals are primarily focused on their own goals, and are willing to pursue them at the expense of others. Narcissism is characterized by a grandiose sense of self and a conviction that one is entitled to privilege and special treatment. Like Machiavellian individuals, those high on narcissism also have exploitative tendencies. Lastly, psychopathy reflects a lack of empathy, callous affect, and a tendency to engage in thrill-seeking behavior. Skilled at manipulation, psychopathic individuals may appear charming in social contexts due to a congenial and confident demeanor (Lebreton, Binning, & Adorno, 2006). The Dark Triad traits have exhibited associations with deficits in empathy and emotional understanding (Ali, Amorim, & Chamorro-Premuzic, 2009; Pilch, 2008; Watson & Morris, 1991), greater sociosexuality (Jonason, Li, Webster, & Schmitt, 2009), and a tendency toward aggressiveness (e.g., Jones & Paulhus, 2010; Kerig & Stellwagen, 2010; Paulhus & Williams, 2002). At the same time, however, these constructs have been shown to relate to successes in social and organizational contexts, although evidence suggests that these may be short-term benefits only (e.g., Furnham, 2007; Jonason, Li, Webster, & Schmitt, 2009; Paulhus, 1998; Robins & Beer, 2001). It has further been reported that narcissism tends to exhibit correlations with feelings of vulnerability and sensitivity to criticism (Atlas & Them, 2008; Wink, 1991).

Given the relations that exist between the Dark Triad traits and related social constructs, it has been proposed that the Dark Triad as a whole may represent a coherent social strategy geared toward the exploitation of others (Figueroedo et al., 2009; Gladden, Figueroedo, & Jacobs, 2009; Jonason, Li, & Teicher, 2010; Jonason et al., 2009). This so-called fast life strategy appears to represent a set of antisocial, competitive, and
manipulative tendencies directed at self-promotion, which may ultimately lead to some beneficial outcomes. Given these defining features, the strategy appears to be characteristic of the aggressive humor style, which involves exploiting others by ridiculing them for social gain. Further, the narcissism component of the Dark Triad bears relevance to the self-defeating humor style by reflecting a susceptibility to negative affect in the face of criticism from others—a tendency also exhibited by those who engage in self-defeating humor (Frewen et al., 2008). Based on these conceptual and empirical similarities, it may prove beneficial to assess the humor styles in conjunction with the Dark Triad traits in order to further clarify the maladaptive social strategies employed by those who engage in negative humor.

1.2 Contextualizing Humor Styles in Personality Models

When developing measures, such as the HSQ (Martin et al., 2003), which assess typically novel or unexplored traits, researchers strive to establish the construct validity of these instruments (Cronbach & Meehl, 1955). That is, they aim to demonstrate that the inventory of interest adequately and accurately assesses the psychological construct under investigation. While this endeavour may be straightforward for certain lines of enquiry, in many cases, the construct of interest represents postulated attributes or theoretical conceptions of qualities that individuals may possess, and therefore they prove to be difficult to examine explicitly (Pervin, 1980). In such instances, it is recommended that researchers establish construct validity by examining the measure of a given construct in relation to relevant theoretical models (Cronbach & Meehl, 1955). If the measure is shown to be useful in research in relation to such models, it gains construct validity (Garber & Strassberg, 1991). To ensure that this approach to construct validity is functional, however, the theoretical models employed in the corresponding analyses must be thorough—capable of moving beyond the simple definition or description of constructs to provide an account of the complex processes and etiological effects that influence the manifestation of relevant constructs (Borsboom, Mellenbergh, & van Heerden, 2004)

In the validation of measures examining individual differences in particular, the process of establishing construct validity entails, in part, the assessment of these instruments in
relation to personality models—broad organizational frameworks consisting of a number of basic dimensions that aim to explain variation in all human behavior. Such structures promise to be a common language in the exploration of individual differences, providing all researchers and theorists with a foundation upon which they can develop and explore their hypotheses, and a context for the assessment of novel traits and trait relations. Despite the potential benefits to measurement validation and beyond of developing a single unifying personality structure, the task of generating such a model in a manner that is widely accepted by the research community has proven difficult (Block, 2010; Paunonen & Jackson, 2000; Pervin, 1994; Veselka, Schermer, & Vernon, 2012; Zuckerman, 1992). In fact, to date, a collection of personality frameworks has been put forward, each proposing a distinct representation of the manner in which traits are organized, and each positing the existence of a unique number of fundamental higher-order personality dimensions (e.g., Allport, 1937; Cattell, 1946; Costa & McCrae, 1992; Digman, 1997; Eysenck & Eysenck, 1985; Goldberg, 1990; Lee & Ashton, 2004; Musek, 2007; Tellegen, 1993).

Due to this lack of consensus in the field of personality regarding the most suitable structure of individual differences, the process of measurement validation, and the establishment of construct validity in particular, has proven complicated. Consequently, the assessment of measures in the context of a single theoretical model may currently be insufficient, particularly if the model selected does not offer insights regarding causality in addition to providing an organizational taxonomy of individual differences (Clark, Livesley, & Morey, 1997; Magnavita, 2002). Therefore, it is recommended that measures be tested in conjunction with rival models so that their corresponding constructs may be situated more thoroughly within the broader theory of personality (Murphy & Maree, 2009; Thompson & Daniel, 1996). Closer examinations of varying models relevant to these assessments, and thereby applicable to the continued assessment of the emerging humor styles constructs, follow.

### 1.2.1 The Big Three

The development of the Big Three model was spearheaded by Eysenck (1967; 1970; Eysenck & Eysenck, 1985), who initially proposed the existence of a Big Two model of
personality, consisting of Neuroticism and Extraversion (Eysenck, 1947). This model was later expanded to include a third dimension of Psychoticism, thereby becoming known as the Big Three, the Giant Three, or the P-E-N model (Eysenck, 1994; Eysenck & Eysenck, 1985). In this personality structure, Psychoticism is characterized by aggressiveness, coldness, egocentrism, as well as a lack of empathy. Extraversion is defined by sociability, impulsivity, and sensation-seeking. Lastly, Neuroticism reflects individual differences in emotionality, anxiousness, and a proneness to reacting strongly to aversive stimuli. Individual differences in the Big Three factors of personality are typically measured using the Eysenck Personality Questionnaire (EPQ; Eysenck & Eysenck, 1975). However, investigations of the measure have noted that its Psychoticism scale possesses inferior psychometric properties relative to the remaining two scales (Bishop, 1977; Block, 1977)—an issue suggesting problems either with the construction of the Psychoticism scale or with the factor itself. Such criticisms have reflected the hesitance of some researchers to incorporate the Psychoticism dimensions into personality models (e.g., Van Kampen, 1993).

In addition to summarizing the manner in which traits can be described as three basic dimensions, Eysenck (1967) further proposed biological processes that may be responsible for variation within these dimensions. Specifically, the model posits that individual differences in Extraversion are a function of differing levels of cortical arousal. Specifically, this arousal argument proposes that individuals who habitually display behavior characteristic of Extraversion experience chronically low arousal levels due to low activation in the ascending reticular activating system—a brain system associated with wakefulness and consciousness (e.g., Paus, 2000). In an effort to counter this under-aroused state, such individuals may seek out stimulation, which could result in the demonstration of sensation-seeking and socially dominant behaviors. Next, the Big Three model of personality suggests that individual differences in Neuroticism can be attributable to differing activity within the brain’s limbic system, which has been linked to the modulation of emotional responses (Fahrenberg, 1987). According to the Big Three model, individuals who have a low activation threshold in this system will respond more readily and with greater intensity to negative events or threatening environments, leading to the display of Neuroticism-typical traits such as moodiness, guilt, and despair. Lastly,
the Big Three Model does not offer a well-specified account for individual differences in Psychoticism, although it does speculate about the centrality of neurotransmitter activity in affecting variability in this dimension (Eysenck 1992; 1997; Lester, 1989). For instance, behaviors representative of Psychoticism, such as interpersonal coldness, antagonism, and self-interest, have been linked to reduced serotonergic function, and to greater dopaminergic function. Psychoticism has also been shown to relate to increased levels of sex hormone levels, such as testosterone (King, Errico, & Parsons, 1995), and to greater levels of the enzyme monoamine oxidase (MAO) enzyme (Ballenger et al., 1993). These biological theories pertaining to the Big Three dimensions have been met with mixed empirical support (e.g., Corr, 2004; Hariri, Bookheimer, & Mazziotta, 2000; Matthews & Amelang, 1993). With that said, the importance of biological processes in the development of variation in these dimensions continues to be widely recognized (e.g., Ormel et al., 2013; Stelmack, 1990; Van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009).

1.2.2 The Big Five and the Five Factor Model

In contrast to the Big Three model of personality, which aims to offer a biosocial representation of human functioning, the development of five-factor structure emerged from lexical approaches to the study of traits—a guiding scientific theory originating in early considerations of human personality (Allport, & Odbert, 1936; Galton, 1884). This approach entails the assessment and statistical analysis of all adjectives descriptive of traits, given the assumption that key traits exhibited in social interactions become encoded as single terms in most, if not all, of the world’s languages (Goldberg, 1990; Osgood, Suci, & Tannenbaum, 1957). These terms are then reduced to a fewer number of broader dimensions via factor analytic methodology to produce representations of basic personality domains (Goldberg, 1990). Consequently, models derived through this analytic approach are deemed to be descriptive rather than etiologically informative (Eysenck, 1992), though etiological influences are typically attributed to the factors comprising these models in post hoc investigations, where applicable (e.g., DeYoung et al., 2010; Hassabis et al., 2014).
Although early evidence of a five-factor structure of human personality emerged from the work of Cattell (1943), it gained a prominent empirical following after Goldberg (1990) reported evidence in support of this structure across a series of studies that examined a substantial pool of English-language trait-descriptive adjectives. Named the Big Five model, this framework was shown to consist of five broad and independent (i.e. orthogonal) factors: Extraversion (Factor I), Agreeableness (Factor II), Conscientiousness (Factor III), Emotional Stability (Factor IV), and Intellect/Imagination (Factor V). Specifically, Extraversion is characterized by assertive social tendencies including gregariousness, spontaneity, exhibitionism, and optimism. Agreeableness reflects convivial and cooperative behaviors such as empathy, patience, benevolence, and morality. Conscientiousness is defined by achievement-orientation and dutifulness, as demonstrated through traits like dependability, persistence, decisiveness, and organization. Emotional Stability represents individual differences in reactivity to stress, and is relevant to traits such as confidence, self-reliance, and candor in contrast to anxiousness, jealousy, and passivity. Lastly, Intellect/Imagination is representative of intellectual curiosity and creativity, and subsumes traits indicative of insightfulness, non-conformity, sophistication, and contemplation. These factors are typically assessed using measures such as the Big Five Inventory (BFI; John & Srivastava, 1999) and the International Item Pool- Five Factor Model scale (IPIP-FFM; Goldberg, 1999).

Costa and McCrae (1992) also put forth a five-factor structure of personality, which, though similar to the Big Five model, is not identical. The researchers first proposed the existence of three broad personality factors following a cluster analysis of existing measures—Anxiety-Adjustment, Introversion-Extraversion, and Openness to Experience (Costa & McCrae, 1976). The first two factors were subsequently renamed to Neuroticism and Extraversion, respectively, given their resemblance to the Big Three dimensions with the same name (Eysenck, 1947). The third factor was defined as reflecting a broad desire for novelty, variety, and change (McCrae, 1993; Digman, 1990). Through subsequent psychometric work conducted in reference to earlier assessments of personality structure (e.g., Cattell, 1943; Digman & Takemoto-Chock, 1981; Norman, 1963), Costa and McCrae added two additional factors to their preliminary taxonomy—Agreeableness and Conscientiousness. These factors were deemed analogous to the
Agreeableness and Conscientiousness dimensions represented in the Big Five model. Costa and McCrae termed this framework the Five Factor Model (FFM) and designed the NEO-Personality Inventory (NEO-PI; Costa, & McCrae, 1985) and later the Revised NEO-Personality Inventory (NEO-PI-R; Costa, & McCrae, 1992) to assess its dimensions. The short-form NEO-Five Factor Inventory (NEO-FFI; Costa, & McCrae, 1992) is also available.

Although the Big Five model and the FFM are commonly used interchangeably to reflect a five-factor personality structure, they are not redundant. Their distinction rests primarily in their unique origins and, more notably, in their differing representations of the Intellect/Imagination versus Openness to Experience factor (John & Srivastava, 1999). The Openness to Experience factor of the FFM is deemed to reflect a general need to broaden one’s horizons and to explore one’s surroundings (McCrae, 1993). Alternatively, the Intellect/Imagination factor of the Big Five is defined with greater specificity, representing a curious, creative, and cultured personality. Indeed, correlations between these factors, though significant, are not indicative of redundancy (e.g., McCrae, 1993). Further, the facet of interpersonal warmth is representative of unique factors across the two models. While warmth defines the factor of Agreeableness in the Big Five model, it characterizes the factor of Extraversion in the FFM (Goldberg, 1993). As a result of these dissimilarities, these two frameworks should not be conflated (Goldberg & Saucier, 1995; John & Robbins, 1993).

Both the Big Five model and the FFM represent descriptive frameworks, and therefore while they provide a unified representation of how traits are organized, they do not clarify why this organization is in place or what etiological processes cause individual differences in the proposed dimensions (Eysenck, 1992). Studies carried out after the introduction of these models, however, have reported the role of biological factors in affecting variation within these dimensions. Behavioral genetic studies of the five-factor structures have shown that individual differences in these factors appear to be robustly heritable (Jang, Livesley, & Vernon, 1996). Further studies have reported an association between variation in the five personality dimensions and activity in numerous regions of the prefrontal cortex, which has shown exhibited links to decision-making, effortful
control, and the moderation of social behavior (e.g., DeYoung et al., 2010; Forbes et al., 2014; Rankin et al., 2004; Wright et al., 2006). It is also important to note, however, that these biological findings have not been incorporated into either five-factor framework to yield a more thorough picture of human personality.

A number of assessments of five-factor trait models in comparison with the Big Three model have been carried out to determine the extent to which the two frameworks are reflective of similar dimensions, despite their distinct origins (Goldberg & Rosolack, 1994; McCrae & Costa, 1985; Saggino, 2000; Scholte, & De Bruyn, 2004). Findings from these investigations have noted that there is a strong association between the Extraversion factors represented in the three models. There is also a notable correlation between the Neuroticism factor from the Big Three and the dimensions of Emotional Stability and Neuroticism from the five-factor structures. Further, the Psychoticism factor of the Big Three model appears to be associated with the five-factor dimensions of Agreeableness and Conscientiousness, while the additional five-factor dimensions of Intellect/Imagination and Openness to Experience did not appear to correlate reliably with any of the Big Three constructs. These results reflect a major criticism of five-factor personality structures—one that suggests that, rather than comprising basic personality dimensions, the models are made up of two fundamental factors, Neuroticism and Extraversion, as well as lower-order or primary constructs that can ultimately be aggregated to yield more all-encompassing and biologically explicable dimensions (Eysenck, 1992; 1994).

1.2.3 The HEXACO Model

Ashton et al. (2004) developed the six-factor HEXACO model following critical investigations of the validity of five-factor personality structures in a cross-cultural context. These researchers observed that numerous lexical investigations carried out in languages other than English were unable to replicate the five-factor framework popularized by the Big Five and the FFM. Some of these studies reported fitting a five-factor structure that was similar but ultimately not identical to the Big Five or FFM (Boies, Lee, Ashton, Pascal, & Nicol, 2001; Caprara & Perugini, 1994; De Raad & Szirmak, 1994; Di Blas & Forzi, 1998; 1999; Szirmak & De Raad, 1994). Others
were simply not able to fit a five-factor solution, and instead reported a structure consisting of six dimensions (De Raad, 1992; Hahn, Lee, & Ashton, 1999).

To explore these inconsistencies further, Ashton et al. (2004) used factor analytic methodology to assess lexical datasets obtained from Dutch, French, German, Hungarian, Italian, Korean, and Polish samples. In all cases, a six-factor structure provided the best fit to the data. This extended structure was named the HEXACO model, and it was proposed to consist of Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. Of these factors, Extraversion and Conscientiousness are analogous to dimensions of the same name that appear in both five-factor structures. That is, Extraversion represents a propensity toward talkativeness, liveliness, and social boldness, while Conscientiousness is defined by organization, diligence, and perfectionism. The Openness to Experience factor of the HEXACO model reflects tendencies toward creativity, innovation, and aesthetic appreciation, and therefore it is in line with the Intellect/Imagination and Openness to Experience factors represented in the Big Five model and the FFM, respectively. With that said, given that this HEXACO dimension is also characterized by unconventionality, it is more closely reminiscent of the Intellect/Imagination dimension, which comprises nonconformity behaviors, than of its FFM counterpart (John & Srivastava, 1999). The factor of Agreeableness is also quite similar to the Agreeableness dimensions of the five-factor frameworks in that it represents individual differences in patience, gentleness, and tolerance. However, it does not also include the facet of sentimentality—a facet typically subsumed by Agreeableness dimensions in five-factor models (Costa & McCrae, 1992; Goldberg, 1990). Instead, sentimentality is characteristic of the Emotionality factor within the HEXACO model, along with tendencies toward emotional reactivity, fearfulness, and anxiousness. Based on these defining features, Emotionality is reminiscent of the Big Five factor of Emotional Stability (low) and the FFM factor of Neuroticism. However, the Emotionality dimension of the HEXACO model is not characterized by anger or irritability, as is the case with Emotional Stability and Neuroticism in the Big Five and FFM. Lastly, Honesty-Humility represents a new dimension not previously included in personality frameworks, and it is characterized by trustworthiness, sincerity, fairness, modesty, and integrity. Individual differences in these
six components of personality are typically assessed using the HEXACO Personality Inventory (HEXACO-PI-R; Lee & Ashton, 2004) or via its short-form measure, the HEXACO-60 (Ashton & Lee, 2009). High scores on all six dimensions are deemed to reflect largely adaptive tendencies (Ashton & Lee, 2007).

Like the five-factor structures of personality, the HEXACO models rests on factorial studies, and therefore it was initially developed as a descriptive taxonomy of traits rather than as a complete model of personality. At the same time, efforts have been made to develop a theoretical framework around these dimensions in order to better represent their etiology and function (Ashton & Lee, 2007). Specifically, the factors of Honesty-Humility, Agreeableness, and Emotionality have been deemed to reflect altruistic tendencies versus antagonistic tendencies. Individuals who obtain high scores on Honesty-Humility are likely to be fair and genuine, even in instances where interpersonal exploitation is possible, while those high in Agreeableness have a tendency to be forgiving, tolerant, and cooperative toward others, even when they risk being exploited by doing so. These tendencies are representative of reciprocal altruism—a willingness to assist others and to provide them with benefits, rather than harming others and imposing costs upon them (Trivers, 1971). In addition, individuals who exercise Emotionality have a propensity toward empathy, emotional attachment, as well as harm-avoidant and help-seeking behaviors—qualities associated with investment in kin and a willingness to face personal risk to ensure kin survival (i.e., kin altruism; Lee & Ashton, 2004). In contrast, the three remaining factors of Extraversion, Conscientiousness, and Openness to Experience are believed to represent engagement—active investment of energy in domains of interest that can result in monetary, resource-based, or social benefits (Gosling, 2001). In particular, Extraversion is focused on interpersonal engagement, Conscientiousness reflects industrious engagement, and Openness to Experience is representative of pensive or idea-driven engagement (Ashton & Lee, 2007). Although elements of the HEXACO model’s theoretical basis are informative of the potential evolutionary influences on individual differences in the HEXACO personality dimensions, they do not yet provide a comprehensive account of the potential biological or genetic mechanisms that may be applicable. Further, given the relative novelty of this model, behavioral genetic findings assessing the model directly do not exist, and
therefore it is not quite clear to what extent variability in these dimensions is accounted for by genetic and/or environmental factors. With that said, considering the likeness between many of the HEXACO factors and the dimensions contained within three-factor and five-factors structures, the biological processes believed to underlie these earlier frameworks may prove to be applicable to components of the HEXACO model.

During the validation of the HEXACO-PI-R (Lee & Ashton, 2004) as well as the HEXACO-60 (Ashton & Lee, 2009) instruments, correlations were assessed between this six-factor scale and the factors of the FFM, as measured by the NEO-FFI (Costa, & McCrae, 1992). Across the two studies, significant correlations were observed between the HEXACO dimensions and theoretically relevant FFM scales, suggesting that the five-factor structure is represented within the HEXACO framework. Further, the sixth dimension of Honesty-Humility was shown to correlate positively, albeit moderately, with the FFM factors of Agreeableness and Openness to Experience, although these correlations did not replicate reliably across samples (Ashton & Lee, 2009). The reported findings appear to suggest that, while related to factors represented in more abbreviated personality structures, the HEXACO dimension of Honesty-Humility largely represents a novel dimension in personality theory (Ashton et al., 2004). Through subsequent analyses of the HEXACO framework in relation to a variety of personality traits, it has also been suggested that the Honesty-Humility may be particularly relevant to antisocial behaviors given its substantial negative associations with egoism, psychopathy, pretentiousness, immorality, Machiavellianism, and antisocial workplace behavior (de Vries, de Vries, de Hoogh, & Feij, 2009; de Vries, & Van Kampen, 2010; Lee & Ashton, 2005; Lee, Ashton, & Shin, 2005). This ability of the HEXACO model to capture malevolent tendencies is an asset in light of criticisms of more concise models, which argue that these frameworks are unable to account sufficiently for individual differences in maladaptive behaviors (e.g., Block, 2010; Veselka, Schermer, & Vernon, 2011).

1.2.4 The Three-Factor Trait-Temperament Model

Although trait models have been central to promoting our understanding of individual differences in personality (Digman, 1990), they have simultaneously been unable to capture sufficiently population variation in the affective components of personality (Clark
Watson, 2008), as reflected by one’s temperament, and therefore they have been deemed by some to be incomplete representations of human tendencies. According to Allport (1937), temperament can be defined as the “the characteristic phenomenon of an individual’s emotional nature, including his [sic] susceptibility to emotional stimulation, his customary strength and speed of response, the quality of his prevailing mood, and all peculiarities of fluctuation and intensity of mood” (p. 54). That is, central to the concept of temperament is emotional expression and regulation, and therefore it represents individual differences in affect-related tendencies within the realm of personality (Kohnstamm, 1989; Rothbart, Ahadi, & Evans, 2000). A further defining feature of temperament is that it is inherent, with biological factors yielding observable characteristics (Clark & Watson, 1999). Although temperament and traits have occasionally been deemed to be synonymous in assessments of personality and human behavior (e.g., Guilford, Zimmerman, & Guilford, 1976), there are key distinctions between them. While temperament is regarded as comprising constitutional affective-centered predispositions that are innate and evident early in life as well as across species (e.g., Clarke & Boinski, 1995; Gosling, 2001), personality traits are considered patterns of thought and behavior that stabilize later in life and are influenced by sophisticated cognitive systems rather than basic psychological processes (Herrmann, Call, Hernández-Lloreda, Hare, & Tomasello, 2007; McCrae & Costa, 1994; McCrae et al., 2000). Both temperament and traits reflect elements of one’s personality (Digman, 1994; Tellegen, 1985; Rothbart, 2007), but these elements are considered to be distinct (Rothbart, 2007). Although some emotion-related content appears to be captured by existing trait models, these models ultimately do not offer a thorough representation of affect-related dispositions pertinent to the understanding of personality (Clark & Watson, 2008).

In an effort to develop a model of personality capable of reflecting variation in traits and temperament, researchers conducted cross-cultural investigations of adjectives relevant to one’s emotional experiences, as well as factor analyses of assessment tools purporting to measure emotion-related dimensions, including scales pertaining to broad personality dimensions, temperaments, and relevant traits and affective states (Clark & Watson, 2008; Tellegen, 1985; Watson & Clark, 1984; Watson, Clark, & Tellegen, 1984). Through these investigations, the researchers identified three broad dimensions of traits
and temperament: Negative Affectivity, Positive Affectivity, and Disinhibition. Negative Affectivity is characterized by proneness toward the experience of negative emotions, such as guilt, nervousness, fear, anger, and dissatisfaction (Watson, Clark, & Tellegen, 1984). Individuals high on Negative Affectivity are more likely to experience distress even in the absence of overt stressors, and to dwell on negative life events (Watson & Clark, 1984). Consequently, these individuals tend to have a less favourable view of the self and of the world (Watson & Slack, 1993). Positive Affectivity is defined by energy, enthusiasm, joy, and confidence (Clark & Watson, 2008). Individuals high on this dimension seek out the company of others and strive to engage fully with their environment. Consequently, these individuals tend to derive pleasure and satisfaction from life experiences, even in instances when these experiences may be challenging (Watson & Slack, 1993). Lastly, Disinhibition is representative of one’s ability to exercise self-regulation in arousal, activity, and emotional experiences, and it is therefore characterized by individual differences in impulsivity. Those who obtain high scores on this dimension tend to be oriented towards immediate feelings, sensations, and experiences rather than considering long-term repercussions (Watson & Clark, 1993).

In this model, it is important to note that the two affectivity factors—Negative Affectivity and Positive Affectivity—are distinct from the concepts of positive and negative affect in that these latter concepts refer to transient mood-states rather than to broadly stable dispositions (Watson & Tellegen, 1985).

Assessments of the three trait-temperament factors have typically been carried out via the General Temperament Survey (GTS; Clark & Watson, 1990), and the Schedule for Nonadaptive and Adaptive Personality Self-Report Form (SNAP-SRF; Clark, 1993; Harlan & Clark, 1999). The SNAP-SRF in particular has attracted attention due to its relevance in the assessment of socially malevolent tendencies (Wilt, Schalet, Durbin, 2010; Ro, Stringer, & Clark, 2012). The SNAP-SRF has exhibited associations with the Dimensional Assessment of Personality Pathology (DAPP; Livesley & Jackson, 2002), designed to assess personality disorders, with results further showing that a three-factor solution that closely resembles that of the trait-temperament model can be extracted from the two measures (Markon, Krueger & Watson, 2005). Consequently, when assessed via
the SNAP-SRF, the trait-temperament model may be capable of differentiating accurately between individual differences in adaptive versus maladaptive tendencies.

Although this framework has been referred to as the Big Three in some publications (Clark & Watson, 2008), it is not synonymous with the Big Three trait framework developed by Eysenck (1967; 1970; Eysenck & Eysenck, 1985). Existing research (i.e., Clark & Watson, 2008) has noted that the dimensions of these models do correlate, with substantial relations being reported between Positive Affectivity and the Extraversion dimension of the Big Three trait model and between Negative Affectivity and the Neuroticism factor from the Big Three framework. More attenuated correlations have emerged between Disinhibition and Psychoticism. These results, however, are not indicative of redundancy. The trait-temperament dimensions have also been assessed in relation to five-factor trait structures, namely the FFM (Clark & Watson, 2008; Simms & Clark, 2005; Watson, Clark, McIntyre, & Hamaker, 1992). Not surprisingly, Negative Affectivity was shown to correlate positively with the Neuroticism factor of the FFM, while Positive Affectivity correlated positively with Extraversion. Furthermore, Disinhibition exhibited negative associations with Agreeableness and Conscientiousness. The FFM factor of Openness to Experience did not correlate reliably with the three trait-temperament dimensions.

Behavioral genetic assessments of the trait-temperament model have not been carried out, and therefore it is presently not clear to what extent variation in these dimensions are attributable to genetic and/or environmental factors. Researchers, however, have noted that biological and etiological theories pertaining to the Big Three model of personality may be relevant to this particular framework as well given the likeness of the two models, and the extent to which they appear to be correlated (Clark & Watson, 2008; Watson & Clark, 1984; Danberry & Rothbart, 1988). In addition, studies of affect, mood, and dimensions of temperament have noted that variation in these components of human behavior have substantial genetic underpinnings (e.g., Anguelova, Benkelfat, & Turecki, 2003; Clark & Watson, 1999; Gillespie, Cloninger, Heath, & Martin, 2003; Hettema, Neale & Kendler, 2001), furthering the argument that individual differences in trait-temperament dimensions, which subsume many of these constructs, may themselves be
rooted in biological factors. Without explicit testing, however, these suggestions are merely speculative.

1.2.5 Humor Styles in Personality Models

Given the popularity of five-factor structures in the study of personality (Bock, 2010), it is unsurprising that the humor styles—affiliative, self-enhancing, aggressive, self-defeating—have been assessed in conjunction with these models. Martin et al. (2003) were the first to report this type of assessment in their validation of the HSQ, by examining the association between the scales of the HSQ and the factors of the FFM, as measured using the NEO-PI-R (Costa & McCrae, 1992). The researchers reported that the positive humor styles exhibited significant and positive associations with the FFM dimensions of Extraversion and Openness to Experience. Self-enhancing humor was further positively correlated with Agreeableness and negatively correlated with Neuroticism. In addition, it was observed that the negative humor styles were positively related to Neuroticism and negatively associated with Agreeableness and Conscientiousness. All significant correlation coefficients were quite strong, with the exception of those representing the relation between the humor styles and Openness to Experience, which were noticeably smaller in magnitude. In summarizing these findings, Martin et al. reported successfully creating a link between the humor styles constructs and the prevailing model in personality psychology. Their results further appeared to indicate that the negative humor styles tend to be more reflective of maladaptive behaviors, whereas the positive humor styles appear to be characteristic of adaptive behaviors.

The initial findings of Martin et al. (2003) have largely been replicated in subsequent analyses using independent samples, although additional significant relations have emerged. Assessing an adult twin sample from North America, Vernon, Martin, Schermer, and Mackie (2008) reported the same pattern of significant associations as did Martin et al. (2003) between the humor styles and the FFM dimensions, measured using the NEO-PI-R (Costa & McCrae, 1992). The researchers further observed a significant positive relation between self-enhancing humor and Conscientiousness, and a negative correlation between affiliative humor and Agreeableness, though these associations were
rather small in magnitude. Additionally, Vernon et al. reported a small but significant positive correlation between the FFM dimension of Openness to Experience and the two negative humor styles. Examining the HSQ in a cross-cultural context, Saroglou and Scariot (2002) assessed a sample of French-speaking Belgian students regarding individual differences in the four humor styles and the Big Five factors of personality, measured using the Big Five Bipolar Rating Scale (Roskam, de Maere-Gaudissart, Vandenplas-Holper, 2000)—a short-form French measure of the Big Five dimensions. Once again, the findings of the researchers echoed the results initially reported by Martin et al., although not as strongly as was the case with the investigation carried out by Vernon et al. Saroglou and Scariot observed the same pattern of correlations pertaining to the positive humor styles as did Martin et al., although they further reported a positive association between affiliative humor and the Big Five factor of Agreeableness, while also not observing a significant correlation between this humor style and Emotional Stability—a positively keyed analogue to FFM Neuroticism. The researchers further noted that while both negative humor styles correlated negatively with Conscientiousness, only aggressive humor was negatively associated with Agreeableness, while only self-defeating humor was negatively associated with Emotional Stability. Aggressive humor further exhibited a small but significant positive association with Extraversion. With these replication studies, the results provide a less clear-cut differentiation between the positive and negative humor styles, with some correlations suggesting that each of these humor styles, with perhaps the exception of self-enhancing humor, may be tied to both adaptive and maladaptive tendencies.

Beyond being examined in conjunction with five-factor structures, the humor styles have not been assessed in the context of the Big Three model (Eysenck, 1967; 1970; Eysenck & Eysenck, 1985) the HEXACO model (Ashton et al., 2004), or the trait-temperament model (Clark & Watson, 2008). Therefore, while these humor styles have been shown to fit within the context of a personality framework, this framework is largely descriptive (Eysenck, 1992), insufficiently reflective of maladaptive tendencies (Block, 2010; Veselka, Schermer, & Vernon, 2011), and not fully capable of capturing individual differences in predispositions toward affective states and reactivity (Clark & Watson, 2008). Consequently, a five-factor structure, as it is has been represented in personality
research (Costa & McCrae, 1992; Goldreg, 1990), may not account for key elements of personality that may be particularly relevant to the assessment of humor in general, and analyses of humor styles in particular.

An assessment of the humor styles in the context of the HEXACO model would be informative in light of this model’s strengths in representing the complexity of malevolent behavior effectively (de Vries et al., 2009; de Vries, & Van Kampen, 2010; Lee & Ashton, 2005; Lee et al., 2005). For instance, the Honesty-Humility dimension of the HEXACO model appears to account for a substantial proportion of variation in the Dark Triad (Lee & Ashton, 2005)—a complex structure that has shown varied correlations with five-factor models (Jakobwitz & Egan, 2006; Lee & Ashton, 2005; Vernon, Villani, Vickers, & Harris, 2008) given its associations with antisocial tendencies (Paulhus & Williams, 2002) but also with positive outcomes (e.g., Furnham, 2007; Paulhus, 1998). Given that, like the Dark Triad, humor styles appear to have both adaptive and maladaptive features (Martin et al., 2003), situating them within a framework capable of reflecting a broad scope of adjustment and malevolence seems ideal.

An examination of the humor styles in the context of the trait-temperament model may also be warranted, and perhaps more fruitful than an assessment of these humor styles in the context of the Big Three model of traits. While the Big Three model has the benefit of being a theory-based representation of personality (Eysenck, 1967), the trait-temperament model appears to reflect not only the traits subsumed by the tripartite trait model, but also additional constructs regarding emotional expression and affective reactivity (Clark & Watson, 2008; Tellegen, 1985; Watson & Clark, 1984; Watson et al., 1984).

Acknowledging the centrality of affective components, such as emotional intelligence (Vernon et al., 2010) and cheerfulness (Martin et al., 2003) to the understanding of humor styles, the assessment of these humor styles in the context of a model capable of representing these affective components adequately may be beneficial. In addition, and perhaps by virtue of its inclusion of temperament constructs, the trait-temperament model appears to represent a succinct summary of individual differences as they pertain to adaptive and maladaptive traits. This model, therefore, has been employed in the
investigation of psychopathology (Markon et al., 2005; Wilt et al., 2010), and may also prove helpful in clarifying the extent to which the four humor styles represent malevolent tendencies.

1.3 Purpose

The goal of the series of studies that follow is to allow for the continued validation and greater understanding of the uses and functions of humor. Specifically, the intrapersonal and interpersonal means by which the four humor styles—affiliative, self-enhancing, aggressive, and self-defeating—relate to psychological well-being or lack thereof are explored. In particular, the intrapersonal factor of personal resiliency, operationalized as mental toughness (Clough et al., 2001), and the interpersonal factor of exploitative social strategy or style, operationalized as the Dark Triad traits (Paulhus & Williams, 2002), are studied. In these analyses, the goal is to clarify the extent to which the humor styles are related to these broad indicators of social adjustment (resiliency) and maladjustment (Dark Triad) in an effort to elucidate the processes by which these same humor styles may result in positive versus negative outcomes.

Further, in an effort to situate humor in the broader theory of personality, the humor styles are examined in conjunction with non-traditional personality frameworks: the HEXACO model, assessed via the HEXACO-60 (Ashton & Lee, 2009) and the trait-temperament model proposed by Clark and Watson (2008), measured here using the SNAP-SRF (Harlan & Clark, 1999). The HEXACO model is broader and more theoretically driven than is the contemporary five-factor structure (Ashton & Lee, 2007). As a result, it is not only capable of capturing maladaptive tendencies effectively, and situating them with greater accuracy in the structure of personality (e.g., Lee & Ashton, 2005), it also provides evolutionary hypotheses pertaining to the etiology of these tendencies. The strength of the trait-temperament model lies in its ability to represent affect with more thoroughness and complexity than is currently possible with other personality frameworks—a feature relevant to the humor styles for which affect, both motivating and reactionary, is relevant (Martin et al., 2013; Vernon et al., 2009). Like the HEXACO, this temperament-relevant model has also been shown to differentiate well between adaptive and maladaptive tendencies (Markon et al. 2005), and its three-factor
structure and similarity to the Big Three model of traits lends itself well to the biological theories of etiology posited for the Big Three framework (Clark & Watson, 2008; Watson & Clark, 1984; Danberry & Rothbart, 1988). Beyond simply situating the humor styles within a number of alternative frameworks, the broader goal of this latter analysis is to provide further construct validity pertaining to the HSQ by examining it in relation to competing models of personality, in recognition of the fact that the contemporary five-factor structure has limitations in terms of underlying theory and scope (Blcok, 2010; Eysenck, 1992).

1.3.1 Behavioral Genetic Methods

Numerous investigations in the present collection of studies employ behavioral genetic methodology, which is built upon the foundation of quantitative genetics. This approach aims to understand variation or individual differences in observed traits, known as phenotypes. Specifically, the purpose of the method is to gauge the relative importance of genetic and environmental factors in contributing to the variation of a given trait or sets of traits (Posthuma et al., 2003) typically by assessing twin or non-twin sibling pairs. Consequently, it allows researchers to obtain etiologically informative results. In these analyses, researcher can differentiate between two types of genetic effects—additive and dominance (Plomin, DeFries, & McClearn, 1990). Additive genetic effects (A) are indicative of genotypes that are transmitted directly from parents to their offspring, thereby increasing parent-offspring resemblance. Genetic influence due to dominance effects (D), however, represents non-additive interactions among alleles, which do not breed true from parents to their offspring, thus creating differences between them. Similarly, it is possible to differentiate between two types of environmental effects—shared and non-shared effects (Plomin et al., 1990). Shared environmental factors (C) represent events that siblings have in common, which ultimately make them more similar to one another. Examples of shared environmental effects include the socioeconomic status, religious orientation, or diet that is common to the siblings during upbringing. In contrast, non-shared environmental effects (E) reflect environmental factors to which one sibling is exposed, but not the other. These effects yield differences between siblings.
Examples of non-shared environmental factors include participation in unique peer groups or the experience of a traumatic event by one sibling only.

Although numerous designs are available that allow for the application of this methodology to the study of personality, the most common approach, and the one employed in this series of investigations, entails the assessment of monozygotic (MZ) and dizygotic (DZ) twin pairs who have been raised in the same environment (Boomsma, Busjahn, & Peltonen, 2002). In this design, it is recognized that members of a given MZ twin pair share all of their genes given that they are derived from a single fertilized egg and therefore inherit identical genetic material. On the other hand, members of a given DZ twin pair share approximately 50% of their genes, and therefore they are no more genetically similar than non-twin siblings (Nichols Bilbro, 1966). In behavioral genetic analyses, the likeness within MZ pairs ($r_{MZ}$) is compared to the likeness among DZ pairs ($r_{DZ}$). When the correlation within MZ pairs is substantially greater than the correlation within DZ pairs, it is inferred that genetic effects may be pertinent to variance in the trait in question. Alternatively, when the two twin correlations are approximately equal, it is suggested that shared environmental factors may be relevant in explaining the observed individual differences. Structural equation modeling can further be used to determine the proportion of variation in the trait that can be explained by applicable genetic and/or environmental factors. This process typically involves fitting a model that estimates the additive genetic, shared environmental, and non-shared environmental contributions to individual differences in the trait of interest (i.e. an ACE model). Although dominance genetic effects can also be estimated in a similar manner, most studies do not have sufficient power to calculate these effects accurately (Neale, Eaves, Kendler, 1994). This is the case in the present investigations.

Twin designs in behavioral genetic analyses are based on two broad, albeit not uncontested, assumptions. First, the design assumes random mating, whereby individuals are deemed equally likely to select a mate who is similar to them as they are to select one who is dissimilar to them. This type of mating stands in contrast to assortative mating, in which individuals with similar genotypes or phenotypes will mate with one another more frequently than would be expected on the basis of chance (Crow, & Kimura, 1970).
Further, the design assumes equal environments, which stipulates that all twins raised in the same home experience equally similar environments, regardless of their zygosity. That is, under this assumption, MZ twins are not treated differently than DZ twins by others in their common environment, such as their parents (Kendler, Neale, Kessler, Heath, & Eaves, 1993; Plomin, Willerman & Loehlin, 1976).

The process described above represents a univariate behavioral genetic analysis given that it is a behavioral genetic analysis of a single variable. In this analysis, the goal is to determine the extent to which variation in a single given trait is attributable to genetic effects and/or to environmental factors. However, bivariate behavioral genetic studies can also be conducted to assess the contribution of genetic and/or environmental factors to the covariance between two traits. In these analyses, one can calculate a phenotypic correlation \( r_p \), representing the association between two observed traits, a genetic correlation \( r_g \) reflecting the proportion of variance that two traits share due to genetic causes, and an environmental correlation (shared and unshared), representing the proportion of variance that two traits share due to common \( r_c \) and/or unique environmental \( r_e \) causes. Bivariate behavioral genetic analyses can be carried out via the method of Cholesky decomposition or triangular decomposition (Neale & Cardon, 1992).

1.4 References


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Chapter 2

2 Laughter and Resiliency: A Behavioral Genetic Study of Humor Styles and Mental Toughness

When first subjected to psychological inquiry, humor was typically defined as a one-dimensional construct that was assumed to be consistently beneficial for physical and psychological health (e.g., Lefcourt, 2001). Indeed, following the personal account of Cousins (1979), who popularized the notion of humor and laughter as a key factor in coping with physical illness, a prevalent theme in humor research was the positive effects of humor on overall well-being (Martin, 2001). In earlier research, this one-dimensional construct of humor, measured using several different scales, was linked to various aspects of health and well-being, including better immune functioning (Dillon, Minchoff, & Baker, 1985), higher self-esteem and optimism (Kuiper & Martin, 1993), and lower levels of depression and anxiety (Thorson, Powell, Sarmany-Schuller, & Hampes, 1997). It was further shown to moderate the impact of stressors on mood disturbance (e.g., Martin & Lefcourt, 1983; Nezu et al., 1988) and immune function (Martin & Dobbin, 1988; for a review of this research, see Martin, 2007).

As interest has grown in the idea of “sense of humor” as a stable personality trait, a more multifaceted understanding of the construct has emerged (Ruch, 1998). Rather than being viewed as a coping skill consistently associated with improved functioning, sense of humor is now conceptualized as a collection of loosely related components, which may not all contribute positively to well-being. Epitomizing this multidimensional perspective is the proposal that there are four humor styles—two positive and two negative—that represent different ways of using and expressing humor (Martin et al., 2003). On the positive side, the affiliative humor style is characterized by a tendency to joke with others in order to create and strengthen interpersonal bonds, while the self-enhancing humor style is defined by the use of humor to maintain a positive outlook on life, regulate emotions, and cope with difficult situations (Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). On the negative end, the aggressive humor style entails the use of sarcasm and teasing to enhance oneself at the expense of others, while the self-defeating humor style
involves the use of self-disparaging humorous remarks in an effort to create bonds with others at the expense of the self (Martin et al., 2003). While these four humor styles have been assessed in relation to a variety of different traits representing psychological well-being or the lack thereof (e.g., Frewen, Brinker, Martin, & Dozois, 2008; Martin et al., 2003), they have not yet been examined in association with the construct of mental toughness—the ability to thrive when faced with adversity (Clough, Earl, & Sewell, 2001). Given the close ties demonstrated between coping and humor, as it was traditionally defined (e.g., Kuiper & Martin, 1998; Kuiper, Martin, & Olinger, 1993; Lefcourt & Martin, 1986), an investigation of the relations between a more multidimensional view of humor and mental toughness could further clarify the role of humor in the context of well-being. Moreover, a behavioral genetic investigation of the potential links between these constructs could help to uncover common etiological factors underlying them.

2.1 Mental Toughness

The construct of mental toughness was born out of research on human hardiness—the ability to exhibit resiliency in the face of high stress (Kobasa, 1979; Kobasa, Maddi, & Kahn, 1982). By studying the effects of stressful life events on illness onset, Kobasa (1979) proposed that the construct of hardiness is made up of three elements: Commitment, Control, and Challenge. Commitment is defined by an overall sense of purpose in life that drives individuals to actively approach and find meaning in the events they encounter. Control represents the tendency to feel as though one is influential rather than helpless in situations of adversity. Lastly, Challenge is characterized by the belief that change is normal in life, and that it can stimulate growth rather than threatening one’s security.

Mental toughness, as defined by Clough et al. (2001), is an extension of this construct of hardiness and its three components. Specifically, in addition to the three factors defining hardiness, mental toughness is further characterized by a fourth factor—that of Confidence, as defined by a high sense of self-belief. Clough et al. argued that this fourth dimension is a necessary component of human resiliency, given their finding that Commitment, Control, and Challenge alone could not explain fully the ability of
individuals to remain relatively unaffected by adversity. In addition, the authors expanded upon the notion of mental toughness by adding sub-components to two of the three original factors of the construct. Specifically, they described Control as being defined by Emotional Control and Control over Life, and Confidence as being made up of Confidence in Abilities and Interpersonal Confidence.

2.2 Humor Styles and Mental Toughness: Common Personality Correlates

To date, there exists no research assessing possible relations between humor styles and the four factors of mental toughness. However, studies have investigated these two sets of constructs individually in relation to other higher-order personality dimensions and outcomes. Patterns of results derived from these studies provide an initial glimpse into potential associations that may exist between humor styles and mental toughness.

Both mental toughness and humor styles have been investigated in relation to the Five-Factor Model (FFM) of personality. The FFM is the currently conventional framework of personality, which posits that all individual differences in human personality can be accounted for by five trait dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Costa & McCrae, 1992). Martin et al. (2003) first examined the correlations between the humor styles and the FFM traits, noting that the positive humor styles were significantly and positively associated with Extraversion and Openness to Experience and that the negative humor styles correlated negatively with Agreeableness and Conscientiousness, and positively with Neuroticism. In addition, self-enhancing humor was positively correlated with Agreeableness and negatively correlated with Neuroticism. Vernon, Martin, Schermer, and Mackie (2008) replicated the findings of Martin et al. (2003), and also reported a few additional significant phenotypic correlations between the FFM dimensions and the four humor styles. Specifically, for the positive humor styles, they observed a positive association between self-enhancing humor and Conscientiousness, and a negative correlation between affiliative humor and Agreeableness, although both of these associations were quite low. For the negative humor styles, Vernon, Martin, Schermer, and Mackie observed a small but significant positive relation between the negative expressions of
humor and Openness to Experience. Overall, the general pattern of results suggests that the negative humor styles have more antisocial underpinnings given their positive association with Neuroticism and their negative correlation with Agreeableness. In contrast, the positive humor styles may be reflective of more prosocial qualities in light of their strong positive associations with factors such as Extraversion and Openness to Experience.

Mental toughness has also been examined in relation to the FFM factors of personality. Horsburgh, Schermer, Veselka, and Vernon (2009) reported a number of significant phenotypic correlations between mental toughness and the FFM. They found that all mental toughness factors as well as global mental toughness, representing the sum of the distinct factors, were significantly negatively associated with Neuroticism, and significantly positively related to Conscientiousness. Significant positive correlations were further noted between most of the mental toughness variables and the remaining FFM dimensions. The only non-significant associations were observed between Extraversion and Control over Life, Agreeable and Emotional control, as well as Openness to Experience and the mental toughness dimensions of Emotional Control, Control over Life, and Confidence in Abilities. Taken together, these results depict mental toughness as a beneficial trait, and individuals possessing it as emotionally stable, outgoing, considerate, and dedicated.

In addition to being assessed in relation to higher-order dimensions, the humor styles and mental toughness variables have also been studied in relation to other personality traits. For instance, effective coping strategies have been found to correlate negatively with the negative humor styles and positively with the positive humor styles (e.g., Erickson & Feldstein, 2007). Similarly, mental toughness has been linked to more effective coping strategies (e.g., Kaiseler, Polman, & Nicholls, 2009). Further, both positive humor styles and a mentally tough disposition have been shown to have a buffering effect against poor psychological health (e.g., Frewen et al., 2008; Maddi, Brow, Khoshaba, & Vaitkus, 2006), as well as poor physical health (e.g., Martin & Lefcourt, 20014; Sheppard & Kashani, 1991). These variables common to both sets of constructs further suggest possible correlations between humor styles and mental toughness.
2.3 Behavioral Genetic Investigations of Humor Styles and Mental Toughness

Although no bivariate behavioral genetic investigations have been carried out pertaining to the humor styles and mental toughness variables, univariate studies of each of the constructs have been conducted. These studies reveal the extent to which individual differences in the constructs can be accounted for by genetic and/or environmental factors. As a result, they provide a good starting point for further behavioral genetic research at the bivariate level. A summary of all univariate behavioral genetic findings pertaining to the humor styles and mental toughness is outlined in Table 2.

Vernon, Martin, Schermer, and Mackie (2008) conducted a univariate behavioral genetic investigation of humor styles using an adult twin sample from the United States. They reported that individual differences in the positive humor styles were primarily attributable to additive genetic and non-shared environmental factors, whereas individual differences in the negative humor styles were largely attributable to shared and non-shared environmental factors. Such findings would seem to suggest that negative humor styles develop mainly as a consequence of learning experiences, while positive humor shows some degree of heritability. Univariate behavioral genetic studies of the humor styles were also carried out in the United Kingdom, however, where it was found that individual differences in all four styles were accounted for entirely by genetic and non-shared environmental factors (Vernon, Martin, Schermer, Cherkas, & Spector, 2008). The researchers suggested that the disparities noted between these studies might be due to cultural differences between the two countries. They suggested that genuine differences in the expression and enjoyment of humor may exist between populations in the United States versus the United Kingdom, and that these distinct cultural preferences may have uniquely affected the genetic evolution of individuals within the two nations.

Horsburgh et al. (2009) carried out a univariate behavioral genetic analysis of mental toughness using a North American twin sample. As predicted, the researchers noted that genetic and non-shared environmental effects contributed to individual differences in nearly all dimensions of the construct.
Table 2: Existing Univariate Behavioral Genetic Investigations of Humor Styles and Mental Toughness

<table>
<thead>
<tr>
<th>Variables</th>
<th>Twin correlations</th>
<th>Parameter estimates (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r_{MZ}$</td>
<td>$r_{DZ}$</td>
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<tr>
<td>Humor Styles (U.S.A.)$^a$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>.49</td>
<td>.28</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>.43</td>
<td>.09</td>
</tr>
<tr>
<td>Aggressive</td>
<td>.45</td>
<td>.44</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>.37</td>
<td>.36</td>
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<tr>
<td>Humor Styles (U.K.)$^b$</td>
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<tr>
<td>Affiliative</td>
<td>.48</td>
<td>.23</td>
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<tr>
<td>Self-enhancing</td>
<td>.40</td>
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<td>Aggressive</td>
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<tr>
<td>Self-defeating</td>
<td>.40</td>
<td>.21</td>
</tr>
<tr>
<td>Mental Toughness$^c$</td>
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<td></td>
</tr>
<tr>
<td>Challenge</td>
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<td>-.04</td>
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<tr>
<td>Commitment</td>
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<td>.11</td>
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<tr>
<td>Control</td>
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<tr>
<td>Emotional control</td>
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<td>Control over life</td>
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<tr>
<td>Confidence</td>
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<tr>
<td>Confidence in abilities</td>
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<td>Interpersonal confidence</td>
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<td>.28</td>
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<tr>
<td>Global mental toughness</td>
<td>.54</td>
<td>.05</td>
</tr>
</tbody>
</table>

Note. $a^2$ = additive genetic effects. $c^2$ = shared environmental effects. $e^2$ = non-shared environmental effects. All effects with confidence intervals that do not include zero are significant at the .05 level.

2.4 Present Study

The purpose of the present study was to determine the phenotypic correlations that may exist between the four humor styles and several dimensions of mental toughness. Additionally, we wished to investigate the extent to which any significant phenotypic correlations that emerge are attributable to correlated genetic and/or correlated environmental factors.

Significant phenotypic correlations were expected to emerge between the humor styles and the factors of mental toughness given their individual associations with common personality dimensions and traits. Specifically, it was predicted that the two positive humor styles—affiliative and self-enhancing—would correlate positively with the mental toughness factors as well as with global mental toughness, given that all of these variables have shown relations with prosocial and beneficial personality constructs and outcomes, including the FFM dimension of Extraversion, effective coping, and physical as well as psychological health (e.g., Horsburgh et al., 2009; Martin et al., 2003; Vernon, Martin, Schermer, & Mackie, 2008). Alternatively, the negative humor styles—aggressive and self-defeating—were predicted to exhibit negative associations with mental toughness, in light of their reported associations with more antisocial and negative traits and outcomes, such as the FFM dimension of Neuroticism, diminished coping, and reduced well-being (e.g., Horsburgh et al., 2009; Martin et al., 2003; Vernon, Martin, Schermer, & Mackie, 2008). Based on previous research with these and other variables, bivariate behavioral genetic analyses of humor styles and mental toughness were expected to show that observed correlations between them are primarily attributable to common genetic and common non-shared environmental factors.

2.5 Method

2.5.1 Participants

Participants were 201 pairs of adult twins: 152 monozygotic (MZ) pairs—20 male pairs, 132 female pairs—and 49 dizygotic (DZ) pairs—6 male pairs, 43 female pairs. They lived in the United States and in Canada at the time of testing and were a sub-sample of
twins who had taken part in previous research projects conducted by our laboratory. The twins ranged in age between 17 and 92 years \((M = 41.42, SD = 17.54)\). Previous reports regarding statistical power in behavioral genetic analyses confirm that this sample size was sufficient given the goals of the present investigation (e.g., Posthuma & Boomsma, 2000; Rijsdijk & Sham, 2002; Visscher, 2004; Visscher, Gordon, & Neale, 2008).

2.5.2 Materials

2.5.2.1 Humor Styles Questionnaire (HSQ)

The HSQ (Martin et al., 2003; Appendix A) was used to measure individual differences in the four humor styles: affiliative, self-enhancing, aggressive, self-defeating. This questionnaire consists of 32 items, each presenting a self-reflective statement regarding humor. Participants used a 7-point Likert scale (where 1 = totally disagree and 7 = totally agree) to indicate the extent to which they agreed with each item. The psychometric properties of the HSQ have been reported by Martin et al. (2003) and they are indicative of a reliable and valid measure of humor styles.

2.5.2.2 Mental Toughness 48 Inventory (MT48)

The 48-item MT48 (Clough et al., 2001) was used to assess mental toughness. This questionnaire measures individual differences in global mental toughness, as well as in its four subscales: Challenge, Commitment, Control, and Confidence. Of these subscales, Confidence and Control each consist of two parts: Confidence in Abilities and Interpersonal Confidence make up the former, while Emotional Control and Control over Life define the latter. Sample items for the subscales include: “Challenges usually bring out the best in me” (Challenge), “I don’t usually give up under pressure” (Commitment), “Even when under considerable pressure, I usually remain calm” (Emotional Control), “I generally feel in control” (Control over Life), “I usually take charge of a situation when I feel it is appropriate” (Interpersonal Confidence), and “I am generally confident in my own abilities” (Confidence in Abilities). To complete the MT48, participants responded to items via a 5-point Likert scale (where 1 = disagree and 5 = agree), with higher scores indicating a greater endorsement of a given construct. The MT48 has been shown to be a psychometrically sound instrument (Clough et al., 2002; Crust & Clough, 2005).
2.5.2.3 Zygosity Questionnaire

A 16-item zygosity questionnaires developed by Nichols and Bilbro (1966) was employed to determine or confirm the zygosity (MZ or DZ) of the participating twin pairs, given the logistical challenge in obtaining biological data from our sample. The items in the questionnaire assess the physical similarity between twin pairs by enquiring about each twin’s height, eye color, and general appearance. Additional items assess the frequency with which the twins are mistaken for one another by parents, teachers, casual friends, and close friends (frequently, occasionally, rarely/never). Empirical assessments of this zygosity questionnaire have reported that there is at least 93% agreement between twin zygosity determined via the measure and zygosity determined by analyses of genetic markers or blood-typing (e.g., Kasriel & Eaves, 1976; Rietveld et al., 2000).

2.5.3 Procedure

In 2006, participants in North America were recruited via newspaper advertisements to participate in an ongoing study of personality in adult twins. They replied to these advertisements by telephone or by e-mail, at which point the details of the study and the nature of their participation in it were described. Individuals who agreed to take part in the study were then sent a package through standard mail containing the HSQ, a zygosity questionnaire, as well as additional questionnaires not relevant to the present study. In 2008, a portion of these twins was invited to complete the MT48 in addition to other measures not pertinent to this report. In each of these mail-outs, participants were asked to fill out the questionnaires individually, and then to return the completed questionnaires using self-addressed stamped envelopes with which they were provided. Participants received $20.00 for taking part in each mail-out, and were entered in a draw to win one of ten $100.00 prizes each time.

2.5.4 Analysis

Nearly all twins participating in the present study fully completed the HSQ and the MT48. However, rare instances did arise in which an item was left blank. In these cases, we replaced the missing information with the average of that particular item’s Likert scale (Downey & King, 1998). Given the range of ages of participants in the present
sample, and the uneven distribution of males and females, all data were corrected for age and sex via the regression approach proposed by McGue and Bouchard (1984). Prior to carrying out subsequent analyses, the items of the HSQ were converted to four scores reflecting the four major humor styles, and the items of the MT48 were reduced to eight scores—one representing global mental toughness, and the remaining scores corresponding to the factors comprising the global construct.

We conducted the bivariate behavioral genetic analyses using the *Mx* software package (Neale, Boker, Xie, & Maes, 2006) to determine the extent to which phenotypic correlations between humor and mental toughness can be accounted for by common genetic and/or common environmental factors. For this analysis, we used the method of Cholesky or triangular factor analysis (Neale & Cardon, 1992) to assess the cross-correlations within twin pairs (i.e., the correlation between one twin’s score on one variable with their co-twin’s score on another variable). We began by fitting a full ACE model to our data to investigate potential correlated genetic (A), common environmental (C), and/or unique environmental (E) effects. Subsequently, reduced AE and CE models were tested. The models with the lowest chi-square change value (relative to the full model) and the lowest AIC value were selected as the best-fitting models. For each of the twin correlations pertaining to constructs under investigation, a reduced AE model was deemed to have the best fit. Consequently, genetic (*rg*) and non-shared environmental (*re*) correlations were estimated only.

### 2.6 Results

Descriptive statistics pertaining to the HSQ and the MT48 are presented in Table 3.

Twin correlations for MZ and DZ twin pairs with regards to the humor style and mental toughness variables are reported in Table 4. Not surprisingly, given that the twins in the present study were a subset of the samples tested by Vernon, Martin, Schermer, and Mackie (2008) and Horsburgh et al. (2009), these twin correlations are very similar to those reported in earlier studies. Consequently, similar univariate behavioral genetic findings pertaining to both the humor styles and the mental toughness factors would be
### Table 3: Descriptive Statistics for the Humor Styles and Mental Toughness Variables

<table>
<thead>
<tr>
<th>Scales</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>5.50</td>
<td>1.08</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>4.71</td>
<td>1.08</td>
</tr>
<tr>
<td>Aggressive</td>
<td>3.08</td>
<td>1.06</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>3.18</td>
<td>1.13</td>
</tr>
<tr>
<td>MT48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Challenge</td>
<td>3.69</td>
<td>0.51</td>
</tr>
<tr>
<td>Commitment</td>
<td>3.83</td>
<td>0.50</td>
</tr>
<tr>
<td>Control</td>
<td>3.37</td>
<td>0.47</td>
</tr>
<tr>
<td>Emotional control</td>
<td>3.57</td>
<td>0.54</td>
</tr>
<tr>
<td>Control over life</td>
<td>3.02</td>
<td>0.56</td>
</tr>
<tr>
<td>Confidence</td>
<td>3.71</td>
<td>0.56</td>
</tr>
<tr>
<td>Confidence in abilities</td>
<td>3.56</td>
<td>0.61</td>
</tr>
<tr>
<td>Interpersonal confidence</td>
<td>3.57</td>
<td>0.64</td>
</tr>
<tr>
<td>Global mental toughness</td>
<td>3.59</td>
<td>0.44</td>
</tr>
</tbody>
</table>

*Note. M = mean, SD = standard deviation. HSQ = Humor Styles Questionnaire measuring humor styles. MT48 = Mental Toughness 48 Inventory measuring mental toughness.*

### Table 4: Within-Pair Intraclass Correlations of Monozygotic (MZ) and Dizygotic (DZ) Twins for the Humor Styles and Mental Toughness Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Twin correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rMZ</td>
</tr>
<tr>
<td><strong>Humor styles</strong></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>.50</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>.46</td>
</tr>
<tr>
<td>Aggressive</td>
<td>.50</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>.37</td>
</tr>
<tr>
<td><strong>Mental toughness</strong></td>
<td></td>
</tr>
<tr>
<td>Challenge</td>
<td>.47</td>
</tr>
<tr>
<td>Commitment</td>
<td>.37</td>
</tr>
<tr>
<td>Control</td>
<td>.44</td>
</tr>
<tr>
<td>Emotional control</td>
<td>.54</td>
</tr>
<tr>
<td>Control over life</td>
<td>.46</td>
</tr>
<tr>
<td>Confidence</td>
<td>.47</td>
</tr>
<tr>
<td>Confidence in abilities</td>
<td>.50</td>
</tr>
<tr>
<td>Interpersonal confidence</td>
<td>.40</td>
</tr>
<tr>
<td>Global mental toughness</td>
<td>.54</td>
</tr>
</tbody>
</table>
anticipated to emerge in the present sample. Due to the fact that these results have already been reported in previous analyses (Horsburgh et al., 2009; Vernon, Martin, Schermer, & Mackie, 2008), they will not be outlined in the present investigation.

Phenotypic correlations between the four humor styles, and the components of mental toughness are shown in Table 5. Significant positive associations were found between the two positive humor styles and all but one of the measured mental toughness variables. Specifically, the correlation between affiliative humor and Control over Life did not reach significance, although a significant correlation did emerge between self-enhancing humor and this mental toughness variable. The majority of the significant correlations between the positive humor styles and mental toughness were moderate in magnitude, with the highest significant phenotypic association emerging between self-enhancing humor and Emotional Control (\( r_p = .41, p < .01 \)), and the lowest between affiliative humor and Control (\( r_p = .14, p < .01 \)). In nearly all cases, the phenotypic correlations between self-enhancing humor and the mental toughness variables were larger than the phenotypic correlations between affiliative humor and these same variables. The one exception to this trend was the correlation between the positive humor styles and Interpersonal Confidence, where affiliative humor exhibited a more substantial association with the mental toughness factor in comparison to self-enhancing humor.

Fewer significant phenotypic associations were noted between the negative humor styles and the mental toughness variables, although all but one of these correlations were negative. The only positive correlation noted was between aggressive humor and Interpersonal Confidence, and this correlation was significant (\( r_p = .12, p < .05 \)). Significant negative correlations were observed between both negative humor styles and the mental toughness factors of Control, Confidence, Confidence in Abilities, and Interpersonal Confidence. Additional significant negative correlations were found between aggressive humor and the mental toughness factors of Commitment and Control over Life, and between self-defeating humor and the mental toughness variables of Emotional Control and global mental toughness. Most of the significant phenotypic correlations observed between the negative humor styles and mental toughness were smaller in comparison to those involving the positive humor styles, with the highest
Table 5: Phenotypic, Genetic, and Environmental Correlations Between the Humor Styles and Mental Toughness Variables

<table>
<thead>
<tr>
<th>Mental toughness</th>
<th>Humor styles</th>
<th>Affiliative</th>
<th>Self-enhancing</th>
<th>Aggressive</th>
<th>Self-defeating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitment</td>
<td></td>
<td><em>rp = .18</em>*</td>
<td><em>rp = .25</em>*</td>
<td><em>rp = -.11</em></td>
<td>*rp = -.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .06 (-.23 to .32)</td>
<td>*rg = .42 (.12 to .72)</td>
<td>*rg = -.23 (-.49 to .05)</td>
<td>*rg = .00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .22 (.06 to .36)</td>
<td>*re = .15 (.01 to .30)</td>
<td>*re = -.07 (-.22 to .08)</td>
<td>*re = .01 (-.13 to .14)</td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td><em>rp = .14</em>*</td>
<td><em>rp = .33</em>*</td>
<td><em>rp = -.13</em>*</td>
<td><em>rp = -.14</em>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .15 (-.08 to .37)</td>
<td>*rg = .64 (.42 to .85)</td>
<td>*rg = -.21 (-.44 to .02)</td>
<td>*rg = -.21 (-.47 to .06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .14 (-.02 to .28)</td>
<td>*re = .11 (-.04 to .26)</td>
<td>*re = -.09 (-.24 to .07)</td>
<td>*re = -.07 (-.22 to .08)</td>
</tr>
<tr>
<td>Emotional control</td>
<td></td>
<td><em>rp = .33</em>*</td>
<td><em>rp = .41</em>*</td>
<td>*rp = -.01</td>
<td><em>rp = -.18</em>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .31 (.09 to .49)</td>
<td>*rg = .61 (.39 to .80)</td>
<td>*rg = -.02 (-.25 to .20)</td>
<td>*rg = -.36 (-.60 to -.12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .40 (.25 to .52)</td>
<td>*re = .27 (.11 to .41)</td>
<td>*re = .01 (-.15 to .16)</td>
<td>*re = -.04 (-.19 to .11)</td>
</tr>
<tr>
<td>Control over life</td>
<td></td>
<td>*rp = .01</td>
<td><em>rp = .25</em>*</td>
<td><em>rp = -.11</em></td>
<td>*rp = -.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = -.04 (-.29 to .19)</td>
<td>*rg = .48 (.24 to .71)</td>
<td>*rg = -.26 (-.50 to -.02)</td>
<td>*rg = -.07 (-.34 to .21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .07 (-.08 to .22)</td>
<td>*re = .10 (-.05 to .25)</td>
<td>*re = -.01 (-.15 to .15)</td>
<td>*re = -.06 (-.19 to .08)</td>
</tr>
<tr>
<td>Confidence</td>
<td></td>
<td><em>rp = .24</em>*</td>
<td><em>rp = .31</em>*</td>
<td><em>rp = -.11</em></td>
<td><em>rp = -.16</em>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .32 (.08 to .53)</td>
<td>*rg = .65 (.40 to .89)</td>
<td>*rg = -.11 (-.35 to .15)</td>
<td>*rg = -.22 (-.49 to .07)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .15 (-.01 to .30)</td>
<td>*re = .08 (-.07 to .23)</td>
<td>*re = -.14 (-.28 to .01)</td>
<td>*re = -.10 (-.25 to .05)</td>
</tr>
<tr>
<td>Confidence in abilities</td>
<td></td>
<td><em>rp = .23</em>*</td>
<td><em>rp = .40</em>*</td>
<td><em>rp = -.10</em></td>
<td><em>rp = -.19</em>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .22 (-.01 to .43)</td>
<td>*rg = .62 (.39 to .82)</td>
<td>*rg = -.10 (-.32 to .14)</td>
<td>*rg = -.30 (-.55 to .04)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .27 (.12 to .41)</td>
<td>*re = .23 (.08 to .38)</td>
<td>*re = -.09 (-.24 to .07)</td>
<td>*re = -.10 (-.25 to .05)</td>
</tr>
<tr>
<td>Interpersonal confidence</td>
<td></td>
<td><em>rp = .38</em>*</td>
<td><em>rp = .29</em>*</td>
<td><em>rp = .12</em></td>
<td><em>rp = -.10</em></td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .37 (.15 to .55)</td>
<td>*rg = .46 (.21 to .69)</td>
<td>*rg = .09 (-.15 to .32)</td>
<td>*rg = -.36 (-.63 to -.10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .41 (.27 to .53)</td>
<td>*re = .20 (.05 to .35)</td>
<td>*re = .12 (-.03 to .27)</td>
<td>*re = .06 (-.09 to .21)</td>
</tr>
<tr>
<td>Challenge</td>
<td></td>
<td><em>rp = .20</em>*</td>
<td><em>rp = .36</em>*</td>
<td>*rp = -.05</td>
<td>*rp = -.07</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .14 (-.11 to .36)</td>
<td>*rg = .56 (.31 to .78)</td>
<td>*rg = -.17 (-.42 to .08)</td>
<td>*rg = -.26 (-.55 to .02)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .24 (.09 to .38)</td>
<td>*re = .24 (.09 to .38)</td>
<td>*re = -.03 (-.12 to .18)</td>
<td>*re = -.04 (-.11 to .18)</td>
</tr>
<tr>
<td>Global mental toughness</td>
<td></td>
<td><em>rp = .26</em>*</td>
<td><em>rp = .40</em>*</td>
<td>*rp = -.08</td>
<td><em>rp = -.15</em>*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*rg = .20 (-.02 to .40)</td>
<td>*rg = .63 (.41 to .82)</td>
<td>*rg = -.16 (-.38 to .07)</td>
<td>*rg = -.31 (-.56 to -.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*re = .31 (.16 to .45)</td>
<td>*re = .22 (.08 to .38)</td>
<td>*re = -.04 (-.19 to .11)</td>
<td>*re = -.02 (-.17 to .13)</td>
</tr>
</tbody>
</table>

Note. *rp = phenotypic correlation. *rg = genetic correlation. *re = non-shared environmental correlation. Values appearing in parentheses represent the 95% confidence interval. All correlations with confidence intervals that do not include zero are significant at the .05 level.
*p < .05, two-tailed. **p < .01, two-tailed.
significant association emerging between self-defeating humor and Confidence in Abilities ($r_p = -0.19, p < .01$), and the lowest between self-defeating humor and Interpersonal Confidence ($r_p = -0.10, p < .05$).

Results from the bivariate behavioral genetic analysis are also shown in Table 5, and reveal that the phenotypic correlations noted above were primarily attributable to common genetic and common non-shared environmental factors. With regard to the positive humor styles, significant genetic correlations were noted between self-enhancing humor and all mental toughness variables. For affiliative humor, significant genetic correlations were observed with the mental toughness factors of Emotional Control, Confidence, and Interpersonal Confidence. For the negative humor styles, significant genetic associations were seen between aggressive humor and Control over Life, and between self-defeating humor and Emotional Control, Confidence in Abilities, Interpersonal Confidence, and global mental toughness. Several of the genetic correlations, particularly those between the positive humor styles and mental toughness, were quite large (e.g., $rg = .65$ between self-enhancing humor and Confidence, $rg = .64$ between self-enhancing humor and Control).

With regard to correlated environmental effects, significant non-shared environmental correlations were observed between the two positive humor styles and Commitment, Emotional Control, Confidence in Abilities, Interpersonal Confidence, Challenge, and global mental toughness. None of the non-shared environmental correlations between the negative humor styles and the mental toughness variables reached significance.

2.7 Discussion

The present study represents the first investigation of phenotypic correlations between humor styles and mental toughness, and it is also the first bivariate behavioral genetic study of relations between the two sets of constructs. The analyses were carried out to clarify ties between humor and human resiliency in order to test the traditional notion that humor always yields beneficial outcomes (e.g., Cousins, 1979; Lefcourt, 2001; Lefcourt & Martin, 1986).
The pattern of phenotypic correlations reported in the present study largely confirmed our initial predictions. For the positive humor styles, the expected positive associations between the mental toughness variables and the affiliative and self-enhancing humor styles were observed. It is possible that these correlations are a reflection of common underlying higher-order dimensions shared by the variables. Specifically, the positive associations between affiliative humor, self-enhancing humor, and the majority of the mental toughness factors may stem from the fact that most of these traits are also positively associated with the FFM factors of Extraversion, Openness to Experience, Agreeableness, and Conscientiousness, and negatively associated with Neuroticism (e.g., Horsburgh et al., 2009; Martin et al., 2003; Vernon, Martin, Schermer, & Mackie, 2008). These correlations may be indicative of an outgoing, inventive, attentive, and emotionally stable personality. Furthermore, both the positive humor styles and mental toughness factors have been linked to physical and psychological well-being, as well as to better coping (e.g., Erickson & Feldstein, 2007; Frewen et al., 2008; Kaiseler et al., 2009, Maddi et al., 2006), which suggests that this prosocial type of personality may have positive health implications (Martin et al., 2003). In particular, it may be the case that mentally tough individuals make conscious use of both affiliative and self-enhancing humor styles, which allows them to gain and maintain social support—a buffer against psychological and physiological distress in itself (e.g., Uchino, Cacioppo, & Kiecolt-Glaser, 1996)—and to view the world in an optimistic way. In turn, positive health-related outcomes may result.

With regard to the negative humor styles, both aggressive and self-defeating humor exhibited negative, although not always significant, correlations with the mental toughness factors, hence largely supporting our predictions. As with the positive humor styles, these negative associations may stem from the higher-order personality factors common to both constructs, as well as from the similar outcomes shared by both. In particular, the phenotypic correlations observed in the present study may be a result of the fact that, although mental toughness has been shown to correlate negatively with the FFM dimension of Neuroticism and positively with the remaining four FFM factors, the negative humor styles have largely exhibited the opposite pattern of correlations in previous investigations (e.g., Horsburgh et al., 2009; Martin et al., 2003; Vernon, Martin,
Schermer, & Mackie, 2008). These differing patterns of associations suggest that while mental toughness is indicative of a prosocial type of personality, the negative humor styles are more reflective of emotional instability and decreased sociability. The fact that mental toughness has been linked to positive physical and psychological outcomes, whereas the opposite pattern of associations has been observed with negative humor styles—particularly with self-defeating humor—may further suggest that an emotionally unstable personality has negative implications for an individual’s overall well-being (e.g., Kaiseler et al., 2009; Martin et al., 2003). Specifically, it may be the case that individuals who lack mental toughness are more prone to employing aggressive and self-defeating humor, which creates a social distance between themselves and others, and may have deleterious implications for their sense of self-worth. Consequently, negative outcomes may result.

Apart from these predicted correlations, additional unexpected associations, or lack thereof, were noted. For instance, no significant relation was observed between affiliative humor and the mental toughness factor of Control over Life, which is characterized by a sense of influence over the direction of one’s life course, and a conviction that one’s successes stem from one’s own efforts (Clough et al., 2001). Both of these variables are broadly adaptive given their respective associations with beneficial outcomes and effective coping (e.g., Kaiseler et al., 2009; Kuiper, Grimshaw, Leite, & Kirsh, 2004; Nicholls, Polman, Levy, & Backhouse, 2008), which would typically suggest a positive association between them. With that said, the general notion of control, as expressed in an interpersonal context such as the one ideal for the use of affiliative humor, has exhibited associations with decreased relationship satisfaction and poor peer evaluations (e.g., Sanders & Malkis, 1982; Zak, Hunton, Kuhn, & Parks, 1997). Consequently, it may be the case that while feelings of control or a desire for control are beneficial on an individual level, they may be deemed threatening in a social context. As a result it is possible that although individuals who use an affiliative humor style may like to feel in control, they do so cautiously and selectively given their interpersonal interests. As a result of this complex role of control, the relation between Control over Life and affiliative humor may have been attenuated.
A further unexpected correlation was the significant positive association observed between the aggressive humor style and Interpersonal Confidence. However, in considering existing findings pertaining to interpersonally aggressive individuals, a relation between these two variables is not entirely unusual. For instance, it has been shown that individuals who are aggressive or socially manipulative are often popular among their peers, which instills in them a sense of social competence (e.g., Andreou, 2006; Dijskra, Lindenberg, Verhulst, Ormel, & Veenstra, 2009). It has also been reported that individuals who have a history of interpersonally aggressive or bullying behavior tend to view themselves as being socially competent and dominant in interpersonal scenarios (Arsenio & Lemierse, 2001; Björkqvist, Ekman, & Lagerspetz, 1982). Thus, it is possible that, in the present study, participants with a greater propensity toward aggressive humor were more likely to rate themselves as being confident in social contexts.

Results from the bivariate behavioral genetic analyses also supported our predictions. Specifically, the phenotypic correlations that emerged between the constructs were largely attributable to correlated genetic effects, and secondarily, in many cases, to correlated non-shared environmental effects. These results suggest the role of common heritability and unique learning experiences in the emergence of individual differences in mental toughness and humor styles. The finding of an important genetic component in these correlations also suggests that there may be an evolutionary basis to the association between humor styles and mental toughness (for evolutionary theories of humor, see Gervais & Wilson, 2005; Weisfeld, 2006).

The absence of significant non-shared environmental influences underlying the phenotypic correlations between the negative humor styles and mental toughness was an unexpected result. It suggests that there is no learned component accounting for the observed association between the traits, and therefore puts an emphasis on shared genetic factors. The finding is particularly interesting given previous research that has attributed individual differences in the negative humor styles at the univariate level to learning experiences only (Vernon, Martin, Schermer, & Mackie, 2008).
Through our study, we have added further support to the multidimensional theory of humor by showing that not all components of humor expression can be linked to positive outcomes. Specifically, we contributed evidence to support the notion that both positive and negative humor styles do exist, and that these humor styles are uniquely associated with factors of human resiliency. Individuals exhibiting either affiliative or self-enhancing humor are more likely to also yield high scores on mental toughness, thereby demonstrating greater resistance against life’s adversities. In contrast, those habitually employing aggressive or self-defeating humor show reduced mental toughness, and therefore a vulnerability to stress and challenge. Behavioral genetic results appear to indicate that many of these relations may be rooted in common genetic factors and, to a lesser, extent, in common non-shared environmental factors.

Although it is possible that mental toughness dictates the humor style that one assumes, it is also feasible that the propensity to engage in different humor styles may allow for the development of greater or reduced mental toughness. Future studies may wish to examine this issue of causality to clarify the direction of influence. Moreover, given previous findings of cultural differences in behavioral genetic analyses of humor styles, it would be useful to replicate the present findings on humor styles and mental toughness in samples of different nationalities.

### 2.8 References


investigation of humor styles and their correlations with the Big-5 personality dimensions. *Personality and Individual Differences, 44*, 1116-1125.


Chapter 3

3 Relations Between Humor Styles and the Dark Triad Traits of Personality

In early studies pertaining to humor, it was noted that varying uses of humor (e.g., perspective-taking, sarcastic) had vastly different effects on psychological well-being (e.g., Allport, 1961; Freud, 1928; Maslow, 1954). However, these unique uses of humor were not formalized into a unified framework until the pivotal work of Martin, Puhlik-Doris, Larsen, Gray, and Weir (2003), in which the existence of four distinct humor styles was proposed: affiliative, self-enhancing, aggressive, and self-defeating. Affiliative humor involves the use of joking and friendly humorous banter to facilitate interpersonal bonds. Self-enhancing humor is characterized by the ability to find amusement in life’s stresses. Aggressive humor entails the use of sarcasm and put-downs with the aim of hurting or manipulating others. Lastly, self-defeating humor represents individuals’ attempts to amuse others by making disparaging remarks about the self. The introduction of these four humor styles has facilitated investigations of the benefits and detriments of various uses of humor, and has allowed for the systematic analysis of humor in prosocial and antisocial contexts (e.g., Hodson, Rush, & MacInnis, 2010; Klein & Kuiper, 2006; Veselka, Schermer, Martin, & Vernon, 2010).

Though assessed in association with a variety of personality variables, the four humor styles have not yet been examined as potential correlates of the Dark Triad of personality—a collection of related sub-clinical, socially aversive traits (Paulhus & Williams, 2002). Specifically, this antisocial trinity is composed of narcissism, as defined by excessive self-love and feelings of superiority; psychopathy, as characterized by high thrill-seeking behaviors paired with low empathy; and Machiavellianism, as exhibited through cold and manipulative behaviors. Although representing distinct maladaptive tendencies, all three traits appear to reflect disagreeableness or a general sense of antagonism at their core (Paulhus & Williams, 2002). With that said, the traits have also exhibited associations with successes in interpersonal, romantic, and organizational contexts, although many of these outcomes tend to have short-term benefits only (e.g.,
Furnham, 2007; Jonason, Li, Webster, & Schmitt, 2009; Paulhus, 1998; Robins & Beer, 2001). These findings appear to reflect the opportunistic and manipulative tendencies of individuals who epitomize the Dark Triad traits (Austin, Farrelly, Black, & Moore, 2007; Blickle, Schlegel, Fassbender, & Klein, 2006; Jonason, Li, & Teicher, 2010; Jonason & Tost, 2010). That is, those who obtain high scores on these traits may employ duplicitous and exploitative strategies that are initially perceived as being personable or charismatic in order to reach personal goals. Given these complex relations that exist between the Dark Triad traits and interpersonal tendencies, it is of particular interest to assess how individuals possessing these traits may employ humor—a social strategy in and of itself (e.g., Bergen, 2007; Guerin, 2003). A clarification of the relations between the Dark Triad traits and the four humor styles in particular may shed light on the potentially maladaptive manner in which those exhibiting Dark Triad traits interact with others under the veil of congeniality.

3.1 Humor Styles and the Dark Triad: Common Personality Correlates

To date, the humor styles and the Dark Triad traits have not been studied in conjunction with one another. However, they have been assessed in relation to common personality factors and traits. Results from these existing investigations, therefore, can be used to gain insight into the potential manner in which the two sets of constructs may be related.

The four humor styles and the Dark Triad traits have both been examined in relation to the FFM factors. These five factors make up the conventional structure of personality, which proposes that all individual differences can be classified into five overarching personality dimensions: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness (Costa & McCrae, 1992). Existing studies show that the two positive humor styles—affiliative and self-enhancing—are positively associated with Extraversion and Openness to Experience (Martin et al., 2003; Vernon, Martin, Schermer, & Mackie, 2008). Additionally, these studies reveal that self-enhancing humor correlates positively with Agreeableness and Conscientiousness, and negatively with Neuroticism. Assessments of the two negative humor styles—aggressive and self-defeating—reveal that these constructs are negatively correlated with
Agreeableness and Conscientiousness, and positively associated with Neuroticism (Martin et al., 2003; Vernon, Martin et al., 2008). A small but significant positive association has also been reported between the two negative humor styles and the FFM factor of Openness to Experience (Vernon, Martin et al., 2008). These findings suggest that the two positive humor styles tend to be more reflective of adaptive tendencies, while the two negative humor styles may be more maladaptive in nature.

Studies of the Dark Triad traits and the FFM model have reported that Machiavellianism and psychopathy both exhibit negative correlations with Agreeableness and Conscientiousness, as well as positive associations with Neuroticism (Jakobwitz & Egan, 2006; Lee & Ashton, 2005; Vernon, Villani, Vickers, & Harris, 2008). While narcissism has also been shown to correlate negatively with Agreeableness, it further relates positively to Extraversion (Jakobwitz & Egan, 2006; Lee & Ashton, 2005; Vernon, Villani, et al. 2008). In one study, narcissism was also negatively associated with Conscientiousness (Jakobwitz & Egan, 2006). Based on these trends, it seems to be the case that, although all three Dark Triad traits appear to represent socially malevolent tendencies, narcissism seems to have more prosocial leanings relative to Machiavellianism and psychopathy.

In addition to being assessed in conjunction with higher-order personality dimensions, the four humor styles and the Dark Triad traits have both been examined alongside variables relevant to trait emotional intelligence (trait EI). Trait EI represents a collection of emotion-related facets that reflect individuals’ self-perceived emotional abilities (Petrides, Pita, & Kokkinaki, 2007). Specifically, the construct is defined by four key factors: Wellbeing, Self-Control, Emotionality and Sociability. The Wellbeing factor is made up of facets that allow for general resilience, the Self-Control factor is made up of facets that contribute to self-regulation in an emotional context, the Emotionality factor is defined by facets that play a role in emotional stability, and the Sociability factor contains facets that facilitate successful interpersonal interactions (Petrides, 2009). These factors have been shown to correlate negatively with the FFM factor of Neuroticism, and positively with the remaining FFM dimensions (Petrides et al., 2010). In their assessment of the humor styles in conjunction with trait EI, Vernon et al. (2009) reported significant
positive correlations between the positive humor styles and the four trait EI factors, and significant negative correlations between these same trait EI factors and the negative humor styles. Additional investigations have also reported negative correlations between overall trait EI and the Dark Triad traits of psychopathy and Machiavellianism (Ali, Amorim, & Chamorro-Premuzic, 2009). While the Dark Triad variable of narcissism has not been explored directly in the context of trait EI, studies have shown that it demonstrates negative associations with some constructs relevant to trait EI, such as emotional regulation (Hendin & Cheek, 1997), and empathy (Asada, Lee, Levine, & Ferrara, 2004). At the same time, narcissism has exhibited both positive and negative associations with resilience (Heisel, Links, Conn, van Reekum, & Flett, 2007; Wallace, Ready, & Weitenhagen, 2009), and it has also been shown to correlate positively with sociability (Akehurst & Thatcher, 2010). Consequently, the construct appears to be defined by both prosocial and antisocial tendencies.

3.2 Present Study

Given that correlations between humor styles and the Dark Triad traits have not yet been explored, the present study aims to determine whether any relations exist between them. Potential associations are particularly of interest because they may shed light on the interpersonal tactics and styles employed by individuals exhibiting Dark Triad traits, while also clarifying adaptive or maladaptive applications of the four humor styles.

To assess potential associations, correlations between the four humor styles and the three Dark Triad traits were assessed. The results from this analysis were predicted to show that those who score higher on psychopathy and Machiavellianism may also exhibit a greater tendency to adopt negative humor styles. This prediction was based on the observation that psychopathy, Machiavellianism, aggressive humor, and self-defeating humor all share similar Big-Five correlates—low Agreeableness, low Conscientiousness, and high Neuroticism (e.g., Vernon, Martin et al., 2008; Vernon, Villani et al., 2008). Further, all four of these variables have been shown to correlate negatively with trait EI (Ali et al., 2009; Vernon et al., 2009). Consequently, Machiavellianism, psychopathy, and the two negative humor styles appear to be characteristic of uncooperative, emotionally unstable, and undisciplined individuals. Conversely, it was predicted that
those scoring high on narcissism would show a greater tendency to use positive humor styles. This prediction stems from the observation that narcissism, affiliative humor, and self-enhancing humor are all positively associated with the FFM dimension of Extraversion (e.g., Vernon, Martin et al., 2008; Vernon, Villani et al., 2008), as well as with relevant trait EI constructs, including sociability (Akehurst & Thatcher, 2010). As a result, these traits appear to be reflective of personable and potentially resilient individuals. With that said, additional correlations between the Dark Triad trait of narcissism and the negative humor styles were also considered plausible in light of previous investigations reporting negative correlations between narcissism and variables such as empathy and the FFM dimension of Agreeableness (Asada et al., 2004; Vernon, Villani et al., 2008).

3.3 Method

3.3.1 Participants

Participants were 114 pairs of adult monozygotic (MZ) and dizygotic (DZ) twins: 18 male pairs and 96 female pairs. They ranged in age from 17 to 92 years (\( M = 41.36, SD = 17.51 \)), and lived in Canada or the United States. The participants represented a convenience sample in the present investigation given that twinship was not required for the intended analysis. The twin participants were a sub-sample of individuals who had taken part in previous research projects conducted by our laboratory.

3.3.2 Materials

3.3.2.1 Humor Styles Questionnaire (HSQ)

The 32-item HSQ (Martin et al., 2003; Appendix A) is a self-report instrument used to assess individual differences in the two positive (affiliative, self-enhancing) and two negative (aggressive, self-defeating) humor styles. Specifically, each humor style was assessed via 8 self-reflective items, to which participants responded using a 7-point Likert scale (where 1 = totally disagree and 7 = totally agree). This measure has demonstrated sound psychometric properties (Martin et al., 2003).
3.3.2.2 **MACH-IV**

The MACH-IV (Christie & Geis, 1970; Appendix B) was administered to assess individual differences in Machiavellianism. This self-report measure consists of 20 items presented as self-reflective statements. Participants responded to the items by indicating the extent to which they agreed with each statement on a 5-point Likert scale (where 1 = disagree strongly and 5 = agree strongly). Prior studies have noted that the MACH-IV possesses good psychometric properties (e.g., Fehr, Samsom, & Paulhus, 1992; Williams, Hazleton, & Renshaw, 1975). It is also the conventional measure of Machiavellianism employed in assessments of the Dark Triad traits (Jones & Paulhus, 2009).

3.3.2.3 **Narcissistic Personality Inventory (NPI)**

The NPI (Raskin & Hall, 1979; Appendix C) consists of 40 forced-choice items measuring individual differences in sub-clinical narcissism. For each item on the NPI, participants must choose between a narcissistic statement (e.g., “I like to be the center of attention”) and a non-narcissistic alternative (e.g., “I prefer to blend in with the crowd”). In scoring the measure, participants receive one point for each narcissistic statement selected, and therefore higher scores are indicative of higher trait narcissism. The NPI has been shown to be a reliable and valid measure of narcissism in non-clinical samples (e.g., Raskin & Hall, 1981; Raskin & Terry, 1988; Watson, Grisham, Trotter, & Biderman, 1984).

3.3.2.4 **Self-Report Psychopathy Scale (SRP-III)**

The SRP-III (Paulhus, Neumann, & Hare, 2009) is a self-report instrument used to measure individual differences in sub-clinical psychopathy. Although the measure typically comprises 64 items, two items were removed due to ethical concerns: “I have never tried to force someone to have sex” (item 18), and “I like to have sex with people I barely know” (item 39). To complete the measure, participants were asked to respond to each item by indicating the extent to which they agreed with it via a 5-point Likert scale (where 1 = disagree strongly and 5 = agree strongly). Psychometric data available for the SRP-III indicate that it is a reliable measure of sub-clinical psychopathy (Lilienfeld, & Fowler, 2006).
3.3.3 Procedure

Participants in the present investigation were adult twins who had initially been recruited in 2006 via newspaper advertisements, to which they responded by telephone or by e-mail. At this initial contact, they were provided with details about the study and about their potential participation in the investigation. Individuals who agreed to take part following this introductory briefing were sent a package through standard mail, which contained the HSQ, a zygosity measure, and other questionnaires not pertinent to the current study. In 2007, a subset of these twins was invited to complete the Dark Triad questionnaires and a number of other questionnaires not relevant to this report. In each mail-out, participants were asked to complete the questionnaires individually, without the assistance of their twin. Upon completing the questionnaires, participants returned them to the laboratory via standard mail using self-addressed stamped envelopes provided to them. In each mail-out, participants received $20.00 taking part in the investigation, and they were entered in a draw to win one of 10 prizes of $100.00. Over 96% of twins who initially agreed to take part in the 2007 mail-out returned their completed questionnaires.

3.3.4 Analysis

Although most of the participants completed all of the items on the four questionnaires, on rare occasions an item was left blank. In these situations, the missing data were replaced with the average of the scale used (Downey & King, 1998). For the purpose of analysis, the items on the HSQ were converted into four scores, one for each of the four humor styles. The remaining questionnaires yielded one general score each, corresponding to each of the Dark Triad traits.

Due to our relatively small sample of twins, we do not report any behavioral genetic analyses of our data. Instead, prior to analyses, one member of each twin pair was arbitrarily designated as Twin 1 and their co-twin was designated as Twin 2. The scores obtained from all of the Twin-1 participants (MZ twins and DZ twins combined) and from all of the Twin-2 participants (MZ twins and DZ twins combined) were then subjected to separate correlational analyses using the standard Pearson product-moment procedure. This division of the sample was carried out to overcome the statistical
dependence that exists between members of the same family, although we acknowledge that the Twin-1 and Twin-2 samples do not provide completely independent replication of the reported findings.

3.4 Results

Descriptive statistics pertaining to the HSQ, MACH-IV, NPI, and SRP-III are presented in Table 6. For each measure, the mean value reported represents the average score of the sample on the measure’s Likert scale. Given that participants could only obtain a score of 0 or 1 on each item of the NPI, the mean response for the scale can be interpreted as the average proportion of narcissistic items that were endorsed.

Table 6: Descriptive Statistics for the Humor Styles and the Dark Triad Traits Observed in Twin-1 and Twin-2 Groups

<table>
<thead>
<tr>
<th>Scales</th>
<th>Twin 1</th>
<th>Twin 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>HSQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>5.42</td>
<td>1.19</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>4.74</td>
<td>1.14</td>
</tr>
<tr>
<td>Aggressive</td>
<td>3.08</td>
<td>1.03</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>3.24</td>
<td>1.12</td>
</tr>
<tr>
<td>MACH-IV</td>
<td>2.45</td>
<td>0.40</td>
</tr>
<tr>
<td>NPI</td>
<td>0.38</td>
<td>0.17</td>
</tr>
<tr>
<td>SRP-III</td>
<td>2.00</td>
<td>0.36</td>
</tr>
</tbody>
</table>

Note. $M$ = mean. $SD$ = standard deviation. HSQ = Humor Styles Questionnaire measuring humor styles. MACH-IV measuring Machiavellianism. NPI = Narcissistic Personality Inventory measuring narcissism. SRP-III = Self-Report Psychopathy Scale measuring psychopathy.

Correlations between the humor styles and the Dark Triad traits are presented for the Twin-1 and Twin-2 samples in Table 7. As predicted, psychopathy and Machiavellianism were significantly and positively associated with the negative humor styles, but showed no significant correlation with the positive humor styles. Among the Twin-1 participants, narcissism correlated significantly and positively with affiliative and self-enhancing humor, as predicted. Narcissism also correlated significantly and positively with affiliative humor among the Twin-2 participants, but its correlation with self-enhancing humor in this group was not significant. In both the Twin-1 and Twin-2 samples, narcissism showed no significant correlation with either of the negative humor styles.
Table 7: Phenotypic Correlations Between the Humor Styles and the Dark Triad Traits in Twin-1 and Twin-2 Groups

<table>
<thead>
<tr>
<th>Humor styles</th>
<th>Dark Triad traits</th>
<th>Machiavellianism</th>
<th>Narcissism</th>
<th>Psychopathy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Twin 1</td>
<td>Twin 2</td>
<td>Twin 1</td>
<td>Twin 2</td>
</tr>
<tr>
<td>Affiliative</td>
<td>-.03</td>
<td>.10</td>
<td>.21 *</td>
<td>.18 *</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>-.15</td>
<td>.03</td>
<td>.16 *</td>
<td>.10</td>
</tr>
<tr>
<td>Aggressive</td>
<td>.42 ***</td>
<td>.38 ***</td>
<td>.05</td>
<td>.06</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>.29 ***</td>
<td>.28 **</td>
<td>.07</td>
<td>-.12</td>
</tr>
</tbody>
</table>

*Note. A total of 114 participants were assessed in each twin group.  
* p < .05, one-tailed. ** p < .01, one-tailed. *** p < .001, one-tailed.

3.5 Discussion

The present study investigated correlations between humor styles and the Dark Triad variables. The majority of our predictions were supported. Psychopathy and Machiavellianism correlated positively with both negative humor styles, while narcissism correlated positively with both positive humor styles in one of our samples and correlated positively with affiliative humor only in the other sample. Moreover, narcissism showed no correlations with the negative humor styles, and psychopathy and Machiavellianism showed no correlations with the positive humor styles.

The correlations found between Machiavellianism, psychopathy, and the negative styles of humor were predicted, based on the fact that the four constructs share several higher-order and lower-order personality correlates (e.g., Vernon, Martin et al., 2008; Vernon et al., 2009). The correlations between psychopathy, Machiavellianism and aggressive humor were particularly strong and may be attributable to the key components of these three constructs. Specifically, aggressive humor is defined, in part, by the intention to manipulate others through disparaging jokes or the threat of such jokes (Martin et al., 2003). Machiavellianism, in turn, is largely characterized by interpersonally manipulative behaviors that are carried out to ensure personal success. Thus, both constructs comprise manipulative elements and this suggests that Machiavellian individuals may employ aggressive humor as a way of controlling others for personal gain.

An element of the aggressive humor style that is more relevant to psychopathy is the notion that it represents a tendency to express humor impulsively, without regard for its
potential impact on others. These components of impulsivity and social unawareness echo theories of psychopathy, which suggest that psychopathic behaviors stem from poor behavioral inhibition (Gray, 1970) and an inability to comprehend the emotion of others (e.g., Mullins-Nelson, Salekin, & Leistico, 2006). Thus, the correlation that we observed between psychopathy and aggressive humor may be attributable to the fact that individuals with high scores on sub-clinical psychopathy employ aggressive humor because they are oblivious to or unconcerned about its impact on others.

As predicted, the only Dark Triad trait to show an association with a positive humor style was narcissism, which correlated positively with affiliative humor in both of our samples, and with self-enhancing humor in one sample. The association with affiliative humor was predicted based on the number of personality correlates shared by the two constructs (e.g., Vernon, Martin et al., 2008; Vernon et al., 2009). In particular, narcissism and affiliative humor have both been linked to the FFM factor of Extraversion, which implies that both entail behaviors such as assertiveness, gregariousness, and interpersonal warmth geared towards creating interpersonal bonds. Consequently, narcissistic individuals may further themselves, heighten their self-esteem, and increase their popularity by building relations with others in part through the use of affiliative styles of humor.

The predicted association between narcissism and self-enhancing humor was observed in one of our two samples. Previous studies have linked narcissism to greater optimism (e.g., Hickman et al., 1996), and to less intense emotional responding to negative life events (e.g., Zuckerman & O’Loughun, 2009)—all qualities reminiscent of the self-enhancing humor style. The lack of a correlation between these traits in our second sample may simply reflect sampling error although, despite the typically optimistic persona of narcissistic individuals, they have also been shown to become hostile when their sense of self is threatened (e.g., Witte, Callahan, & Perez-Lopez, 2002). Consequently, their ability to maintain a humorous perspective does not appear to extend to all aspects of their life, which may mute or negate the association between narcissism and the self-enhancing humor style. We are currently exploring this further in additional samples to see whether we can replicate a positive correlation between narcissism and self-enhancing humor.
3.6 References


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Chapter 4

4 A Behavioral Genetic Study of Relations Between Humor Styles and the Six HEXACO Personality Factors

Over the past several years, there has been a dramatic shift in the way psychologists perceive humor. No longer viewed as a one-dimensional construct with consistently beneficial effects on physical and psychosocial well-being (e.g., Lefcourt, 2001; Martin, 2001), humor is now defined by a complex collection of traits that relate to both beneficial and deleterious outcomes (Martin, Puhlik-Doris, Larsen, Grey, & Weir, 2003). Most recently, the notion of humor styles—different ways of expressing and using humor—has attracted a substantial empirical following. While a considerable portion of the emerging research has focused on better understanding these humor styles (e.g., Chen & Martin, 2007; Frewen, Brinker, Martin, & Dozois, 2008; Veselka, Schermer, Martin, & Vernon, 2010), far fewer studies have centered upon situating these styles within various frameworks of human personality, and understanding their etiology in the context of these frameworks.

A small body of research is available that examines humor styles in conjunction with the Five-Factor Model (FFM)—the conventional structure of human personality (e.g., Vernon, Martin, Schermer, & Mackie, 2008). However, studies assessing different and more elaborate structures of personality in relation to humor do not exist. Given that there is still a lack of consensus as to the true structure of personality, and a continuing debate regarding the number of higher-order dimensions that can account most accurately for the variance in human personality (e.g., Ashton, Lee, Goldberg, and de Vries, 2009; Eysenck, 1992; Lee & Ashton, 2004; Paunonen & Jackson, 2000), this restricted focus on the FFM in personality research is not justified. With this broad issue in personality research in mind, the present study focuses on humor styles in relation to the HEXACO model—an alternative structure of personality comprising six rather than five higher-order dimensions (Ashton & Lee, 2001). In addition to reporting the first behavioral genetic investigation of the HEXACO model, our study assesses the phenotypic correlations between the four humor styles and the six dimensions of this model. Further, by using
data obtained from a sample of twins, the study explores the extent to which any obtained phenotypic correlations are attributable to correlated genetic and/or correlated environmental factors.

4.1 Personality Models and the HEXACO Factors

Throughout most of the 20th century, little consensus existed regarding the structure of human personality. Several models were put forth, each proposing varying numbers of higher-order dimensions that could account for all individual differences (e.g., Cattell, 1946; Eysenck, 1947; Wiggins, 1979). However, with the exception of Eysenck’s P-E-N model (Eysenck, 1947), none gained an especially strong following. By the 1980s, however, the research community began to embrace the idea that variation in human personality was attributable to five broad, roughly orthogonal dimensions (e.g., Goldberg, 1990; Saucier & Goldberg, 1996). Collectively named the "Big Five" (Goldberg, 1990), these factors were termed: Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Intellect/Imagination. Costa and McCrae (1985) incorporated these five dimensions into their personality questionnaire research, which led them to propose the existence of the FFM—a model very similar, though not identical, to the Big Five model. The researchers named the FFM factors Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience and operationalized them in the NEO Personality Inventory (NEO-PI; Costa & McCrae, 1985). These factors have since become ubiquitous in assessments of personality structure and traits (e.g., O’Connor, 2002; John, Naumann, & Soto, 2008; Judge, Heller, & Mount, 2002; Malouff, Thorsteinsson, & Schutte, 2005; McCrae, Costa, Del Pilar, Rolland, & Parker, 1998).

Since the emergence of five-factor models of personality, lexical investigations carried out in a number of different languages have pointed to the potential existence of more elaborate personality models. Specifically, studies conducted with German (Angleitner & Ostendorf, 1989), Dutch (De Raad, 1992), Korean (Hahn, Lee, & Ashton, 1999), and French (Boies, Lee, Ashton, Pascal, & Nicol, 2001) sample have all noted the existence of a sixth factor of personality in addition to the conventional five—one that touches upon sincerity and modesty. Moreover, studies carried out in Hungarian and Italian have confirmed a five-factor solution of human personality structure, but have defined the fifth
factor as reflecting integrity and trustworthiness rather than the conventional Intellect/Imagination or Openness to Experience dimensions (e.g., De Raad & Szirmak, 1994; Di Blas & Forzi, 1998). Taking these results into account, Ashton and Lee (2001) proposed the HEXACO model of personality, which is composed of six distinct trait dimensions. Five of these dimensions are conceptually similar to those of the FFM (Extraversion, Agreeableness, Conscientiousness, Emotionality, and Openness to Experience). The sixth factor is labeled Honesty-Humility, and is defined by characteristics such as modesty, fairness, and sincerity (Lee & Ashton, 2004).

Although behavioral genetic analyses of the HEXACO model have not yet been undertaken, the FFM dimensions of personality have been investigated using this approach, the results of which shed some light on the potential etiology of at least some of the HEXACO factors. Across the majority of the available studies, there is a consensus that individual differences in the FFM dimensions are attributable primarily to genetic and non-shared environmental factors, with some negligible contribution from the shared environment (e.g., Jang, Livesley, & Vernon, 1996; Jang, McCrae, Angleitner, Riemann, & Livesley, 1998; Loehlin, 1992; Riemann, Angleitner, & Strelau, 1997). Here, non-shared environmental factors represent things that one twin experiences but their co-twin does not experience, such as having different friends or being assigned to different teachers at school. In contrast, shared environmental factors reflect experiences that both twins have in common, such as growing up in the same homes or going on vacations together with their parents. Further research by Loehlin, McCrae, Costa, and John (1998) has shown that the FFM dimensions are all approximately equally heritable, and that these heritabilities do not differ significantly across sexes. Most recently, Johnson, Vernon, and Feiler (2008) reviewed all behavioral genetic studies of the FFM and related personality traits. They found 145 such studies, carried out between 1955 and 2007, and their review confirmed that additive genetic and non-shared environmental factors accounted for the majority of the variance in these traits. Their review, and the other investigations referred to above, however, did not include the sixth HEXACO factor of Honesty-Humility, which does not have an approximate analogue in five-factor personality structures, and therefore information on the genetic and/or environmental etiology of this factor is currently not available.
4.2 Humor Styles and Their Personality Correlates

Humor styles were first introduced in early psychological research, where it was observed that certain uses of humor (e.g., perspective-taking, affiliative) were linked to positive psychological functioning, whereas other forms of humor (e.g., sarcastic, disparaging) were associated with more negative outcomes (e.g., Allport, 1961; Freud, 1928; Maslow, 1954). However, it was Martin et al. (2003) who formally proposed the existence of distinct humor styles—two positive and two negative—after noting that previous empirical studies had found only weak associations between measures of humor and mental health variables (e.g., Kuiper & Martin, 1998; Thorson, Powell, Sarmany-Schuller, & Hampes, 1997), and inconsistent relations between humor and physical health constructs (Martin, 2001). Specifically, Martin et al. (2003) proposed the existence of affiliative, self-enhancing, aggressive, and self-defeating styles of humor.

Affiliative humor is a non-hostile form of humor that is intended to amuse others as a way of facilitating relations. Self-enhancing humor sees individuals finding amusement in life's hardships and incongruities, allowing them to maintain a humorous outlook even when faced with adversity. Aggressive humor is a form of disparaging humor that entails the use of sarcasm and put-downs, and which can be used to manipulate others. Lastly, self-defeating humor involves saying funny things at one's own expense in order to gain approval, and laughing along with others when one is being ridiculed. Only the affiliative and self-enhancing humor styles have been linked positively to psychological well-being, whereas aggressive and self-defeating humor styles tend to be negatively associated with well-being and relationship satisfaction (e.g., Kazarian & Martin, 2006; Martin, 2007; Martin et al., 2003).

In developing these humor styles, Martin et al. (2003) assessed associations between the humor styles and the FFM dimensions of personality in order to situate these constructs in the conventional framework of personality. The researchers found that the affiliative and self-enhancing humor styles were positively associated with Extraversion and Openness to Experience, with self-enhancing humor further correlating positively with Agreeableness and negatively with Neuroticism. Additionally, they noted significant negative correlations between the aggressive and self-defeating humor styles and the
FFM factors of Agreeableness and Conscientiousness, as well as significant positive associations between these same humor styles and FFM model’s Neuroticism dimension. These findings were largely replicated by Vernon, Martin, Schermer, and Mackie (2008).

Given the relatively novel status of the HEXACO model, it has not yet been assessed in relation to the humor styles. Existing research examining correlations between the FFM dimensions and the four styles of humor does shed some light on the manner in which the HEXACO factors, excluding Honesty-Humility, would be expected to relate to the humor styles. Such conclusions are possible in light of the significant associations that exist between these five HEXACO factors and their corresponding FFM dimensions (Ashton & Lee, 2009). However, this line of research does not elucidate the manner in which the sixth factor of Honesty-Humility would be associated with the four humor styles in recognition of the fact that this dimensions is not represented in the FFM (Ashton & Lee, 2005).

Previous assessments of variables characteristic of the Honesty-Humility dimensions have reported positive associations between well-being and constructs such as fairness (e.g., Sparr & Sonnentag, 2008; Tortia, 2008), modesty, (Park, Peterson, & Seligman, 2004), and low materialism (e.g., Burroughs, & Rindfleisch, 2002; Kashdan & Breen, 2007). Additional studies of well-being have linked this outcome variable to the use of positive humor styles, while simultaneously noting that negative humor styles tend to be associated with diminished well-being (e.g., Kazarian & Martin, 2006; Martin et al., 2003). Such findings suggest that positive relations may exist between the positive humor styles and the Honesty-Humility factor, and that negative correlations may be found between the negative humor styles and this same HEXACO factor. These suggestions are, at this point, quite speculative, however, and require empirical inquiry.

4.3 Previous Behavioral Genetic Analyses of Humor Styles

Early research on the behavioral genetic origins of variation in humor focused on humor appreciation, which assessed the extent to which participants perceived target material as being funny. Results from these studies indicated that individual differences in humor appreciation were primarily attributable to shared and non-shared environmental factors
(e.g., Cherkas, Hochberg, MacGregor, Snieder, & Spector, 2000; Nias & Wilson, 1977; Wilson, Rust, & Kasriel, 1977). Later assessments of humor, however, noted that the construct of humor appreciation, though legitimate, was not related to one’s ability to produce or to engage in humor, and was therefore not a valid representation of sense of humor or humor style (Köhler & Ruch, 1996). As such, subsequent behavioral genetic research on humor shifted to assess individual differences in sense of humor, which represents the extent to which individuals notice and enjoy humor, maintain a cheerful outlook, and laugh and smile frequently (e.g., Martin, 1996). Findings from these studies suggested that variation in sense of humor is partly heritable (Loehlin & Nichols, 1976), and attributable to a combination of genetic and non-shared environmental factors (e.g., Manke, 1998).

Most recently, behavioral genetic research on humor has begun to focus on humor styles. Vernon, Martin, Schermer, Cherkas et al. (2008) carried out the seminal study assessing the potential etiology of humor styles, and found that individual differences in all of the styles were accounted for by genetic, shared, and non-shared environmental factors. Specifically, they observed that the affiliative and self-enhancing humor styles were primarily influenced by genetic and non-shared environmental effects, with only a negligible contribution from shared environmental factors. Variation in the aggressive and self-defeating styles, on the other hand, was mainly attributable to shared and non-shared environmental factors. The researchers further carried out a bivariate behavioral genetic investigation to assess the extent to which phenotypic correlations between the four humor styles and the FFM factors of personality were attributable to common genetic and/or common environmental factors. Results revealed that the obtained phenotypic correlations were entirely accounted for by correlated genetic and correlated unique environmental factors. No significant shared environmental correlations were noted between the variables. These results suggest that both the humor styles and the FFM dimensions share some of the same genetic and non-shared environmental determinants.

Bivariate behavioral genetic studies have not yet been carried out to assess the humor styles in conjunction with personality structures other than the FFM, meaning that shared
etiological factors underlying the HEXACO dimensions and the four humor styles have not yet been examined. The work of Vernon, Martin, Schermer, Cherkas et al. (2008) provides a good basis for this type of research, given that five factors of the HEXACO model are very similar to the FFM dimensions, and may therefore yield similar results (Ashton & Lee, 2009). The Honesty-Humility factor, however, has not been explored in relation to humor styles, and consequently an assessment of this dimension in the context of humor styles will make a novel contribution to this area of research.

4.4 Present Study

The purpose of the present study was to gain greater understanding of the humor styles by examining them in relation to an alternative model of personality—that of the HEXACO. In this study, humor styles were measured using the Humor Styles Questionnaire (HSQ; Martin et al., 2003) and the HEXACO factors were assessed using the short form HEXACO-60 (Ashton & Lee, 2009). Univariate behavioral genetic analyses were first conducted to investigate the extent to which individual differences in the HEXACO factors can be accounted for by genetic and/or environmental factors—findings that are important for better understanding results at the bivariate level (Plomin, 1986). Phenotypic correlations between the four humor styles and the six HEXACO dimensions were then computed to determine the relations between these sets of constructs, and to situate the humor styles into an alternative personality model other than the FFM. Lastly, bivariate behavioral genetic analyses were carried out to assess the extent to which any obtained phenotypic correlations are attributable to common genetic and/or environmental factors. These analyses promise to provide a deeper glimpse into the potential etiology of humor styles in relation to personality structure dimensions.

In the univariate behavioral genetic assessment of the HEXACO model, it was predicted that variation in all six dimensions would be accounted for by genetic and non-shared environmental factors. In part, this prediction stemmed from existing research pertaining to the FFM, where it was reported that variation in the model’s five dimensions, which are broadly analogous to five of the six HEXACO dimensions, is largely attributable to both genetic and unique environmental factors. Although no previous etiological work has been done on the variables characterizing the sixth factor of Honesty-Humility or on
the dimension itself, it was expected that this dimension would behave as most personality variables do when under behavioral genetic assessment—showing primarily genetic and non-shared environmental effects (Johnson et al., 2008).

In terms of phenotypic correlations, it was predicted that the positive and negative styles of humor would exhibit differing patterns of associations with the HEXACO dimensions. Specifically, based on previous findings with the FFM (e.g., Martin et al., 2003; Vernon, Martin, Schermer & Mackie, 2008), it was expected that the affiliative and self-enhancing humor styles would correlate positively with the HEXACO factors of Extraversion and Openness to Experience. It was also predicted that aggressive and self-defeating humor would correlate negatively with Agreeableness and Conscientiousness, and positively with Emotionality—the HEXACO model’s approximate analogue to the Neuroticism factor of the FFM. Lastly, self-enhancing humor was also predicted to correlate positively with Agreeableness and negatively with Emotionality. With regard to the Honesty-Humility dimension: we deemed it plausible that this dimension would correlate positively with the two positive humor styles, given that these humor styles as well as the Honesty-Humility factor all show associations with psychosocial well-being (e.g., Martin et al., 2003). By the same token, it was expected that the two negative humor styles would show negative correlations with Honesty-Humility, because they tend to be negatively associated with well-being (e.g., Kazarian & Martin, 2006).

To account for potential significant correlations, it was predicted that the bivariate behavioral genetic analyses would show that the phenotypic correlations between the humor styles and the HEXACO dimensions would be accounted for by correlated genetic and correlated non-shared environmental factors. This prediction is especially salient for the HEXACO dimensions that are similar to those of the FFM, given that correlations between these FFM dimensions and the four humor styles have previously been shown to be attributable to genetic and unique environmental effects (Vernon, Martin, Schermer, & Mackie, 2008). Because a substantial body of research examining the Honesty-Humility factor of the HEXACO does not presently exist, predicting the behavior of this factor under bivariate behavioral genetic investigation with the four humor styles is less straightforward. It was, however, suggested that any observed correlations between the
humor styles and Honesty-Humility would also be accounted for by correlated genetic and non-shared environmental factors, based on the similar pattern of results obtained with other higher-order personality dimensions (e.g., Vernon, Martin, Schermer, & Mackie, 2008).

4.5 Method

4.5.1 Participants

Participants in the present study were 1,186 pairs of twins: 664 monozygotic (MZ) twin pairs (604 female pairs and 60 male pairs), and 522 dizygotic (DZ) twin pairs (482 female pairs and 40 male pairs). The twins ranged in age from 18 to 92 years ($M = 56.41$, $SD = 13.23$). Although there are many more females than males in our samples, this is not uncommon in research with twins (Lykken, McGue, & Tellegen, 1987). However, the disproportionate representation is particularly exaggerated in our sample because the original focus of research using this sample was the study of the genetic underpinnings of osteoporosis and osteoarthritis—conditions that are much more common among females (Srikanth et al., 2005). Twins in this investigation were participants in ongoing studies conducted by the Department of Twin Research and Genetic Epidemiology at King’s College London in England, UK. This department mails out questionnaires to approximately 9,000 individual twins each year. The zygosity of participating twins was established by means of genome scans (100% accurate; Wilson et al., 2003), DNA tests (at least 98% accurate; Becker et al., 1997), or by responses to a zygosity questionnaire (at least 93% accurate; Rietveld et al., 2000). Twins taking part in the study were not compensated for their participation.

4.5.2 Materials

4.5.2.1 Humor Styles Questionnaire (HSQ)

Individual differences in the four humor styles—affiliative, self-enhancing, aggressive, and self-defeating—were assessed using the 32-item HSQ (Martin et al., 2003; Appendix A). Each item of the HSQ presents a self-reflective statement pertaining to humor. Participants indicate the extent to which they agree with each statement using a 7-point
Likert scale (where 1 = totally disagree and 7 = totally agree). Consequently, higher scores reflect greater endorsement of a given humor style. The HSQ has shown sound psychometric properties (Martin et al., 2003).

4.5.2.2 HEXACO Personality Inventory (HEXACO-60)

Participants completed the HEXACO-60 (Ashton & Lee, 2009; Appendix D), which assesses individual differences in six personality dimensions—Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. Specifically, 10 self-reflective items assess each dimension of the HEXACO model. Participants responded to each item using a 5-point Likert scale (where 1 = strongly disagree and 5 = strongly agree). Psychometric assessments of the measure have shown it to be a reliable instrument for the assessment of the intended personality factors (Ashton & Lee, 2009).

4.5.3 Procedure

In 2006, approximately 9,000 individual twins were sent a battery of questionnaires via standard mail, which included the HSQ as well as other measures not pertinent to the present investigation. Participants were instructed to complete the questionnaires on their own and without the assistance of their twin. They returned the completed questionnaires to the Department of Twin Research and Genetic Epidemiology at King’s College London via standard mail. In 2008, a second mail-out took place, in which the full eligible sample of about 9,000 individual twins was sent several measures, including the HEXACO-60. Of all twins who took part in both waves of testing, a total of 664 MZ twin pairs and 522 DZ twin pairs complete both the HSQ and the HEXACO-60 and were therefore included in the present investigation.

4.5.4 Analysis

Even though the majority of the participating twins completed the questionnaires in full, there were some instances in which an item was left blank. In these cases, the missing information was replaced with the average of the item’s Likert scale (Downey & King, 1998). Subsequently, the items of the HSQ were reduced to four scores reflecting the four
humor styles being assessed. Similarly, the items of the HEXACO-60 were converted to six distinct scores corresponding to the six dimensions of the HEXACO model of personality. Prior to analysis, all data were corrected for age and sex via the regression approach proposed by McGue and Bouchard (1984). This method controls for any age or sex differences that might exist, and it was particularly relevant in the present study given the greater number of females than males that characterized our sample.

When conducting univariate behavioral genetic analyses, members of each twin pair were randomly designated as Twin 1 or Twin 2, and within-pair intraclass twin correlations were then calculated separately for MZ and DZ twins. Structural equation model-fitting was carried out using the software package Mx (Neale, Boker, Xie, & Maes, 2006) to estimate the extent to which individual differences can be attributed to additive genetic (A), shared environmental (C), and non-shared environmental factors (E). Although it is possible to fit reduced models to data (e.g., AE, CE), we did not do so in the present analysis due to the recommendations of Sullivan and Eaves (2002). These researchers have suggested that reduced models yield oversimplified rather than more parsimonious results, whereas full ACE models provide accurate estimates for discrete traits.

Bivariate behavioral genetic analyses were also performed using Mx (Neale et al., 2006). These analyses estimate the extent to which observed phenotypic correlations between variables are attributable to common genetic and/or common environmental influences. Specifically, the method of Cholesky or triangular decomposition (Neale & Cardon, 1992) was employed to assess the cross-correlations within twin pairs (i.e., the correlation between one twin’s score on one variable with their co-twin’s score on another variable). In conducting these analyses, a full ACE model was tested as well as reduced AE and CE models. The model with the lowest chi-square value and lowest AIC value is chosen as the best fitting model. For each of the correlations reported, an AE model was found to have the best fit, resulting in estimates of genetic (rg) and non-shared environmental (re) correlations only.
4.6 Results

Descriptive statistics pertaining to the four scales of the HSQ representing the humor styles and the six scales of the HEXACO-60 defining the HEXACO personality model are provided in Table 8.

Table 8: Descriptive Statistics for the Humor Styles and the HEXACO Factors

<table>
<thead>
<tr>
<th>Scales</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>5.03</td>
<td>1.20</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>4.62</td>
<td>1.07</td>
</tr>
<tr>
<td>Aggressive</td>
<td>2.95</td>
<td>0.91</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>3.40</td>
<td>1.17</td>
</tr>
<tr>
<td>HEXACO-60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honesty-Humility</td>
<td>3.89</td>
<td>0.49</td>
</tr>
<tr>
<td>Emotionality</td>
<td>3.23</td>
<td>0.54</td>
</tr>
<tr>
<td>Extraversion</td>
<td>3.45</td>
<td>0.53</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>3.35</td>
<td>0.51</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>3.65</td>
<td>0.48</td>
</tr>
<tr>
<td>Openness to Experience</td>
<td>3.32</td>
<td>0.59</td>
</tr>
</tbody>
</table>

*Note. M = mean. SD = standard deviation. HSQ = Humor Styles Questionnaire. HEXACO-60 = HEXACO Personality Inventory.*

Given the large size of our samples, it is not surprising that significant sex differences were found for most of the variables under investigation. Females obtained significantly higher scores on the HEXACO dimensions of Honesty-Humility, Emotionality, and Agreeableness (all tests two-tailed, \( p < .001 \)). On the other hand, males scored significantly higher than did females on the HEXACO dimension of Extraversion and on all scales of the HSQ (all tests two-tailed, \( p < .05 \)). In fact, the only constructs not exhibiting sex differences were the HEXACO dimensions of Conscientiousness and Openness to Experience. These findings are not atypical, particularly for Emotionality, Honesty-Humility, and the aggressive humor style (e.g., Ashton & Lee, 2009; Chen & Martin, 2007; Kazarian & Martin, 2006), although it also bears noting that the actual mean differences between males and females were quite small. We also found significant correlations between age and all HEXACO and HSQ variables, with the exception of the HEXACO factor of Openness to Experience. Although significant, many of these
correlation coefficients were quite small. Regardless, in all subsequent analyses, we controlled for the effects of age and sex.

Within-pair twin correlations and parameter estimates derived from univariate behavior genetic analyses of the six HEXACO dimensions are presented in Table 9. For all of the dimensions, MZ correlations were substantially larger than DZ correlations, implying the existence of genetic effects. Model-fitting results clarified these effects by revealing that individual differences in the higher-order HEXACO factors can be accounted for entirely by genetic and non-shared environmental factors. Genetic effects were particularly strong for the HEXACO dimension of Openness to Experience ($a^2 = .59$) while Conscientiousness exhibited the lowest contribution from genetic factors ($a^2 = .32$). This is the first report on the heritability of the HEXACO dimensions and it is of interest that Honesty-Humility factor— the dimension unique to the HEXACO model— shows a similar degree of genetic influence ($a^2 = .35$) as several of the other, more traditional, dimensions.

Table 9: Within-Pair Intraclass Twin Correlations and Parameter Estimates for the HEXACO Factors

<table>
<thead>
<tr>
<th>Twin correlations</th>
<th>Parameter estimates (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MZ</td>
</tr>
<tr>
<td>Honesty-Humility</td>
<td>.36</td>
</tr>
<tr>
<td>( .22 to .40)</td>
<td></td>
</tr>
<tr>
<td>Emotionality</td>
<td>.49</td>
</tr>
<tr>
<td>( .30 to .52)</td>
<td></td>
</tr>
<tr>
<td>Extraversion</td>
<td>.48</td>
</tr>
<tr>
<td>( .36 to .50)</td>
<td></td>
</tr>
<tr>
<td>Agreeableness</td>
<td>.40</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>.33</td>
</tr>
<tr>
<td>( .28 to .42)</td>
<td></td>
</tr>
<tr>
<td>Openness to Experience</td>
<td>.59</td>
</tr>
<tr>
<td>( .48 to .63)</td>
<td></td>
</tr>
</tbody>
</table>

Note. $a^2 =$ additive genetic effects; $c^2 =$ shared environmental effects; $e^2 =$ non-shared environmental effects; CI = confidence interval. All effects whose confidence intervals do not include zero are significant at the .05 level.

The results of univariate genetic analyses of the HSQ within this sample have been reported previously (Vernon, Martin, Schermer, Cherkas, & Spector, 2008). In brief, in
this sample of twins obtained from the United Kingdom, individual differences in all four humor styles were found to be attributable to additive genetic and non-shared environmental factors, with heritability estimates ranging between $a^2 = .34$ (self-defeating humor) and $a^2 = .49$ (affiliative humor).

Phenotypic correlations ($rp$) between the HSQ and the HEXACO-60 are summarized in Table 10. These correlations revealed that the affiliative and self-enhancing humor styles were positively associated with the HEXACO factors of Extraversion, Openness to Experience and, to a lesser extent, with Conscientiousness. Both adaptive humor styles were also negatively correlated with the Emotionality dimension of the HEXACO framework. Affiliative humor further showed a small but significant negative correlation with the Honesty-Humility factor, while self-enhancing humor correlated positively with Agreeableness. With regards to the negative humor styles, aggressive and self-defeating humor styles were negatively related to the HEXACO factors of Honesty-Humility, Agreeableness, and Conscientiousness. Self-defeating humor further exhibited a positive correlation with the Emotionality dimension, whereas aggressive humor showed a small but significant negative correlation with this same factor. Self-defeating humor also had a small but significant negative correlation with Extraversion.

The bivariate model-fitting results are also reported in Table 10 and reveal that the phenotypic correlations observed between the scales comprising the HEXACO-60 and the HSQ were entirely attributable to correlated genetic ($rg$) and correlated non-shared environmental ($re$) factors. For the positive humor styles, significant genetic correlations can be seen between affiliative humor and the HEXACO factors of Extraversion, Conscientiousness, and Openness to Experience, as well as between self-enhancing humor and the dimensions of Emotionality, Extraversion, Agreeableness, and Openness to Experience. For the negative humor styles, significant genetic correlations were noted between aggressive humor and the HEXACO factors of Honesty-Humility, Emotionality, Agreeableness, and Conscientiousness, and between self-defeating humor and all HEXACO dimensions, with the exception of Extraversion. A number of these significant genetic correlations were particularly substantial, including the correlations between
Table 10: Phenotypic, Genetic, and Environmental Correlations Between Humor Styles and the HEXACO Factors

<table>
<thead>
<tr>
<th>HEXACO factors</th>
<th>Affiliative</th>
<th>Self-enhancing</th>
<th>Aggressive</th>
<th>Self-defeating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rp = -.06*</td>
<td>rp = .01</td>
<td>rp = -.33*</td>
<td>rp = -.16*</td>
</tr>
<tr>
<td></td>
<td>rg = -.10 (-.23 to .02)</td>
<td>rg = -.03 (-.17 to .11)</td>
<td>rg = -.55 (-.76 to .43)</td>
<td>rg = -.21 (-.35 to .08)</td>
</tr>
<tr>
<td></td>
<td>re = -.03 (-.10 to .04)</td>
<td>re = .02 (-.05 to .09)</td>
<td>re = -.18 (-.25 to .12)</td>
<td>re = -.12 (-.19 to .05)</td>
</tr>
<tr>
<td>Honesty-Humility</td>
<td>rp = -.09*</td>
<td>rp = -.17*</td>
<td>rp = -.07*</td>
<td>rp = .15*</td>
</tr>
<tr>
<td></td>
<td>rg = -.09 (-.19 to .02)</td>
<td>rg = -.26 (-.14 to .37)</td>
<td>rg = -.20 (-.31 to -.09)</td>
<td>rg = .14 (.03 to .25)</td>
</tr>
<tr>
<td></td>
<td>re = -.10 (-.02 to .18)</td>
<td>re = -.11 (-.04 to .18)</td>
<td>re = .03 (-.04 to .10)</td>
<td>re = .13 (.06 to .20)</td>
</tr>
<tr>
<td></td>
<td>rp = .42**</td>
<td>rp = .39*</td>
<td>rp = .03</td>
<td>rp = -.08*</td>
</tr>
<tr>
<td></td>
<td>rg = .61 (.53 to .69)</td>
<td>rg = .60 (.50 to .70)</td>
<td>rg = .09 (-.02 to .20)</td>
<td>rg = -.12 (-.23 to .01)</td>
</tr>
<tr>
<td></td>
<td>re = .26 (.19 to .32)</td>
<td>re = .23 (.16 to .29)</td>
<td>re = -.01 (-.07 to .07)</td>
<td>re = -.04 (-.11 to .03)</td>
</tr>
<tr>
<td>Extraversion</td>
<td>rp = -.01</td>
<td>rp = .19*</td>
<td>rp = -.27*</td>
<td>rp = -.06*</td>
</tr>
<tr>
<td></td>
<td>rg = -.10 (-.22 to .01)</td>
<td>rg = .16 (.04 to .29)</td>
<td>rg = -.47 (-.59 to -.36)</td>
<td>rg = -.14 (-.27 to -.02)</td>
</tr>
<tr>
<td></td>
<td>re = .07 (-.01 to .14)</td>
<td>re = .19 (.12 to .25)</td>
<td>re = -.13 (-.20 to -.06)</td>
<td>re = -.01 (-.07 to .07)</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>rp = .10*</td>
<td>rp = .06*</td>
<td>rp = -.16*</td>
<td>rp = -.15*</td>
</tr>
<tr>
<td></td>
<td>rg = .25 (.13 to .38)</td>
<td>rg = .08 (-.06 to .22)</td>
<td>rg = -.18 (-.31 to -.05)</td>
<td>rg = -.19 (-.32 to -.06)</td>
</tr>
<tr>
<td></td>
<td>re = -.02 (-.09 to .05)</td>
<td>re = .03 (-.04 to .10)</td>
<td>re = -.15 (-.22 to -.08)</td>
<td>re = -.12 (-.19 to -.05)</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>rp = .20*</td>
<td>rp = .17*</td>
<td>rp = -.05</td>
<td>rp = .03</td>
</tr>
<tr>
<td></td>
<td>rg = .29 (.21 to .38)</td>
<td>rg = .28 (.19 to .38)</td>
<td>rg = -.04 (-.14 to .06)</td>
<td>rg = .11 (.07 to .21)</td>
</tr>
<tr>
<td></td>
<td>re = .09 (.02 to .16)</td>
<td>re = .06 (-.01 to .14)</td>
<td>re = -.06 (-.13 to .01)</td>
<td>re = -.06 (-.13 to .01)</td>
</tr>
</tbody>
</table>

Note. rp = phenotypic correlation. rg = genetic correlation. re = non-shared environmental correlation. Values appearing in parentheses represent the 95% confidence interval. All correlations with confidence intervals that do not include zero are significant at the .05 level.
*p < .05, two-tailed. **p < .01, two-tailed.
affiliative humor and Extraversion ($rg = .61$), self-enhancing humor and Extraversion ($rg = .60$), as well as aggressive humor and Honesty-Humility ($rg = -.55$). The magnitude of these associations was indicative of a considerable overlap between the genes that may contribute to individual differences on each of these variables.

In terms of environmental correlations, significant non-shared environmental associations were found between affiliative humor and the HEXACO dimensions of Extraversion and Openness to Experience, as well as between self-enhancing humor and the Extraversion and Agreeableness factors. Significant non-shared environmental correlations were also noted between the aggressive humor styles and the HEXACO factors of Honesty-Humility, Agreeableness, and Conscientiousness, and between the self-defeating humor style and the Honesty-Humility, Emotionality, and Conscientiousness dimensions. The majority of the environmental correlations were smaller than the genetic correlations between the same pairs of variables.

4.7 Discussion

In addition to reporting the first behavioral genetic investigation of the HEXACO model, the present study had two main goals: to determine the associations between the four humor styles and the six HEXACO dimensions in order to situate the humor styles in a more comprehensive personality structure, and to assess the potential etiology of humor styles in the context of this structure. These goals were addressed through a correlational analysis coupled with univariate and bivariate behavioral genetic analyses.

As predicted, individual differences in the six HEXACO dimensions were entirely attributable to genetic and non-shared environmental factors. In part, these findings replicate the results of past studies of the FFM (e.g., Jang et al., 1996; Johnson et al., 2008; Riemann et al., 1997), the dimensions of which are roughly analogous to five of the six HEXACO factors. These studies have reported that variance in the FFM dimensions is largely accounted for by genetic and unique environmental factors. Beyond replicating these findings, and extending them to the HEXACO model, however, the present study further confirmed that the sixth HEXACO dimension of Honesty-Humility, which is not
reflected completely in classic trait frameworks, also appears to have etiological origins that are similar to those of existing personality factors, as well as to the remaining HEXACO dimensions. As such, the present study further validates the HEXACO model by demonstrating that all of its dimensions share a similar etiology. Moreover, it is likely that the heritabilities found in our study are lower-bound estimates given that we used the short-form version of the HEXACO Personality Inventory (HEXACO-60; Ashton & Lee, 2009), which is less reliable than the long-form version of the measure (HEXACO-PI; Lee & Ashton, 2004). More substantial heritabilities may have been observed had scores been obtained using the more comprehensive instrument.

Many of the phenotypic correlations observed between the HEXACO dimensions and the four humor styles confirmed our initial predictions regarding these constructs, and echoed the results of previous studies examining relations between humor styles and the FFM. With regard to the prosocial humor styles (affiliative, self-enhancing), positive correlations were noted between these variables and the Extraversion and Openness to Experience factors of the HEXACO model. A further positive association was observed between self-enhancing humor and the Agreeableness dimension. Given that previous studies with the FFM have found similar associations (e.g., Martin et al., 2003; Vernon, Martin, Schermer & Mackie, 2008), and that the two prosocial humor styles or related measures have been linked to social intimacy (Martin et al., 2003), creativity (e.g., Oral, 2006; Wycoff & Pryor, 2003) and trust (Hampes, 1999), which are characteristics of Extraversion, Openness to Experience, and Agreeableness, respectively (Lee & Ashton, 2004), these correlations are not surprising.

With regard to the two deleterious styles of humor (aggressive and self-defeating), these variables were found to correlate negatively with the HEXACO factors of Agreeableness and Conscientiousness, as we had predicted. Similar findings have been reported in previous studies of the humor styles and the FFM dimensions (e.g., Martin et al., 2003; Vernon, Martin, Schermer & Mackie, 2008). Other studies have further substantiated these findings by reporting negative relations between these two humor styles or related constructs, and the variables of trust (e.g., Hampes, 1999) and perfectionism (e.g., Fry,
1995)—traits that are characteristic of the HEXACO factors of Agreeableness and Conscientiousness, respectively.

In addition to these predicted correlations, other associations were observed that had not been noted in previous investigations of humor styles. For example, negative correlations were found between the two positive humor styles and the HEXACO dimension of Emotionality, which is a rough analogue to the FFM dimension of Neuroticism. Previous studies have noted this type of association between self-enhancing humor and Neuroticism, but they have not reported the same associations pertaining to affiliative humor (e.g., Martin et al., 2003; Vernon, Martin, Schermer & Mackie, 2008). However, given that both of these prosocial humor styles have been linked to psychological well-being (Martin et al., 2003), whereas Emotionality reflects such negative affect traits as anxiety, fearfulness, and dependence (Lee & Ashton, 2004), the correlations we obtained hold conceptual validity.

Moreover, although we expected that both negative humor styles would correlate positively with Emotionality, given the findings of previous studies linking the Neuroticism factor of the FFM to aggressive and self-defeating humor, only self-defeating humor exhibited this positive relation. In turn, aggressive humor correlated negatively with the Emotionality dimension. It can, however, be argued that this pattern of correlations makes sense, in light of the manner in which the HEXACO dimension of Emotionality is defined. Specifically, because Emotionality is characterized by qualities such as fearfulness, anxiety, and dependence (Lee & Ashton, 2004), it may be the case that those who employ self-defeating humor are high on the Emotionality dimension due to their insecurity (high anxiety) and excessive concern about close relations with others (high dependence). On the other hand, those exhibiting an aggressive humor style may be unconcerned about harming the feelings of others (low anxiety), and may be motivated to push others away (low dependence).

In addition to substantially replicating many of the correlations previously noted between the FFM and humor styles, thereby confirming the HEXACO model’s validity as a higher-order personality framework, we also observed several correlations between the
humor styles and the sixth dimension of the HEXACO framework: Honesty-Humility. Specifically, as predicted, the two negative humor styles exhibited negative correlations with Honesty-Humility. Because Honesty-Humility is defined as a prosocial dimension (Lee & Ashton, 2004), while aggressive and self-defeating humor have more socially aversive overtones (Martin et al., 2003), these obtained negative correlations are reasonable, suggesting that those who employ deleterious humor styles—particularly aggressive humor—are likely to be less sincere, less modest, and less fair than those who do not. A small yet significant negative correlation was also found between affiliative humor and the Honesty-Humility factor, which we had not predicted. This correlation may indicate that, while those who obtain high scores on Honesty-Humility tend to exhibit modesty and avoid flattery, those who use affiliative humor may sometimes employ a certain amount of insincere adulation in an effort to secure friendships and, as a result, may score lower on the Honesty-Humility dimension. In support of this suggested effect is the finding that the affiliative humor style has been linked to narcissism (Veselka et al., 2010)—a trait characterized, in part, by insincerity in social contexts (Back, Schmukle, & Egloff, 2010). Narcissism has also been shown to correlate negatively with the Honesty-Humility factor (Lee & Ashton, 2005).

Lastly, with regard to the bivariate behavioral genetic analyses, we found that the phenotypic correlations discussed above were attributable primarily to correlated genetic factors and secondarily to correlated non-shared environmental factors, as predicted. These results suggest that the four humor styles and the six HEXACO dimensions share many overlapping genetic and unique environmental determinants. These results also add to the existing literature by showing that all of the HEXACO dimensions, including the Honesty-Humility factor that has not been explored previously using bivariate behavioral genetic methodology, behave as other higher-order dimensions of personality have done in similar assessments (e.g., Vernon, Martin, Schermer & Mackie, 2008).

To put our results into a broader context, it may be informative to look at studies of relations between humor styles, the FFM, and trait emotional intelligence (trait EI; Greven, Chamorro-Premuzic, Arteche, & Furnham, 2008; Vernon, Villani, Schermer, Kirilovic, Martin, Petrides et al., 2009, Vernon, Villani, Schermer & Petrides, 2008).
construct of trait EI comprises a collection of self-perceived emotion-related dispositions and abilities. In its global form, it is negatively associated with Neuroticism and positively associated with the other FFM factors (Vernon, Villani et al., 2008)—correlations that indicate its prosocial nature, while also situating it within the structure of human personality. In addition, trait EI correlates positively with the two prosocial humor styles, and negatively with the two deleterious humor styles (e.g., Greven et al., 2008; Vernon et al., 2009). Given these links, it is possible that trait EI contributes to determining why people adopt certain humor styles. Specifically, the characteristic use of positive humor styles may require high trait EI, given that individuals need to understand the emotions of others, and to manage their own emotions if they want to create friendships and overcome adversity (Vernon et al., 2009). On the other hand, those who employ negative humor styles may be lower on trait EI, exhibiting emotionally unaware or emotionally self-harming tendencies in their use of humor (Vernon et al., 2009). If this is the case, then it is unsurprising that, in the present study, the positive humor styles were linked to the HEXACO factors of Extraversion, Openness, and Agreeableness—dimensions that are also associated with high trait EI (Vernon, Petrides et al., 2010). A similar effect may also account for the negative correlations we found between the negative humor styles and the Honesty-Humility factor, which is defined by constructs such as forgiveness and fairness, and in turn reflect high trait EI.

Through this study, we have demonstrated that the HEXACO model is a valid framework structure that exhibits similar patterns of association to the FFM model when assessed in conjunction with the four humor styles. The Honesty-Humility factor of the HEXACO is also a justifiable addition to personality frameworks given its correlations with humor styles, and its etiological similarities to the other higher-order dimensions. In terms of the humor styles, our study has confirmed their place in personality by situating them within the HEXACO model—an alternative framework to the FFM—in addition to providing greater insight into their etiology.

4.8 References


Although the construct of “sense of humor” and has been studied extensively in the field of personality research (Martin, 1996; Ruch, 1998), more recent investigations have reported that this variable correlates only weakly with indicators of mental and physical well-being (Kuiper & Martin, 1998; Martin, 2001). In accounting for these results, it has been argued that existing studies of humor have defined the construct overly broadly and inconsistently, without differentiating between adaptive and maladaptive expressions or uses of humor (Martin, 2001; Martin, 2003). By focusing solely on whether a stimulus evokes laughter and the extent to which individuals engage in laughter, many studies may have confounded prosocial and antisocial uses of humor, yielding a measured construct that reflects a mixture of positive and negative tendencies.

To represent different uses of humor more accurately, and to differentiate between adaptive and maladaptive functions of humor, Martin, Puhlik-Doris, Larsen, Gray, and Weir (2003) introduced the notion of humor styles. These humor styles represent distinct uses or functions of humor in everyday life. Specifically, the researchers proposed and provided empirical support for four unique humor styles: affiliative, self-enhancing, aggressive, and self-defeating. Affiliative humor involves the telling of jokes or engaging in witty banter with the intention of facilitating interpersonal relationships. Self-enhancing humor is characterized by the adoption of a positive outlook on everyday life, and the use of humor to alleviate times of difficulty or adversity. Aggressive humor is a disparaging form of humor that entails the use of sarcasm, put-downs, and teasing in order to manipulate or ridicule others. Lastly, self-defeating humor involves the telling of jokes at one’s own expense in order to gain the approval of others. The affiliative and self-enhancing humor styles have been identified as being positive, whereas the aggressive and self-defeating functions of humor represent negative humor styles.
Since their inception, the four humor styles have been assessed in relation to a number of personality-trait frameworks with the goal of situating these constructs within the broader theory of personality (e.g., Vernon, Martin, Schermer, & Mackie, 2008; Veselka, Schermer, Martin et al., 2010). However, to date, no empirical work has been carried out to elucidate the ties between the four humor styles and personality frameworks explicitly subsuming individual differences in temperament—the affective, non-intellective component of personality encompassing characteristic levels of emotional expression and excitability (Kohnstamm, 1989; Rothbart, Ahadi, & Evans, 2000). This gap in the literature is surprising, given the relevance of humor to affect and emotion (Vernon et al., 2009; Weisfeld, 2006; Yip & Martin, 2006).

To obtain a clearer understanding of the link between humor styles and the broader structure of personality representing both affective and intellective individual differences, we assess the associations between the four functions of humor in the context of a recently proposed three-factor structure of traits and temperament (Clark & Watson, 2008). We further examine the etiology of individual differences in this three-factor structure in order to provide a more genetically informative picture of humor in the context of the framework of personality.

5.1 Emergence of the Three-Factor Model of Traits and Temperament

Temperament broadly reflects individual differences in one’s self-regulation, affect, and reactivity (Rothbart & Danberry, 1981). It is deemed to be an inherent component of one’s character that helps to shape one’s experiences (Digman, 1994), with some researchers arguing that it may influence and set constraints on the development of other aspects of an individual’s personality (Clark & Watson, 1999; Rothbart et al., 2000). Alternatively, it has been suggested that personality dimensions foster variability in affective and emotional responding (Larsen & Ketelaar, 1991). Regardless of the perspective taken, the connection and interplay between traits and temperament are generally acknowledged (Digman, 1994; Tellegen, 1985; Rothbart, 2007).
Unlike personality dimensions, which have been organized into a widely accepted albeit not unchallenged framework known as the Five-Factor Model (FFM; Costa & McCrae, 1992) defined by Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness, the features of temperament have largely eluded categorization. While efforts have certainly been made to yield a taxonomy of temperament (e.g., Thomas & Chess, 1977; Merenda, 1987; Rowe & Plomin, 1977), many of these classifications have not gained a strong empirical following (Rothbart et al., 2000). With that said, however, a three-factor structure has emerged most reliably, and it has been formalized in the Pleasure-Arousability-Dominance model (PAD; Mehrabian, 1978; 1996). In this model, the Pleasure factor reflects individuals’ predisposition toward positive versus negative affective states. The Arousability factor is defined by variability in mental or physical arousal in response to stimuli, and it is therefore representative of emotional reactivity. Lastly, the factor of Dominance reflects one’s feelings of control or influence over various aspects of one’s life, including relationships and outcomes, thereby tapping into the interpersonal or sociable components of temperament. These broad factors have been echoed in a number of temperament measures, most notably the Emotionality, Activity, and Sociability (EAS) Temperament Survey (Buss & Plomin, 1984). Behavioral genetic investigations have reported that variability in these temperament dimensions is principally explained by genetic and non-shared environmental factors (e.g., Oniszczenko et al., 2003; Plomin, Pedersen, McClearn, Nesselroade, & Bergeman, 1988).

Although assessments of temperament have typically been carried out separately from analyses of personality traits and dimensions (Clark & Watson, 1999), empirical efforts have been made to bring together these parallel lines of enquiry in order to yield a comprehensive model of personality. As with the classification of temperament, these efforts have yielded a collection of varied structures, although a three-factor framework has been deemed to be the most parsimonious and theoretically relevant (Clark & Watson, 2008; Tellegen, 1985). This three-factor structure comprises the dimensions of Negative Affectivity, Positive Affectivity, and Disinhibition. Negative Affectivity is characterized by the extent to which individuals view their surroundings as threatening or problematic, and it is marked by a predisposition toward negative moods, such as guilt,
fear, anger, and sadness (Watson & Clark, 1984). Positive Affectivity represents a habitual willingness to engage with one’s surroundings, and it entails the experience of positive mood states including confidence, joy, alertness, and affiliative tendencies (Watson, Clark, & Tellegen, 1988). Lastly, Disinhibition represents individual differences in the regulation of arousal and emotional responses, and it is in line with the notion of impulsivity and recklessness (Watson & Clark, 1993).

5.2 Biological Underpinnings of the Three-Factor Model of Traits and Temperament

Investigations of the three-factor structure of traits and temperament (e.g., Clark & Watson, 2008; Zuckerman, 1995) have observed that this structure closely resembles the Big Three or PEN model of personality (Eysenck & Eysenck, 1985)—a biosocial framework of basic personality dimensions, which proposes that all human traits can be classified into the higher-order dimensions of Psychoticism, Extraversion, and Neuroticism. Psychoticism is characterized by non-conformist behaviors as well as tendencies toward risk-taking. Neuroticism is defined by emotional instability, fearfulness, and anxiousness. Lastly, Extraversion reflects a propensity toward sociability, excitability, and assertiveness. Unlike the FFM, which has its roots in lexical assessments of trait adjectives (McCrae & John, 1992), the Big Three model aims to identify the dimensions of personality that are grounded in biological processes (McCrae & Costa, 1985). As a result, it has been argued that this model is etiologically informative whereas the FFM is simply descriptive (Eysenck, 1992).

Investigations assessing individual differences in the Big Three’s dimensions have posited that individual differences in Extraversion may stem from variability in one’s inherent level of cortical arousal (Eysenck, 1967). In particular, it has been suggested that those who obtain high scores on Extraversion are chronically under-aroused, and therefore they seek external stimulation in order to overcome this lethargic state. Evidence in support of this arousal theory is mixed, although findings do suggest that arousal may interact with additional factors, such as attentional processes and gender, to yield variability in Extraversion (e.g., Corr, 2004; Matthews & Amelang, 1993; Smith et al., 1995). It has further been argued that individual differences in the Big Three model’s
Neuroticism dimension stem from varying activation of one’s limbic system—a set of brain structures commonly associated with the experience of basic emotions (Isaacson, 1982). Specifically, those who occupy the high end of this dimension may have a low activation threshold in these structures, resulting in the rapid display of negative affect when confronted with even minor stressors (Eysenck, 1967; Ormel et al., 2013). Lastly, proposed explanations for variability in Psychoticism have focused on biochemical theories, most notably suggesting that higher levels of the hormone testosterone and the enzyme monoamine oxidase (MAO) may yield tendencies subsumed by the Psychoticism domain (e.g., Eysenck, 1967; Ballenger et al., 1993).

Comparisons of the Big Three model and the three-factor trait-temperament model have suggested that, given the similarities between the two structures, the biological processes that are believed to underlie the Big Three model may also be applicable to the temperament-inclusive framework (Clark & Watson, 2008). In support of this suggestion are the results of behavioral genetic investigations of Negative Affectivity, Positive Affectivity, and Disinhibition, which have found that variability in these constructs is primarily attributable to genetic and non-shared environmental factors (Clark & Watson, 2008)—results that are similar to studies of the Big Three as well as other models of personality (Bouchard, 2004; Jang, Livesley, & Vernon, 1996). Consequently, the situation of variables within the trait-temperament framework may ultimately provide some preliminary insight into the etiological factors applicable to these variables in addition to establishing these variables within broader personality paradigms.

5.3 Humor Styles and Temperament: Common Correlates

To date, empirical investigations have not assessed directly the association between the four humor styles and the three-factor structure of traits and temperament comprising Negative Affectivity, Positive Affectivity, and Disinhibition. These sets of constructs, however, have been studied in relation to common variables. Therefore, assessments of these common correlates may provide indirect insight into the potential associations that may exist between functions of humor and the trait-temperament dimensions, and may offer additional information regarding the fit of humor styles within a personality framework subsuming both traits and temperament.
In assessments of the humor styles in conjunction with trait frameworks of personality, these four functions of humor have been examined in association with the FFM (Costa & McCrae, 1992). These investigations have observed that the affiliative and self-enhancing humor styles are positively associated with the FFM dimensions of Extraversion and Openness to Experience (Martin et al., 2003; Vernon et al., 2008). Self-enhancing humor further correlates positively with Agreeableness and Conscientiousness, and negatively with Neuroticism. Consequently, both of these styles of humor appear to reflect adaptive tendencies. In contrast, the aggressive and self-defeating humor styles have been shown to correlate negatively with the FFM dimensions of Agreeableness and Conscientiousness, and positively with Neuroticism (Martin et al., 2003; Vernon et al., 2008), and therefore they are deemed to be maladaptive in nature.

Similarly, the three-factor model of traits and temperament (Clark & Watson, 2008) has also been studied in relation to the FFM. Findings have noted that Negative Affectivity correlates positively with Neuroticism, while Positive Affectivity correlates positively with Extraversion (Watson, Clark, McIntyre, & Hamaker, 1992). Further, the dimension of Disinhibition exhibits negative associations with Agreeableness and Conscientiousness (Sims & Clark, 2005). Openness to Experience does not appear to correlate reliably with these three factors (Clark & Watson, 2008). Based on existing findings, Positive Affectivity seems to be representative of action-oriented, energetic, and outgoing tendencies at its positive pole—tendencies that are typically seen as being adaptive (Watson, 2002). On the other hand, Negative Affectivity is characterized by emotional instability, while Disinhibition is defined by impulsivity and manipulative tendencies, and therefore both can be seen as representing maladaptive tendencies at their positive poles (e.g., Samuel Widiger, 2008).

Further providing insights into potential relations between the four humor styles and the three-factor structure of traits and temperament are analyses linking these constructs to common lower-order traits and outcomes. For instance, Positive Affectivity, affiliative humor, and self-enhancing humor have all been linked to cheerfulness, effective coping, higher self-esteem, and psychological well-being (e.g., Martin et al., 2003; Veselka, Schermer, Martin, & Vernon, 2010a; Watson et al., 1992). In contrast, Negative
Affectivity, Disinhibition, as well as the aggressive and self-defeating humor styles have correlated significantly and positively with indicators of poor psychological health (e.g., Chen & Martin, 2007; Ro, Stringer, & Clark, 2012). Further, Negative Affectivity and the two negative humor styles have shown associations with manipulative and cynical tendencies (e.g., Clark, 1993; Veselka, Schermer, Martin, & Vernon, 2010b). These same tendencies are not significantly associated with the positive humor styles (Veselka, Schermer, Martin, & Vernon, 2010b). Lastly, Disinhibition and the two negative styles have been tied to impulsivity and risky behavior (Cann & Cann, 2013; Clark, 1993).

5.4 Present Study

In the present investigation, we provide the first assessment of humor styles in relation to the broader personality dimensions of Negative Affectivity, Positive Affectivity, and Disinhibition, as measured by the Schedule for Nonadaptive and Adaptive Personality Self-Report Form (SNAP-SRF; Harlan & Clark, 1999). The goal of this endeavor is to obtain a more thorough understanding of the manner in which these humor styles relate to broader personality dimensions, and to gain insight into the potential manner in which the theorized biological systems corresponding to these dimensions may play a role in yielding individual differences in uses of humor.

In order to gain insight into the potential genetic and/or environmental factors underlying the factors of Negative Affectivity, Positive Affectivity, and Disinhibition, univariate behavioral genetic modeling was carried out using scores from a sample of monozygotic (MZ) and dizygotic (DZ) twins. It was predicted that variability within these broad dimensions would be primarily explained by genetic and non-shared environmental factors. These findings would be in line with previous investigations of personality factors, as well as with past assessments of temperament dimensions (Bouchard, 2004; Jang et al., 1996).

Associations between the humor styles and the trait-temperament framework were examined through bivariate correlation and multivariate regression analyses. Based on existing findings, it was predicted that Negative Affectivity and Disinhibition would exhibit positive associations with the aggressive and self-defeating humor styles, and that
these two trait-temperament factors would uniquely predict variation in the typically maladaptive humor styles. This prediction is rooted in the observation that all four of these constructs share a number of common high-order and lower-order personality correlates, including the FFM factors of Neuroticism, low Agreeableness, and low Conscientiousness (Martin et al., 2003; Watson et al. 1992), as well as trait manipulativeness (e.g., Clark, 1993; Veselka, Schermer, Martin, & Vernon, 2010b) and diminished well-being (Chen & Martin, 2007; Ro et al., 2012). Further, it was predicted that Positive Affectivity would add significantly to the prediction of affiliative and self-enhancing humor, and would exhibit positive associations with these constructs. These results were deemed plausible given existing research linking all three of these variables to the FFM factor of Extraversion, as well as to effective coping and psychological well-being (e.g., Martin et al., 2003; Veselka, Schermer, Martin, & Vernon, 2010a; Watson et al., 1992).

5.5 Method

5.5.1 Participants

A total of 386 twin pairs took part in the present investigation: 283 monozygotic (MZ) pairs—34 male pairs and 249 female pairs—and 103 dizygotic (DZ) pairs—30 male pairs and 73 female pairs. Twins ranged in age from 16 to 71 years ($M = 38.39, SD = 15.35$). A smaller subset of these twins completed all necessary measures and therefore scores from this subset only were employed in conducting bivariate and multivariate analyses. Specifically, this smaller subset consisted of 146 twin pairs—16 male pairs, and 130 female pairs. The ages of participants in this sub-sample ranged from 15 to 71 years ($M = 37.47, SD = 14.98$). All twins resided in either Canada or the United States. Participants were compensated for taking part in the investigation.

5.5.2 Materials

5.5.2.1 Humor Styles Questionnaire (HSQ)

To assess individual differences in two positive humor styles (affiliative and self-enhancing) and two negative (aggressive, self-defeating) humor styles, we administered
the HSQ (Martin et al., 2003). This measure is made up of 32 self-reflective items, with eight items assessing each humor style. To complete the questionnaire, participants responded to each item via a 7-point Likert scale (where 1 = totally disagree and 7 = totally agree). Psychometric assessments of the HSQ have reported that the questionnaire is a reliable and valid measure of the four humor styles (Martin et al., 2003; Sirigatti, Penzo, Giannetti, & Stefanile, 2014).

5.5.2.2 Schedule for Nonadaptive and Adaptive Personality Self-Description Rating Form (SNAP-SRF)

The 33-item SNAP-SRF (Harlan & Clark, 1999) is a short-form measure adapted from the full-length SNAP instrument (Clark, 1993). It was developed to assess individual differences in three temperament variables and 12 traits characteristic of adaptive and maladaptive functioning. These variables can further be classified into three factors reflective of the broad trait-temperament dimensions proposed by Tellegen (1985) and echoed in subsequent works pertaining to personality (e.g., Clark & Watson, 2008). Specifically, 14 items of the SNAP-SRF measure the factor of Negative Affectivity, which is defined by a negative temperament, mistrust, manipulation, aggression, self-harm, and dependency. Further, nine items assess the factor of Positive Affectivity, which reflects a positive temperament, exhibitionism, entitlement, and low detachment. Lastly, nine items measure the factor of Disinhibition, which is characterized by an uninhibited or unconstrained temperament (disinhibition), impulsivity, low workaholism, and low propriety. A description of these subscales is outlined in Table 11. One additional item measuring eccentric perceptions—the tendency to have out-of-body experiences and to believe that one is in the possession of special abilities such as extrasensory perception (ESP)—is also typically included in the SNAP-SRP. However, this item has not been shown to load reliably on the three temperament-trait factors (e.g., Harlan & Clark, 1999), and it was therefore omitted from this investigation.

Each item comprising the SNAP-SRP is presented as a series of brief statements outlining the high and low poles of a given characteristic. For example, an item assessing negative temperament states: “People high on this trait often feel nervous and stressed. They are tense and edgy a lot of the time. They worry about all sorts of things that
happen or might happen—even little things. People low on the trait are calm and secure. They are rarely worried or bothered by things.” To respond to each item, participants indicate the extent to which they identify with it via a 6-point Likert scale (where 1 = very much like low end of description and 6 = very much like high end of description). Higher scores reflect a greater endorsement of the characteristic being measured. The SNAP-SRF has demonstrated acceptable psychometric properties (Harlan & Clark, 1999).

**Table 11: SNAP-SRF Scales and Descriptions**

<table>
<thead>
<tr>
<th>SNAP-SRF scale</th>
<th>Description of high scores</th>
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</thead>
<tbody>
<tr>
<td>Negative affectivity</td>
<td></td>
</tr>
<tr>
<td>Negative temperament</td>
<td>Tendency to express negative moods, high stress response</td>
</tr>
<tr>
<td>Mistrust</td>
<td>Mistrustful, skeptical, cynical toward others</td>
</tr>
<tr>
<td>Manipulation</td>
<td>Untruthful, exploitative, passive-aggressive</td>
</tr>
<tr>
<td>Aggression</td>
<td>Angry, hostile toward others</td>
</tr>
<tr>
<td>Self-harm</td>
<td>Experiences feelings of self-loathing, has suicidal tendencies</td>
</tr>
<tr>
<td>Dependency</td>
<td>Seeks approval from others, indecisive</td>
</tr>
<tr>
<td>Positive affectivity</td>
<td></td>
</tr>
<tr>
<td>Positive temperament</td>
<td>Cheerful, energetic</td>
</tr>
<tr>
<td>Exhibitionism</td>
<td>Boastful, prone to seeking attention</td>
</tr>
<tr>
<td>Entitlement</td>
<td>Feels deserving of privilege, identifies as a special person</td>
</tr>
<tr>
<td>Detachment (low)</td>
<td>Warm, affiliative, outgoing</td>
</tr>
<tr>
<td>Disinhibition</td>
<td></td>
</tr>
<tr>
<td>Disinhibition</td>
<td>Reckless, careless, unreliable</td>
</tr>
<tr>
<td>Impulsivity</td>
<td>Impulsive, spontaneous</td>
</tr>
<tr>
<td>Workaholism (low)</td>
<td>Puts leisure ahead of work, unconcerned with perfection</td>
</tr>
<tr>
<td>Propriety (low)</td>
<td>Disinterested in having a good reputation, non-conforming</td>
</tr>
</tbody>
</table>

SNAP-SRF = Schedule for Nonadaptive and Adaptive Personality Self-Description Rating Form measuring traits and temperament.

### 5.5.2.3 Zygosity Questionnaire

In order to determine the zygosity (MZ or DZ membership) of participating twin pairs, a 16-item zygosity questionnaire was employed (Nichols & Bilbro, 1966). This brief questionnaire consists of items that assess the extent to which twins resemble one another in terms of their height, eye colours, and general appearance. Additional items also enquire about the extent to which individuals who are close to the twins (parents, teachers, friends) mistake the twins for one another (*frequently, occasionally,*
rarely/never). Assessments of zygosity determination in classical twin studies have noted that this questionnaire can identify zygosity with 93% accuracy, relative to analyses of genetic markers or blood-typing (e.g., Kasriel & Eaves, 1976; Rietveld et al., 2000).

5.5.3 Procedure

Participants in the present study represent a sub-sample of twins who were recruited to take part in an ongoing investigation of adult personality in 2006. This initial recruitment was carried out through advertisements in newspapers, to which participants responded via telephone or by e-mail. All interested participants who provided informed consent to take part in the investigation were sent a battery of personality measures, which included the zygosity questionnaire and the HSQ, as well as additional measures not relevant to the present report. In 2009, these same twins were invited to complete the SNAP-SRF, along with other instruments not pertinent to the goals of the current investigation. During each testing period, participants were asked to complete the paper-and-pencil measures independently and without the assistance of their twin. Completed questionnaires were then returned to us via standard mail using provided self-addressed stamped envelopes.

5.5.4 Analysis

Missing data were rare in the present sample. However, in cases where missing values were noted, these blank cells were replaced with the average of the item’s scale (Downey & King, 1998). To facilitate subsequent analyses, the items comprising the HSQ were summed to yield four scores representing the four humor styles. Further, the items making up the SNAP-SRF were summed to calculate three scores representing the trait-temperament dimensions of Negative Affectivity, Positive Affectivity, and Disinhibition. In order to ensure that scores on the three dimensions reflected the factor poles accurately, the items pertaining to the traits of detachment, workaholism, and propriety were reverse-coded prior to the calculation of these broader scores.

Scores from all twins who completed the SNAP-SRF were included in the univariate behavioral genetic analysis of the factors assessed by the measure. To carry out this analysis, within-pair intraclass twin correlations were calculated for MZ and DZ twins.
Further, the software package *Mplus* (Muthén & Muthén, 1998-2012), was used to carry out structural equation model-fitting in order to determine the extent to which variation in SNAP-SRF factor scores was accounted for by additive genetic (A), shared environmental (C), and non-shared environmental factors (E). Although earlier univariate behavioral genetic investigations of traits and temperament fitted reduced models to the data (e.g., AE, CE), it has recently been shown that such practices may result in oversimplification of the etiological effects rather than in the presentation of more parsimonious models (Sullivan & Eaves, 2002). Consequently, these reduced models were not assessed in the present investigation.

Given the relatively small number of participants who had completed both the HSQ and the SNAP-SRF, it was not possible to carry out multivariate behavioral genetic analyses of the variables under investigation. Rather, prior to analysis, one member of each twin pair was randomly assigned to a Twin-1 group, and their co-twin was assigned to a Twin-2 group. Both groups consisted of MZ and DZ twins. We then conducted separate bivariate correlational analyses and multivariate regression analyses on the data obtained from each twin group. The intention behind this separation of twin data during analysis was to circumvent the statistical dependence found between members of the same family, while simultaneously assessing whether our findings could be replicated across two samples. We acknowledge, however, that the two samples created by the Twin-1 and Twin-2 groups do not allow for completely independent replication.

### 5.6 Results

A summary of the descriptive statistics pertaining to the HSQ and the SNAP-SRF, as obtained from the Twin-1 and Twin-2 groups can be found in Table 12.

Prior to assessing relations between the humor styles and the dimensions of the trait-temperament model, a univariate behavioral genetic analysis was carried out to assess the extent to which individual differences in the SNAP-SRF factors are attributable to genetic, shared environmental, and/or non-shared environmental effects. Results were obtained via the software *Mplus* (Muthén & Muthén, 1998-2012) and they are outlined in Table 13. For the factors of Negative Affectivity and Positive Affectivity, the correlations
Table 12: Descriptive Statistics for the Humor Styles and the SNAP-SRF Factors Observed in Twin-1 and Twin-2 Groups

<table>
<thead>
<tr>
<th>Scales</th>
<th>Twin 1</th>
<th>Twin 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>HSQ</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>5.49</td>
<td>1.15</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>4.77</td>
<td>1.12</td>
</tr>
<tr>
<td>Aggressive</td>
<td>3.12</td>
<td>1.06</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>3.24</td>
<td>1.10</td>
</tr>
<tr>
<td>SNAP-SRF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative affectivity</td>
<td>2.40</td>
<td>.71</td>
</tr>
<tr>
<td>Positive affectivity</td>
<td>3.85</td>
<td>.86</td>
</tr>
<tr>
<td>Disinhibition</td>
<td>2.73</td>
<td>.80</td>
</tr>
</tbody>
</table>

Note. A total of 146 participants were assessed in each twin group. M = mean. SD = standard deviation. HSQ = Humor Styles Questionnaire. SNAP-SRF = Schedule for Nonadaptive and Adaptive Personality Self-Description Rating Form.

Table 13: Within-Pair Intraclass Twin Correlations and Parameter Estimates for the SNAP-SRF Factors

<table>
<thead>
<tr>
<th>SNAP-SRF factors</th>
<th>Twin correlations</th>
<th>Parameter estimates (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MZ</td>
<td>DZ</td>
</tr>
<tr>
<td>Negative affectivity</td>
<td>.51</td>
<td>.26</td>
</tr>
<tr>
<td></td>
<td>(.41 to .60)</td>
<td>(.40 to .59)</td>
</tr>
<tr>
<td>Positive affectivity</td>
<td>.48</td>
<td>.27</td>
</tr>
<tr>
<td></td>
<td>(.08 to .55)</td>
<td>(.42 to .61)</td>
</tr>
<tr>
<td>Disinhibition</td>
<td>.34</td>
<td>.35</td>
</tr>
<tr>
<td></td>
<td>(.24 to .50)</td>
<td>(.54 to .76)</td>
</tr>
</tbody>
</table>

Note. $a^2$ = additive genetic effects; $c^2$ = shared environmental effects; $e^2$ = non-shared environmental effects; CI = confidence interval. All effects whose confidence intervals do not include zero are significant at the .05 level. N = 386 pairs (283 MZ, 103 DZ).

between the MZ twins were larger than the correlations between DZ twins—patterns broadly indicative of potential genetic effects contributing to individual differences in these trait-temperament factors. In contrast, the MZ twin correlations were smaller than the DZ twin correlations for the Disinhibition factor, suggesting that shared environmental factors rather than genetic factors may account for variability in this personality dimension. Subsequently, ACE models were fit to the data, with results showing that additive genetic and non-shared environmental effects explained individual differences in Negative Affectivity and Positive Affectivity. Shared environmental effects
were also observed for the Positive Affectivity dimension, but these effects were found to be non-significant. Model-fitting results further revealed that variability in Disinhibition was accounted for entirely by shared and non-shared environmental factors.

Next, Pearson product-moment correlations were assessed between all variables under investigation (see Table 14). Significant positive correlations were noted between all of the humor styles among the Twin-1 participants. Positive associations also were evident between these same variables in the Twin-2 group, although the correlations between self-enhancing humor and the two negative humor styles did not reach significance. These findings are in line with the coefficients reported by Martin et al. (2003) in their initial validation of the HSQ. In regards to the SNAP-SRF, Negative Affectivity exhibited significant positive associations with Disinhibition in both groups of participants. The remaining associations were not significant, lending support to the notion that the higher-order dimensions of personality are largely independent (Eysenck & Eysenck, 1985).

Relations were further assessed between the humor styles and the SNAP-SRF factors for both twin groups. Results showed that, for the Twin-2 group, the Negative Affectivity factor of the SNAP-SRF was significantly positively correlated with the two maladaptive humor styles, and significantly negatively associated with self-enhancing humor. This factor did not exhibit a significant relation with affiliative humor. In the Twin-1 group, this same pattern of correlations was observed, but the relations between Negative Affectivity and the self-defeating humor style did not reach significance. Next, the Positive Affectivity factor of the SNAP-SRF was significantly positively correlated with the affiliative, self-enhancing, and aggressive humor styles in both Twin-1 and Twin-2 groups. Self-defeating humor, however, did not correlate significantly with Positive Affectivity in either group. Lastly, the Disinhibition factor of the SNAP-SRF exhibited significant positive correlations with aggressive humor in both twin groups. Additionally, a significant positive association was also evident between Disinhibition and the self-defeating humor style in the Twin-1 group, but not in the Twin-2 group. Disinhibition was not significantly related to the positive humor styles in either twin group.
Table 14: Phenotypic Correlations Between the Humor Styles and the SNAP-SRF Factors in Twin-1 and Twin-2 Groups

<table>
<thead>
<tr>
<th></th>
<th>HSQ</th>
<th>SNAP-SRF</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Twin 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Affiliative</td>
<td>.54 ***</td>
<td>.38 ***</td>
<td>.30 ***</td>
<td>-01</td>
<td>.38 ***</td>
<td>.07</td>
</tr>
<tr>
<td>2. Self-enhancing</td>
<td>.23 **</td>
<td>.26 **</td>
<td></td>
<td>-.33 ***</td>
<td>.30 ***</td>
<td>.06</td>
</tr>
<tr>
<td>3. Aggressive</td>
<td>.36 ***</td>
<td></td>
<td></td>
<td>.22 **</td>
<td>.19 *</td>
<td>.36 ***</td>
</tr>
<tr>
<td>4. Self-defeating</td>
<td></td>
<td></td>
<td></td>
<td>.14</td>
<td>.15</td>
<td>.22 **</td>
</tr>
<tr>
<td>SNAP-SRF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Negative affectivity</td>
<td></td>
<td></td>
<td></td>
<td>-.10</td>
<td>.30 ***</td>
<td></td>
</tr>
<tr>
<td>6. Positive affectivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.13</td>
<td></td>
</tr>
<tr>
<td>7. Disinhibition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Twin 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSQ</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Affiliative</td>
<td>.43 ***</td>
<td>.24 **</td>
<td>.25 **</td>
<td>-.15</td>
<td>.36 ***</td>
<td>.06</td>
</tr>
<tr>
<td>2. Self-enhancing</td>
<td>.05</td>
<td>.10</td>
<td></td>
<td>-.32 ***</td>
<td>.22 **</td>
<td>.10</td>
</tr>
<tr>
<td>3. Aggressive</td>
<td>.29 ***</td>
<td></td>
<td></td>
<td>.35 ***</td>
<td>.18 *</td>
<td>.23 **</td>
</tr>
<tr>
<td>4. Self-defeating</td>
<td></td>
<td></td>
<td></td>
<td>.21 **</td>
<td>-.01</td>
<td>.02</td>
</tr>
<tr>
<td>SNAP-SRF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Negative affectivity</td>
<td></td>
<td></td>
<td></td>
<td>-.14</td>
<td>.27 **</td>
<td></td>
</tr>
<tr>
<td>6. Positive affectivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>7. Disinhibition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. A total of 146 participants were assessed in each twin group. HSQ = Humor Styles Questionnaire. SNAP-SRF = Schedule for Nonadaptive and Adaptive Personality Self-Description Rating Form.

* p < .05, two-tailed. ** p < .01, two-tailed. *** p < .001, two-tailed.
To determine the extent to which the trait-temperament dimensions of Negative Affectivity, Positive Affectivity, and Disinhibition add uniquely to the prediction of the four humor styles, taking into account the dependence between the criterion variables, a multivariate regression analysis was carried out using the software Mplus (Muthén & Muthén, 1998-2012). In this analysis, the variables of the age (in years at time of testing) and sex (0 = male, 1 = female) of the participants were included as covariates. This multivariate regression procedure was conducted separately for the Twin-1 and Twin-2 groups and the findings are summarized in Table 15. Results revealed that Positive Affectivity added significantly to the prediction of affiliative and self-enhancing humor in both twin groups, with greater Positive Affectivity exhibiting associations with higher scores on these two positive humor styles. Positive Affectivity was also a significant predictor of aggressive humor in the multivariate regression model, but this effect was significant in the Twin-2 group only. Further, Negative Affectivity added significantly to the prediction of self-enhancing humor in both twin groups, with an inverse relation being noted between the predictor and the criterion. Greater Negative Affectivity was also predictive of higher scores on the aggressive and self-defeating humor styles in the Twin-2 group, but not in the Twin-1 group. Lastly, the Disinhibition dimension added significantly to the prediction of the two maladaptive humor styles in the Twin-1 group only, and to the prediction of greater self-enhancing humor in the Twin-2 group only.

5.7 Discussion

In the present investigation, the goal was to explore the four humor styles in the context of the three-factor model of traits and temperament, defined by Negative Affectivity, Positive Affectivity, and Disinhibition (Clark & Watson, 2008; Tellegen, 1985), and operationalized via the SNAP-SRF (Harlan & Clark, 1999). By doing so, we aimed to assess the adaptive and maladaptive nature of these humor styles through their connection to these broader personality dimensions. We further aimed to determine the fit of the humor styles within this affect-inclusive and biosocial model, and to use the results in order to obtain an initial idea of the potential etiological factors contributing to individual differences in these four habitual uses of humor.
Table 15: The Trait-Temperament Factors of the SNAP-SRF as Predictors of Humor Styles in a Multivariate Regression

<table>
<thead>
<tr>
<th>SNAP-SRF (predictor)</th>
<th>HSQ (criterion)</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Affiliative</td>
<td>Self-enhancing</td>
<td>Aggressive</td>
<td>Self-defeating</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$\beta$</td>
<td>$SE$</td>
<td>$\beta$</td>
<td>$SE$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Twin 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative affectivity</td>
<td>-.07</td>
<td>.09</td>
<td>-.33 ***</td>
<td>.08</td>
<td>.09</td>
</tr>
<tr>
<td>Positive affectivity</td>
<td>.35 ***</td>
<td>.08</td>
<td>.24 **</td>
<td>.08</td>
<td>.15</td>
</tr>
<tr>
<td>Disinhibition</td>
<td>.02</td>
<td>.08</td>
<td>.13</td>
<td>.08</td>
<td>.31 ***</td>
</tr>
<tr>
<td>Twin 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative affectivity</td>
<td>-.14</td>
<td>.09</td>
<td>-.36 ***</td>
<td>.08</td>
<td>.34 ***</td>
</tr>
<tr>
<td>Positive affectivity</td>
<td>.34 ***</td>
<td>.08</td>
<td>.17 *</td>
<td>.08</td>
<td>.21 **</td>
</tr>
<tr>
<td>Disinhibition</td>
<td>.08</td>
<td>.08</td>
<td>.21 **</td>
<td>.08</td>
<td>.08</td>
</tr>
</tbody>
</table>

*Note.* A total of 146 participants were assessed in each twin group. HSQ = Humor Styles Questionnaire. SNAP-SRF = Schedule for Nonadaptive and Adaptive Personality Self-Description Rating Form. $\beta$ = standardized regression coefficient. $SE$ = standard error.

* $p < .05$, two-tailed. ** $p < .01$, two-tailed. *** $p < .001$, two-tailed.
Using univariate behavioral genetic analysis, we assessed the extent to which variation in the SNAP-SRF factors scores, representing the dimensions of the trait-temperament framework, was attributable to genetic and/or environmental factors. In line with our predictions, results revealed that additive genetic and non-shared environmental effects accounted for individual differences in Negative Affectivity and Positive Affectivity. These findings imply the role of biological processes in the manifestation of tendencies reflective of these trait-temperament dimensions, and they lend support to the biological theories extended to the three-factor trait-temperament structure as a result of its likeness to the Big Three model of personality. In particular, the relevance of biological factors to the Negative Affectivity dimension strengthen the argument that variation in this dimension may stem from differences in the activation threshold of the cortical limbic network (Eysenck, 1967; Ormel et al., 2013). Similarly, these results pertaining to Positive Affectivity lend support to the arousal theory, which suggests that chronic under-arousal may, at least in part, yield variation in tendencies toward sociability and the experience of positive mood states (Eysenck, 1967; Corr, 2004).

Univariate behavioral genetic results further revealed that individual differences in Disinhibition were attributable to shared and non-shared environmental factors—a finding that challenges the biological theories that have typically been applied to this personality dimensions (Eysenck, 1967; Ballenger et al., 1993). Rather than suggesting that innate factors propel variability in reckless, impulsive, and non-conforming tendencies, the results appear to imply that experiential factors common to individuals may play a role in the development of these tendencies. Indeed, theories put forth regarding the effects of childrearing on relevant behaviors have posited that unresponsive and unsupportive parenting may be predictive of impulsive and rebellious behaviors (Hitlin, 2006; Lykken, 1995). With that said, it is also plausible that the observed behavioral genetic results pertaining to the Disinhibition factor in the present study are indicative of a gene-environment (G x E) interaction, as suggested by the large and significant non-shared environmental effect observed for this dimension (Purcell, 2002; Rushton, Fulker, Neale, Nias, & Eysenck, 1986). This type of interaction indicates that the effect of one’s genotype depends on one’s environment and/or that the effects of
one’s environment depend on one’s genotype (Dick, 2011). Consequently, it may still be the case that variability in Disinhibition has biological influences, although these influences may have complex associations with environmental factors. In support of this potential interaction are findings reporting that psychopathologies and tendencies relevant to Disinhibition, including achievement motivation (Tucker-Drob, Briley, & Harden, 2013), impulsivity (Boomsma, de Geus, van Baal & Koopmans, 1999), and disordered eating (Treasure & Kanakam, 2012) may be rooted in an interplay between one’s genotype and one’s experiences. Subsequent investigations of trait-temperament models may wish to use samples of twins reared together and apart to explore this potential interaction directly.

In addition to assessing the etiological underpinnings of the trait-temperament dimensions, we further examined the associations between these dimensions and the four humor styles, testing the extent to which the dimensions were predictive of the humor styles in a multivariate analysis. Results revealed that, in line with our predictions, Negative Affectivity and Disinhibition added significantly to the prediction of aggressive and self-defeating humor, with positive associations observed between all constructs. These findings support the notion that these two negative forms of humor are representative of maladaptive tendencies and temperaments that may ultimately result in poor psychological outcomes (e.g., Chen & Martin, 2007; Martin et al., 2003; Ro et al., 2012). Specifically, it seems to be the case that individual prone to negative moods, manipulativeness, mistrust, recklessness, impulsivity, and non-conformity are more likely to employ deleterious humor in order to achieve social goals.

This connection drawn between negative humor styles and the SNAP-SRF factors of Negative Affectivity and Disinhibition further suggest that individual differences in the maladaptive humor styles may be attributable to heritable biological factors. This conclusion is rooted in previous assessments of Negative Affectivity and Disinhibition, which have posited that variability in these dimensions appears to stem from differences in limbic-system activation or from hormonal variation (Ballenger et al., 1993, Eysenck, 1967; Ormel et al., 2013). If trait-temperament dimensions are predictive of humor use, as theories of personality may suggest (Clark & Watson, 1999; Rothbart et al., 2000),
then their corresponding etiological factors may be relevant to the varying functions of humor. At the same time, given the significant shared environmental effects that were reported for the dimension of Disinhibition in the present study, it seems necessary to be mindful of potential common environmental influences on humor-style development, which may include parenting style, culture, education, and socioeconomic status. To get a clearer picture of the manner in which etiological factors may interact to yield unique uses of humor, future investigations may wish to carry out studies of G x E interactions on the humor styles.

With regards to the positive humor styles: results in the present study showed that Positive Affectivity added significant and positively to the prediction of affiliative and self-enhancing humor. These findings are in line with our predictions, and they appear to suggest that the positive humor styles do ultimately reflect adaptive tendencies and temperaments that are relevant to psychological well-being (e.g., Martin et al., 2003; Veselka, Schermer, Martin, & Vernon, 2010a; Watson et al., 1992). More specifically, the results indicate that outgoing, cheerful, energetic, and perhaps even socially dominant individuals are more likely to employ these positive humor styles. Further, the link between Positive Affectivity and the adaptive humor styles may be indicative of the role of biological processes in the development and refinement of these humor styles. Previous studies have noted that variation in the dimension of Positive Affectivity may be explained by inherent individual differences in physiological arousal (e.g., Corr, 2004; Matthews & Amelang, 1993; Smith et al., 1995). If the causal link between humor styles and the Positive Affectivity dimension is verified, then this arousal theory may be extended to account for differences in the use of the affiliative and self-enhancing functions of humor.

Beyond these predicted associations, two other unexpected relations emerged. First, Negative Affectivity was shown to be predictive of less avid use of self-enhancing humor. Though not explicitly predicted, this finding is in line with previous research. Specifically, while self-enhancing humor has been linked to high self-esteem, effective coping, and overall resilience in the face of adversity (Martin et al., 2003; Veselka et al., 2010a), Negative Affectivity is defined by a predisposition to cynicism, self-harm, and
negative moods (Harlan & Clark, 1999; Watson & Clark, 1984). Consequently, these two constructs reflect opposite poles of adaptive and hardy behavior.

Additionally, Positive Affectivity was positively associated with aggressive humor—an unexpected though unsurprising finding. In addition to being characterized by affiliative tendencies and interpersonal warmth, the Positive Affectivity factor is further defined by more socially aggressive behaviors such as exhibitionism and entitlement (Harlan & Clark, 1999). That is, it appears to reflect a tendency to engage with one’s environment, even if the resulting behaviors are deemed to be domineering or imperious. In past studies, aggressive humor has been linked not only to antisocial variables, including the Dark Triad traits of Machiavellianism and psychopathy (Veselka et al., 2010b) and bullying (Klein & Kuiper, 2006), but also to more prosocial constructs, such as interpersonal confidence (Veselka et al., 2010a). Therefore, this type of humor seems to be representative of individuals who wish to engage socially, and who do so in a skilled manner, despite the fact that these social efforts are underscored by more malevolent or boastful intentions. This idea is supported by the positive correlation that is typically noted between aggressive humor and affiliative humor (Martin et al., 2003)—one that was observed in the present study as well.

Through this investigation, we have demonstrated that the three-factor structure of traits and temperament provides a helpful framework in assessing individual differences in affect-relevant constructs, such as the four humor styles. This model helped to clarify the extent to which the four humor styles represent adaptive versus maladaptive tendencies and, by virtue of being an etiologically informative structure, offered potential explanation as to the etiological basis for these tendencies.

5.7.1.1 Limitations

A few limitations to the present investigation should be noted. First, self-report measures were employed in the assessment of all constructs, which may have introduced bias into the data. Although the present findings largely echo previous investigations and are in line with existing theory regarding humor styles and personality structure, future investigation may wish to administer peer-report instruments or other forms of objective
assessments to examine humor, temperament, and traits. Additionally, in the present study, we assessed the factors of Negative Affectivity, Positive Affectivity, and Disinhibition using a short-form measure—the SNAP-SRF (Harlan & Clark, 1999). Although psychometrically validated, this measure is ultimately less reliable than its long-form version (Clark, 1993), and may have therefore yielded inaccurate results in some cases.

5.8 References


Chapter 6

6 Discussion

The broad aim of the present series of investigations was to assess the four humor styles—affiliative, self-enhancing, aggressive, and self-defeating—in relation to variables and dimensions indicative of adaptive and maladaptive tendencies, thereby clarifying the extent to which these styles of humor represent positive versus negative constructs. Beyond that, however, the goal was to determine the fit of the humor styles within alternative personality frameworks, namely the HEXACO model and the trait-temperament model, in order to assess the construct validity of the Humor Styles Questionnaire (HSQ; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003), while simultaneously assessing the ability of these frameworks to represent social malevolence accurately. Results revealed patterns of correlations that confirmed the adaptive nature of the affiliative and self-enhancing humor styles, while further demonstrating the maladaptive tendencies of those who habitually employ aggressive and self-defeating humor. Further, the humor styles were shown to correlate reliably with higher-order personality dimensions across both models tested.

6.1 Humor Styles and Mental Toughness

Analyses were carried out to assess the four styles of humor in relation to personal resiliency, represented in the present investigation by mental toughness and assessed using the Mental Toughness 48 Inventory (MT48; Clough et al., 2001). The purpose of these analyses was to obtain a more thorough understanding of the manner in which individuals who engage in different humor styles employ coping methods within their daily lives. A clarification of these relations was deemed crucial in providing preliminary insight into the potential manner by which humor styles may ultimately exhibit a link to well-being (e.g., Chen & Martin, 2007; Martin et al., 2003). Certainly, existing studies have examined resiliency in the context of the more all-encompassing construct of sense of humor (e.g., Cameron, Fox, Anderson, & Cameron, 2010; Ong, Bergeman, & Bisconti, 2004; Shaunessy & Suldo, 2010). However, many of these investigations did not employ
measures of humor capable of differentiating between negative humor styles from more positive functions of humor, and therefore the results from such investigations may paint an overly general representation of the role of humor in one’s ability to overcome adversity (Kuiper & Martin, 1998; Martin, 2001). In studies of humor styles explicitly, previous analyses have provided only broad insights into the relevance of resiliency to humor (Chen & Martin, 2007; Martin et al., 2003; Taher, Kazarian, & Martin, 2008), with only one study addressing the potential link between these variables directly (Erickson & Feldstein, 2007). Consequently, there has been insufficient evidence in the existing literature linking the humor styles uniquely to resiliency, despite theory stating that these associations should be evident (Martin et al., 2003).

To date, a number of theories have been put forth regarding the manner in which humor may promote greater resiliency. These theories have largely focused on cognitive appraisals, by proposing that those who are prone to using coping humor tend to express more positive challenge appraisals in the face of threatening circumstances (Abel, 2002; Kuiper, Martin, & Olinger, 1993). That is, such individuals appear to be more likely to view obstacles as challenges rather than as impediments, and to evaluate these obstacles more favorably. Some studies have also shown that those who exercise cheerful humor at times of stress tend to exhibit greater task motivation and effort (Kuiper, McKenzie, & Belanger, 1995) as well as more positive affect (Kuiper et al., 1995; Geisler & Weber, 2010). At the same time, these individuals do not appear to deny or disregard their negative affect (Geisler & Weber, 2010), engaging instead in down-regulation—a type of emotional regulation whereby they interpret this negative affect as being less threatening (Gross, 2002). These individuals are further more likely to apply external attributions in instances of failure by ascribing these failures to external factors beyond their control rather than to factors related to the self (Geisler & Weber, 2010). In turn, these individuals tend to perform well during stress-inducing tasks (Kuiper, 2012; Kuiper et al., 1993). Taken together, such findings suggest that positive humor styles may elicit a collection of beneficial responses akin to approach coping (Roth & Cohen, 1986) that mitigate the negative effects of adversity.
The present study extends these potential theories to the investigation of both adaptive and maladaptive humor styles rather than focusing exclusively on positive humor. In line with existing theories and findings (Erickson & Feldstein, 2007), the results lend themselves well to the suggestion that positive humor use yields greater resiliency, while further demonstrating that negative humor use is associated with decreased resiliency. With regards to the positive humor styles: these functions of humor may indeed yield greater resiliency or mental toughness by encouraging the appraisal of adversity as a manageable challenge (Abel, 2002; Kuiper et al., 1993), as exhibited by the positive correlation between the adaptive humor styles and the Challenge factor of the MT48. We further found support for the notion that positive humor is linked to increased engagement in stressful tasks (Kuiper et al., 1995), given the positive association that emerged between these humor styles and the Commitment factor of the MT48. Additionally, the relation between the adaptive humor styles and the MT48 factor of Emotional Control corroborates the importance of emotional regulation in the connection between humor and resiliency (Gross, 2002).

A reliable correlation did not emerge between the adaptive humor styles and the MT48 factor of Control over Life, suggesting either that a sense of control over life is not relevant to the enactment of positive humor, or perhaps that those who employ these adaptive humor styles experience both high and low feelings of control in various situations. This latter suggestion is consistent with previous investigations reporting that positive humor tends to be associated with external attributions in cases of failure (Geisler & Weber, 2010), whereby negative events are deemed to be the cause of external factors rather than personal traits or abilities. That is, a lower propensity to believe that one is in control of life events may ultimately act as a buffer against convictions that one’s failures are solely the cause of one’s own inabilities (David & David, 1972). At the same time, feelings of control in adverse situations not specific to failure have exhibited associations with improved coping (e.g., Taylor, Helgeson, Reed, & Skokan, 1991).

The adaptive humor styles also exhibited a correlation with greater confidence, as measured by the Confidence factor of the MT48. Although confidence and self-esteem have been shown to be positively associated with sense of humor, coping humor, coping
ability, and adjustment in previous findings (e.g., Dumont & Provost, 1999; Martin, Kuiper, Olinger, & Dance, 1993; Nezlek & Derks, 2001; Overholser, 1992), this construct has not been incorporated into a model of resiliency and humor (Kuiper, 2012). Consequently, future investigations may wish to examine confidence in the context of adversity, to determine the means by which positive humor styles may impact resiliency by way of influencing one’s level of confidence. Alternatively, it may also be the case that individuals’ level of confidence dictates their use of humor, which, in turn, has implications for resiliency. These potential causal relationships are presently unclear.

Negative humor styles were also assessed in conjunction with mental toughness. Unlike the positive humor styles, which were fairly consistent in their correlations with mental toughness, the negative humor styles exhibited more unique patterns of correlations with the resiliency construct. While both aggressive and self-defeating humor were negatively associated with the MT48 factor of Control, suggesting a general propensity to feel ineffectual in life events, it was shown that aggressive humor was related to a decreased feeling of control over the direction of one’s life (Control over Life) whereas self-defeating humor was negatively associated with a sense of control over one’s emotions (Emotional Control). These results suggest that those who habitually use self-defeating humor may experience ineffective emotional control in difficult situations, thereby being less able to cope with stressors effectively (Geisler & Weber, 2010). In contrast, the aggressive humor style may ultimately be linked to poor resiliency and to diminished well-being by promoting maladaptive thought processes about individuals’ lack of influence in their lives during times of distress (e.g., Taylor et al., 1991). Both findings are relevant to existing frameworks of resiliency and humor, which posit the importance of cognitive and emotional regulation in the context of thriving under stress and pressure (Kuiper, 2012). A further finding that is in line with such models or theories is the negative correlation that emerged between the aggressive humor style and the MT48 Commitment factor. This relation implies that, in circumstances of difficulty, those who habitually employ disparaging forms of humor show disinterest in or disengagement from goals when faced with adversity rather than applying themselves to resolve stressors and to persevere. This behavior may therefore perpetuate rather than alleviate the stressors, which, in turn, may have a deleterious impact on well-being (e.g., Kobasa, 1982).
In addition to these findings, it was further shown that the negative humor styles are, for the most part, negatively associated with the MT48 factor of Confidence and with its facets. The exception to this trend is the positive relation that emerged between aggressive humor and Interpersonal Confidence, which reveals that those who have a propensity for this antisocial form of humor tend also to feel self-assured in social contexts. This association is unsurprising, however, given existing evidence suggesting that those who are interpersonally aggressive or dominant tend to be regarded and tend to regard themselves as being socially adept (e.g., Andreou, 2006; Arsenio & Lemerise, 2001). Although these findings are interesting in that they distinguish between the two negative types of humor, it is less clear in what way these trends translate to resiliency. Given the limited theoretical framework available regarding the role of confidence in the link between humor and resiliency, it is not quite evident to what extent one’s confidence is the cause or the consequence of differing humor styles.

Bivariate behavioral genetic analyses carried out within the context of this investigation revealed that the majority of the observed phenotypic associations between the humor styles and mental toughness were primarily attributable to common genetic effects as well as to common non-shared environmental effects. These effects indicate that common biological or evolutionary factors may play a role in the variation of mental toughness and the humor styles. Existing evolutionary theories pertaining to humor have proposed that, when expressed positively, humor is capable of offsetting negative affect, promoting individual-level and group-level functioning, facilitating communication, and offering relief in the face of everyday stresses (Gervais & Wilson, 2005). Consequently, humor tends to be depicted as having adaptive advantages with evolutionary benefits by contributing to psychological well-being and to improved social support (Alexander, 1986). More specifically, it can be viewed as a facet or component of overall resiliency (Kuiper, 2012), as epitomized by mental toughness, which itself represents a broader set of intrapersonally and interpersonally advantageous behavioral tendencies (Cacioppo, Reis, & Zautra, 2011; Jackson, Firtko, & Edenborough, 2007).
6.2 Humor Styles and the Dark Triad

To obtain a clearer idea of the interpersonal strategies that may be employed by individuals prone to adaptive versus maladaptive forms of humor, the four humor styles were examined in conjunction with the Dark Triad traits of personality. Previous investigations of the humor styles have demonstrated that the adaptive styles were linked to positive social abilities, such as greater social competence, higher emotional intelligence, and increased sociability (Çeçen, 2007; Martin et al., 2003; Yip & Martin, 2006; Vernon et al., 2009). Specifically, it was shown that the positive humor styles are primarily positively associated with these social variables, while the negative humor styles exhibited negative correlations with the constructs. Although these existing findings provide a richer understand of the adaptive humor styles by clarifying their interpersonal correlates, they ultimately do not provide a wealth of information about the interpersonal strategies employed by those prone to using maladaptive humor, apart from simply showing which characteristics are atypical of them. Consequently, the assessment of the humor styles in conjunction with more complex social variables relevant to antisocial behaviors was deemed necessary. The Dark Triad traits (Paulhus & Williams, 2002) seemed especially relevant for this purpose given previous representation of these traits as malevolent social strategies largely defined by interpersonal exploitation and competitiveness (Jonason, Li, & Teicher, 2010).

The results obtained during this investigation helped to clarify further the differences between adaptive and maladaptive humor styles. In the investigation, both maladaptive humor styles were found to correlate significantly and positively with Machiavellianism and psychopathy. These same Dark Triad constructs were unrelated to the positive humor styles. On the other hand, the positive humor styles exhibited significant positive correlations with narcissism, while narcissism did not correlate significantly with either aggressive or self-defeating humor. With that said, the significant positive correlation between the self-enhancing humor style and narcissism did not replicate across the two twin groups, and therefore this particular association may not be generalizable beyond the present sample.
The positive correlations between the maladaptive humor styles and the Dark Triad traits provide insight into the manner by which individuals who use these humor styles navigate social situations. If one applies life history theory to these findings (MacArthur & Wilson, 1967; Rushton, 1985), which focuses on the evolutionary value of human traits, it could be argued that individuals who engage in maladaptive forms of humor are likely to employ a fast life strategy. This life strategy is broadly defined by risky behavior, high mating effort, and low parental investment, and it is hypothesized that it evolved primarily to enhance reproductive fitness at times of adversity or instability (Rushton, 1985). Researchers have argued that individual differences in the Dark Triad traits, and primarily psychopathy and Machiavellianism, are reflective of this fast life strategy given that these antisocial constructs have been linked to exploitative tendencies, risk-taking behaviors, and sociosexuality (Figueroedo et al., 2009; Gladden, Figueredo, & Jacobs, 2009; Jonason, Koenig, & Tost, 2010; Jonason, Li, & Teicher, 2010; Jonason et al., 2009). Specifically, it has been argued that those high on the Dark Triad traits tend to engage in these strategies in order to attain personal goals, without consideration for the long-term consequences of their actions (Jonason, Koenig et al., 2010). As a result, these individuals may experience some positive outcomes as a result of their exploitative endeavours, although such outcomes tend to be short-term and fleeting, and ultimately not linked to broadly defined well-being (Furnham, 2007; Paulhus, 1998; Robins & Beer, 2001).

Given the positive associations found between the aggressive and self-defeating humor styles and the Dark Triad traits of psychopathy and Machiavellianism, which have been shown to be particularly relevant to a fast life strategy, it is possible that individuals who employ these maladaptive forms of humor also tend to engage in fast-life social behaviors. Such individuals may, therefore, use humor in a manipulative way for the purposes of self-interest, in order to achieve social benefits. Specifically, aggressive humor may be used to elevate one’s social role, even though this tactic may ultimately alienate others. Similarly, self-defeating humor may be employed to permeate social groups despite the fact that this function of humor may eventually result in a depleted self-concept and diminished feelings of social intimacy (Martin et al., 2003). These
strategies are line with existing theoretical conceptualization pertaining to the maladaptive humor styles (Martin et al., 2003).

The positive correlation noted between the positive humor styles and the Dark triad trait of narcissism were unexpected, and appear to suggest that, like those who employ maladaptive styles of humor, individuals with a propensity for positive functions of humor may also use humor in an exploitative way. In support of this notion, Martin et al. (2003) reported that the affiliative and aggressive humor styles tend to be positively correlated, suggesting that, even in convivial situations, one may engage in some form of hostile joking through the use of friendly teasing or light-hearted sarcasm. More likely, however, the positive correlation noted above may stem from the fact that the conventional measure of narcissism—the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) comprises items that reflect both socially desirable qualities, such as leadership skills and self-confidence, as well as antisocial characteristics, including manipulativeness and a sense of entitlement (McDonald, Donnellan, & Navarrete, 2012; Veselka, Schermer, & Vernon, 2012). Consequently, rather than being indicative of the malevolent propensities of those employing adaptive humor, the positive correlations noted between these humor styles and narcissism might be a greater indication of the self-assured nature of those with a tendency to use affiliative or self-enhancing humor.

In an effort to better understand the findings reported in the present investigation, Martin et al. (2012) assessed the humor styles in relation to the same Dark Triad constructs. However, beyond looking at global scores on the three measures of the Dark Triad traits—the MACH-IV (Christie & Geis, 1970), the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979), and the Self-Report Psychopathy Scale (SRP-III; Paulhus, Neumann, & Hare, 2009)—the researchers examined associations between the humor styles and the factor scores for these variables. The results indicated that, although both maladaptive humor styles did indeed correlate positively with Machiavellianism and psychopathy at the global and factor level, it was the aggressive humor style that exhibited a greater number of correlations with the Dark Triad variables. Specifically, aggressive humor correlated significantly and positively with the psychopathy factors reflecting a propensity toward callous affect, interpersonal manipulation, and the pursuit
of an erratic or reckless lifestyle. Self-defeating humor did not correlate significantly with the callous affect factor, although it did exhibit correlations with the remaining two indicators of psychopathy. Further, aggressive humor was related significantly and positively to all three factors defining Machiavellianism: a cynical view of human nature, a general disregard for conventional morality, and a tendency to employ or endorse exploitative interpersonal tactics. In contrast, self-defeating humor exhibited a positive correlation with the factor denoting a cynical view of human nature only. In addition, although self-defeating humor was not significantly associated with narcissism, aggressive humor correlated positively with the construct’s exploitativeness/entitlement factor as well as with its superiority/arrogance factor. In assessing the adaptive humor styles, Martin et al. noted significant positive associations between affiliative humor and the narcissism factors of leadership/authority, superiority/arrogance, and self-absorption/self-admiration. In contrast, self-defeating humor correlated negatively with the exploitativeness/entitlement factors of narcissism, and with most of the Machiavellianism factors.

The patterns of correlations observed in this investigation help to clarify the results of the present study in relation to the theory of a fast life strategy. Specifically, it seems to be the case that, indeed, both maladaptive humor styles tend to be reflective of antisocial strategies (e.g., Jonason, Koenig et al., 2010). However, while these strategies are primarily exploitative for individuals who employ aggressive humor, they tend to be more reflective of cynicism and sensation-seeking for individuals with a propensity for self-defeating humor. These results reveal that, despite both being maladaptive, the aggressive and self-defeating humor styles ultimately relate to unique social tactics. These conclusions regarding the incongruence of the fast-life strategy in its application to antisocial and exploitative tendencies in general echoes previous investigations, which have suggested that, in fact, a number of socially malevolent life strategies may exist, each having unique implications for outcomes (Furnham, Richards, & Paulhus, 2013; McDonald et al., 2012; Mealey, 1995). Future studies may wish to explore the validity of these theories in relation to the humor styles.
With regards to the positive humor styles, the findings clarify that, while affiliative humor may be linked to narcissism by virtue of its relevance to leadership and self-esteem (Martin et al., 2003; Klein & Kuiper, 2006), self-enhancing humor may ultimately not relate to any of the Dark Triad traits. This conclusion is based on the factor-level findings of Martin et al. (2012) paired with the results in the present investigation noting an unreliable correlation between the self-enhancing humor style and narcissism, and the null correlations between self-enhancing humor and the remaining Dark Triad traits. Such findings indicate that self-enhancing humor may not be characterized by a tendency toward manipulation nor is it closely aligned with more socially dominant behaviors. Subsequent studies of this humor style may benefit from exploring the social tactics employed by individuals who use this type of humor given the humor style’s relevance to participation in social groups (Martin et al., 2013).

### 6.3 Humor Styles and the HEXACO Model

The relevance of adaptive and maladaptive behaviors to the enactment of the four humor styles was demonstrated in the previous two investigations pertaining to mental toughness (Veselka, Schermer, Martin, & Vernon, 2010a) and the Dark Triad traits (Veselka, Schermer, Martin, & Vernon, 2010b). In light of these findings, and in recognition of the inconsistent correlations demonstrated between the humor styles and the contemporary five-factor structure of personality (Martin et al., 2003; Saroglou, & Scariot, 2002; Vernon, Martin, Schermer, & Mackie, 2008), it was deemed necessary to assess the humor styles in the context of a personality framework capable of comprehensively reflecting maladaptive behaviors. The HEXACO model was selected for these investigations in light of its broader trait structure relative to five-factor frameworks (Ashton et al., 2004), and because of its ability to correlate reliably with socially malevolent constructs, such as pretentiousness, immorality, adult delinquency, and the Dark Triad traits (de Vries & Van Kampen, 2010; Dunlop, Morrison, Koenig, & Silcox, 2012; Lee & Ashton, 2005).

In the present investigation, behavioral genetic results revealed that individual differences in the HEXACO dimensions are entirely explained by genetic and non-shared environment factors. That is, heritable influences appear to account for variation in all of
the model’s six dimensions. This observation adds support to the HEXACO model’s evolutionary theoretical framework (Ashton & Lee, 2007). It also strengthens the argument that, although both the HEXACO and the five-factor structures are largely descriptive (Ashton et al., 2004; John, Naumann, & Soto, 2008), the HEXACO model is ultimately more informative to the study of personality, in part, given its ability to provide a biologically-based theoretical account for variation in its dimensions (Ashton & Lee, 2007). The theoretical model put forth regarding the HEXACO structure suggests that the dimensions of Honesty-Humility, Agreeableness, and Emotionality are representative of propensities toward the emotion-centered construct of altruism. That is, those who obtain high scores on these dimensions tend to be genuine, tolerant, and empathetic—willing to provide assistance, care, and friendship without exploiting the weaknesses of others and without fearing exploitation. In contrast, the dimensions of Extraversion, Consciousness, and Openness to Experience are deemed to represent the more pragmatic construct of engagement by reflecting active and dedicated investment in beneficial resources or pursuits. In particular, Extraversion is defined by interpersonal engagement, Conscientiousness is characterized by industrious engagement, and Openness to Experiences appears to represent engagement in ideas and innovation. Recent research, however, has suggested that, rather than being unified by a habitual display of engagement, these three dimensions of Extraversion, Consciousness, and Openness to Experience may instead reflect proactivity—a propensity to effect change on one’s environment by identifying opportunities for change, initiating change, and persevering in one’s efforts until change has taken place (Bateman & Crant, 1993; de Vries, Wawoe, & Holtrop, 2015). In studies of proactivity, the construct has been shown to be predictive of job performance, entrepreneurial intentions, and life satisfaction (Crant, 1996; Greguras & Diefendorff, 2010; Seibert, Crant, & Kraimer, 1999) and therefore, like engagement, it implies adaptive tendencies. Proactivity has further been shown to correlate positively with the relevant HEXACO factors of Extraversion, Consciousness, and Openness to Experience, while exhibiting only weak correlations with the altruistic factors of Honesty-Humility, Agreeableness, and Emotionality (de Vries et al., 2015). Consequently, this construct appears to provide a more unified account of the relations between the non-altruistic dimensions of the HEXACO model.
When the HEXACO model was assessed in conjunction with the humor styles, unique patterns of correlations emerged for the adaptive versus maladaptive functions of humor. Specifically, both affiliative and self-enhancing humor exhibited significant positive correlations with the three proactivity dimensions of the HEXACO model: Extraversion, Conscientiousness, and Openness to Experience. These findings indicate that individuals who adopt positive humor styles tend to take part in proactive behaviors through which they exhibit a desire to have an impact on their surroundings, and through which they show enterprise and determination in social, organizational, and creative settings.

Consequently, these two adaptive forms of humor tend to be underscored by forward-thinking and practical pursuits. In support of these findings, existing research has demonstrated that the positive humor styles are related to career success and to feelings of personal accomplishment (Malinowski, 2013; Nikić, Travica, & Mitrović, 2014). In addition to these relations, however, the positive humor styles also differed in terms of their correlations with the dimensions of the HEXACO model relevant to altruism. While affiliative humor was negatively related to Honesty-Humility and Emotionality, self-enhancing humor exhibited a positive association with Agreeableness. These results suggest that the use of affiliative humor is indicative of a desire for status and self-interest, and reflective of an even temperament rather than one marked by emotional volatility. Such observations are broadly in line with previous findings, which have shown that affiliative humor tends to be linked to leadership and social dominance (Martin et al., 2012), but is not typically correlated with constructs defined by emotional reactivity (Martin et al., 2003; Vernon et al., 2008). In contrast, self-enhancing humor appears to have positive ties to reciprocal altruism, with its relation to Agreeableness suggesting that this humor style is reflective of leniency, patience, and being non-judgmental. Studies of related variables have echoed these findings by noting that self-enhancing humor is unrelated to prejudiced attitudes (Hodson, MacInnis, & Rush, 2010), while being significantly correlated with greater emotional awareness (Vernon et al., 2009). Therefore, although the two positive humor styles are linked by a tendency toward proactivity, they ultimately do not represent identical propensities when one considers the altruistic dimensions of the HEXACO.
While the two adaptive humor styles appear to share a common core centered upon proactivity, the negative humor styles are connected via a tendency toward antagonism (i.e., low altruism). In particular, both the aggressive and self-defeating humor styles exhibit negative correlations with the HEXACO dimensions of Honesty-Humility and Agreeableness, both of which have been linked to reciprocal altruism (Ashton & Lee, 2007). Both negative humor styles are further associated with low Conscientiousness. These results reveal that individuals who regularly make use of maladaptive humor styles tend to be exploitative, cynical, and unmotivated, and therefore largely antipathetic toward others. Evidence in support of this broad characterization has been observed in assessments of the humor styles and the Dark Triad traits, where it has been noted that both maladaptive forms of humor correlate positively with the Machiavellian factor of interpersonal cynicism, as well as with the psychopathy factor of interpersonal manipulation (Martin et al., 2012). Aggressive humor has further been shown to correlate negatively with the mental toughness factor of task commitment (Veselka et al., 2010b), as well as with the construct of organizational commitment (Romero & Arendt, 2011)—findings that elucidate its negative association with the HEXACO dimension of Conscientiousness. Interestingly, self-defeating humor has not exhibited these same negative correlations with commitment-related variables, and it has also been shown that this humor style is positively associated with perfectionism (Frewen, Brinker, Martin, & Dozois, 2008; Stoeber, 2015), which defines the positive pole of Conscientiousness in the HEXACO model (Ashton et al., 2004). Self-defeating humor, however, is related to low motivation (Saroglou, & Scariot, 2002), which may be the driving force behind its association with the Conscientiousness dimension.

In addition to these common correlates primarily reflective of low reciprocal altruism, a few dissimilarities were noted between the negative humor styles in their association with the remaining HEXACO dimensions, thereby further demonstrating that these two humor styles represent unique functions despite sharing a common socially malevolent core. Specifically, the HEXACO dimension of Emotionality was shown to correlate negatively with aggressive humor but positively with self-defeating humor. In the HEXACO model, Emotionality is deemed to be pertinent to kin altruism, with existing theory suggesting that those high on this dimension tend to exhibit harm-avoidance and help-seeking.
behaviors (Ashton & Lee, 2007). Consequently, the present findings suggest that while aggressive humor may be relevant to thrill-seeking and self-sufficiency, self-defeating humor is characterized by greater caution and more substantial dependency on others. These findings are in line with the defining features of the two humor styles, as proposed by Martin et al. (2003) during the development of the HSQ, where aggressive humor was described as entailing a lack of concern for the feelings and opinions of others when one is telling jokes. On the other hand, in this original theoretical framework, self-defeating humor was described as involving the production of humor with the aim of gaining social approval. Self-defeating humor further exhibited negative correlations with Extraversion in the present investigation. Therefore, despite the desire for acceptance and interpersonal dependency (Frewen et al., 2008) that characterize individuals who employ self-defeating humor habitually, these individuals are ultimately not assertive or dominant in social situations (Yip & Martin, 2006) nor do they appear to show the initiative necessary for the proactive pursuit of social goals (Saroglou, & Scariot, 2002).

Bivariate behavioral genetic results revealed that the reported correlations between the HEXACO dimensions and the humor styles are largely attributable to genetic effects, suggesting that common biological factors underlie individual differences in both sets of constructs. Given that the HEXACO dimensions are deemed to be representative of basic evolutionary processes (Ashton & Lee, 2007; de Vries et al., 2015), it is possible that the humor styles reflect interpersonal and intrapersonal tactics pertinent to these processes. Here, the positive humor styles are prosocial tactics intended to facilitate the acquisition of beneficial resources, whereas the negative humor styles represent antisocial tactics aimed at the manipulation of others to allow for personal gain. These latter tactics seem to fit the notion of a fast life strategy as it has typically been applied to the Dark Triad traits (e.g., Figueredo et al., 2009; Jonason et al., 2009). Taken together, these results further highlight the advantage of the HEXACO model in personality theory, by showing that not only can it account for individual differences in adaptive and maladaptive traits, but it can also organize these individual differences into a genetically informative framework based on testable evolutionary theory. The fact that the HSQ dimensions correlate reliably with the dimensions of this descriptive and etiologically relevant
personality model augments the construct validity of the HSQ (Borsboom, Mellenbergh, & van Heerden, 2004; Cronbach & Meehl, 1955).

6.4 Humor Styles and the Trait-Temperament Model

The relevance of affect to humor styles has been highlighted by previous investigations (e.g., Cann, Stilwell, & Taku, 2010; Vernon et al., 2009) as well as by the present collection of studies (Veselka, Schermer, Martin, Cherkas, et al., 2010; Veselka et al., 2010b; 2010c) where emotion regulation and emotional reactivity have been shown to be particularly pertinent to our understanding of humor in the context of coping, social interactions, and evolutionary motivations. Given the importance of emotional constructs to processes and theories regarding humor styles, it was considered necessary to take such constructs into account in assessing these functions of humor in relation to existing personality models. To date, only one framework of personality has been developed that explicitly takes into account temperament—the affective component of personality (Kohnstamm, 1989)—in addition to providing a taxonomy of traits. This three-factor trait-temperament model introduced by Clark and Watson (2008) aims to explain all individual differences using three broad dimensions of personality identified through cross-cultural assessments of mood and trait dimensions (Tellegen, 1985; Watson & Clark, 1984; Watson, Clark, & Tellegen, 1984): Negative Affectivity, Positive Affectivity, and Disinhibition. The model further seems promising in the study of adaptive and maladaptive traits as a result of its documented relevance in investigations of antisocial tendencies and psychopathology (Markon, Krueger & Watson, 2005).

Although a unique theoretical framework has not been developed for this trait-temperament model, its tripartite structure has been deemed to be an extension of and an elaboration upon the Big Three trait model (Eysenck, 1994; Eysenck & Eysenck, 1985), and therefore it has adopted this trait model’s biosocial approach to understanding personality differences (Eysenck, 1967; Clark & Watson, 2008). Specifically, the model stipulates that variation in Positive Affectivity is reflective of individuals’ chronic level of arousal, variation in Negative Affectivity stems from differences in cortical limbic-system activity, and variation in Disinhibition is rooted in hormonal or neurotransmitter effects. These biological theories have received mixed empirical support, however, and
therefore additional investigations are needed to assess more thoroughly the validity of these suggested processes (e.g., Ballenger et al., 1993; Corr, 2004; Matthews & Amelang, 1993; Ormel et al., 2013).

Results from univariate behavioral genetic analyses of the etiological factors pertinent to the trait-temperament dimensions reflect the current lack of consensus in the research community regarding the causes of variation in these three factors. In support of the notion that individual differences in the dimensions of Negative Affectivity and Positive Affectivity are rooted in biological factors, the present study reported that variation in these two factors was primarily attributable to genetic and non-shared environmental effects. At the same time, the present study did not find support for the suggestion that individual differences in Disinhibition are rooted primarily or exclusively in biological causes. Instead, the findings suggested that the shared environment, typically representing the features of one’s upbringing, were largely responsible for variation in individuals' tendency toward recklessness, impulsivity, and non-conformity. However, it was also noted that the findings regarding Disinhibition could be indicative of an interaction between genetic and environmental factors. Such a conclusion has basis in a recent investigation of impulsivity, where it was noted that a functional polymorphism in the promoter region of the monoamine oxidase A (MAOA) gene appeared to moderate the manifestation of psychopathology following exposure to maltreatment or abuse during childhood (Kim-Cohen et al., 2006). Consequently, it may still be the case that individual differences in Disinhibition are partly rooted in biological effects.

When assessed in conjunction with the trait-temperament model, it was noted that the adaptive humor styles did indeed exhibit a unique pattern of correlations with the factors of the framework, relative to the maladaptive humor styles. This observation is in line with previous assessment of the humor styles in the context of personality structures, where the same distinction could be made between positive and negative functions of humor using model dimensions (Martin et al., 2003; Saroglou, & Scariot, 2002; Vernon et al., 2008). Specifically, the two adaptive humor styles were shown to correlate positively with the Positive Affectivity dimension, indicating that a propensity toward positive uses of humor is related to cheerfulness, energetic engagement with one’s
surroundings, and assertiveness in social situations. These findings support existing studies that have linked the adaptive humor styles to sociable tendencies (Martin et al., 2003; Yip & Martin, 2006; Veselka et al., 2010c). At the same time, it was also noted that self-enhancing humor but not affiliative humor was negatively related to Negative Affectivity, indicating that individuals who employ this type of optimistic and resilient humor tend not to be prone to negative moods, cynicism, and interpersonal manipulation. This description of self-enhancing humor corroborates the conclusions of previous reports that have identified positive correlations between self-enhancing humor and the constructs of mental toughness and reciprocal altruism, and negative correlations between this humor style and an exploitative social strategy (Veselka et al., 2010a; 2010b; 2010c). Affiliative humor did not exhibit a significant association with Negative Affectivity, which may reflect the notion that congenial displays of humor may, on occasion, entail some elements of hostility, but not reliably (Martin et al., 2003; Veselka et al., 2010c). As was the case in previous assessments of the adaptive humor styles, the affiliative and self-enhancing functions of humor were shown to be related to one another by a common core within the trait-temperament framework, while also exhibiting distinct associations, which confirmed that these styles are not redundant representations of positive humor use.

In contrast to the adaptive humor styles, the maladaptive humor styles exhibited positive associations with the dimensions of Negative Affectivity and Disinhibition. These patterns of correlations clarify that individuals who employ these maladaptive functions of humor tend also to be manipulative, mistrustful of others, and impulsive in their thoughts and actions. These results are particularly relevant to the previously described study of humor styles and the Dark Triad traits, where it was noted that maladaptive humor use may be related to a fast life strategy that is defined by interpersonal exploitation and a typically cynical view of the world (Veselka et al., 2010c). Besides these common correlations, it was further shown that aggressive humor was related to higher levels of Positive Affectivity—an association not evident in the case of self-defeating humor. This result indicates that, while the two maladaptive humor styles are both exploitative, they ultimately differ in terms of how they are expressed. Specifically, affiliative humor appears to be characterized by interpersonal exhibitionism, while the
self-defeating humor style does not reflect these socially dominant tendencies. The more boisterous or perhaps overbearing nature of individuals who employ aggressive humor supports that manner in which this humor style was originally defined in the theoretical and psychometric work carried out by Martin et al. (2003).

The patterns of correlations reported between the trait-temperament framework and the humor styles are consistent with existing research pertaining to these styles (Martin et al., 2013; Veselka et al., 2010a; 2010b; 2010c). That is, within this model representing both traits and temperament, all humor styles exhibited correlations with the various dimensions defining the framework. As a result, these constructs were soundly situated within an affect-centered structure of personality, which confirms the importance of emotions in our understanding of humor. Further, the trait-temperament model proved capable of distinctly representing prosocial versus antisocial variables, and effectively capturing propensities uniquely attributable to each of these variables. With that said, the reported correlations did not always replicate across the two twin groups assessed, and therefore analyses with this particular model proved to be less reliable than was the case with the HEXACO framework. Consequently, in continued analyses of adaptive and maladaptive personality traits, the HEXACO model may provide the most thorough representation of individual differences. With that said, this model may not yet be capable of representing affect comprehensively. As a result, future investigations may wish to assess whether revisions to the HEXACO model are necessary in order to ensure that it provides a sufficient representation of temperament variation.

6.5 Conclusion

Taken together, results from the four investigations indicated that, in line with our predictions, previous investigations, and available personality theories, the affiliative and self-enhancing humor styles appear to be predominantly adaptive, whereas the aggressive and self-defeating humor style are shown to be largely maladaptive. Specifically, results revealed that the adaptive humor styles are related to greater resiliency, as demonstrated through positive correlations with the factors of mental toughness. Further, these humor styles do not appear to be associated with exploitative social strategies, although affiliative humor does tend to reflect a propensity for greater dominance in social circles.
Additionally, these adaptive humor styles appear to be linked broadly to proactivity and positive affectivity. In contrast, the maladaptive humor styles have shown relations with decreased resiliency, greater interpersonal manipulation, diminished reciprocal altruism, and a propensity toward negativity affectivity and poor impulse control. With that said, the expression of these tendencies differs across the two negative humor styles, with aggressive humor primarily reflecting assertive tendencies, whereas self-defeating humor entails a more tempered approach.

Across all studies, the results further demonstrate that while the adaptive humor styles are typically associated with positive constructs, and the maladaptive humor styles show correlations primarily with negative constructs, these two classes of humor styles do not represent opposite poles of the same variable. As a result, the finding that the adaptive humor styles are positively correlated with a given construct does not imply that the maladaptive humor styles will exhibit the opposite pattern of associations. This effect demonstrates the importance of studying all styles of humor in the context of humor research in order to gain a thorough understanding of the complex role of these styles in predicting outcomes. Similarly, although the affiliative and self-enhancing humor styles are shown to be predominantly adaptive, while the aggressive and self-defeating humor styles appear to be largely maladaptive, it is not the case that they are defined by identical tendencies. Consequently, it should not be assumed that the behavioral outcomes of one humor style are transferable to the outcomes of another.

Lastly, it was observed that, across three personality frameworks, two of which were tested in the present series of investigations, reliable correlations emerged between the four humor styles and broader personality dimensions. These findings confirm that the personality construct representing one’s style of humor as opposed to a sense of humor is a robust variable that has been shown to fit consistently within broader personality theory. Additionally, the corresponding measure of humor styles—the HSQ—has demonstrated remarkable construct validity across three personality frameworks. As a result, it appears to be a psychometrically sound instrument of humor use.
6.6 Limitations

A number of limitations pertaining to the present collection of investigations should be noted to ensure that subsequent studies might improve upon our methodology to offer a more complete theory of humor styles in the context of well-being. First, across all investigations, self-report measures were administered to the participants. This approach introduced the possibility of bias into our data due to factors such as social desirability (Van de Mortel, 2008). A possible alternative approach to minimizing this bias may have been to use a design in which knowledgeable others, such as one’s twin, rated participants within the study samples. This approach, however, may have had its own disadvantages, leading perhaps to leniency bias, in which raters provide more favourable feedbacks for individuals whom they know or like in an effort to make these individuals appear more socially desirable (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Behavioral measures would also have been particularly helpful in limiting common method biases. However, for logistical reasons, this approach was not applied within the investigations that were carried out.

Further, across the four investigations, we exclusively assessed English-speaking participants from North America and the United Kingdom. Given that humor has been shown to vary across cultures and countries to some extent (e.g., Alden, Hoyer, & Lee, 1993; Kalliny, Cruthirds, & Minor, 2006), the findings reported in the present series of studies may not be universally generalizable. In conducting the investigations, we compared our findings to existing research pertaining to humor and humor styles as conducted outside of North America (Çeçen, 2007; Chen & Martin, 2007; Kazarian & Martin, 2004; 2006; Saroglou, & Scariot, 2002), predominantly observing similar effects to what we reported. With that said, future investigations may wish to assess the cross-cultural validity of the conclusions put forth.

Lastly, in all investigations reported, we relied on a twin sample to obtain data on the constructs of interest. Twin data were consistently collected in order to allow for univariate and bivariate behavioral genetic analyses that would ultimately provide etiologically informative findings. Some have argued that, given the unique genetic and environmental features characterizing twin dyads, findings obtained from these dyads
may not be generalizable to the broader population of non-twin individuals (Petersen, Nielsen, Beck-Nielsen & Christensen, 2011). However, in a recent assessment of this claim, it was shown that twins do not differ systematically from the general population of non-twins, and therefore twin status does not ultimately bias results in behavioral research (Barnes, & Boutwell, 2013).

6.7 References


temperament and personality from infancy to adulthood (pp. 37-51). Hillsdale, NJ: Lawrence Erlbaum.


Appendices

Appendix A: Items of the Humor Styles Questionnaire (HSQ)


Note. *Items marked with an asterisk are reverse keyed.

Affiliative Humor

1. I usually don’t laugh or joke around much with other people.*
2. I don’t have to work very hard at making other people laugh—I seem to be a naturally humorous person.
3. I rarely make other people laugh by telling funny stories about myself.*
4. I laugh and joke a lot with my closest friends.
5. I usually don’t like to tell jokes or amuse people.*
6. I enjoy making people laugh.
7. I don’t often joke around with my friends.*
8. I usually can’t think of witty things to say when I’m with other people.*

Self-Enhancing Humor

1. If I am feeling depressed, I can usually cheer myself up with humor.
2. Even when I’m by myself, I’m often amused by the absurdities of life.
3. If I am feeling upset or unhappy I usually try to think of something funny about the situation to make myself feel better.
4. My humorous outlook on life keeps me from getting overly upset or depressed about things.
5. If I’m by myself and I’m feeling unhappy, I make an effort to think of something funny to cheer myself up.
6. If I am feeling sad or upset, I usually lose my sense of humor.*
7. It is my experience that thinking about some amusing aspect of a situation is often a very effective way of coping with problems.
8. I don’t need to be with other people to feel amused—I can usually find things to laugh about even when I’m by myself.
Aggressive Humor

1. If someone makes a mistake, I will often tease them about it.
2. People are never offended or hurt by my sense of humor.*
3. When telling jokes or saying funny things, I am usually not very concerned about how other people are taking it.
4. I do not like it when people use humor as a way of criticizing or putting someone down.*
5. Sometimes I think of something that is so funny that I can’t stop myself from saying it, even if it is not appropriate for the situation.
6. I never participate in laughing at others even if all my friends are doing it.*
7. If I don’t like someone, I often use humor or teasing to put them down.
8. Even if something is really funny to me, I will not laugh or joke about it if someone will be offended.*

Self-Defeating Humor

1. I let people laugh at me or make fun at my expense more than I should.
2. I will often get carried away in putting myself down if it makes my family or friends laugh.
3. I often try to make people like or accept me more by saying something funny about my own weaknesses, blunders, or faults.
4. I don’t often say funny things to put myself down.*
5. I often go overboard in putting myself down when I am making jokes or trying to be funny.
6. When I am with friends or family, I often seem to be the one that other people make fun of or joke about.
7. If I am having problems or feeling unhappy, I often cover it up by joking around, so that even my closest friends don’t know how I really feel.
8. Letting others laugh at me is my way of keeping my friends and family in good spirits.
Appendix B: Items of the MACH-IV


Note. *Items marked with an asterisk are reverse keyed.

1. Never tell anyone the real reason you did something unless it is useful to do so.
2. The best way to handle people is to tell them what they want to hear.
3. One should take action only when sure it is morally right.*
4. Most people are basically good and kind.*
5. It is safest to assume that all people have a vicious streak and it will come out when they are given a chance.
6. Honesty is the best policy in all cases.*
7. There is no excuse for lying to someone else.*
8. Generally speaking, people won't work hard unless they're forced to do so.
9. All in all, it is better to be humble and honest than to be important and dishonest.*
10. When you ask someone to do something for you, it is best to give the real reasons for wanting it rather than giving reasons which carry more weight.*
11. Most people who get ahead in the world lead clean, moral lives.*
12. Anyone who completely trusts anyone else is asking for trouble.
13. The biggest difference between most criminals and other people is that the criminals are stupid enough to get caught.
14. Most people are brave.*
15. It is wise to flatter important people.
16. It is possible to be good in all respects.*
17. P.T. Barnum was wrong when he said that there's a sucker born every minute.
18. It is hard to get ahead without cutting corners here and there.
19. People suffering from incurable diseases should have the choice of being put painlessly to death.
20. Most people forget more easily the death of their parents than the loss of their property.
Appendix C: Items of the Narcissistic Personality Inventory (NPI)


The statements that have been underlined represent narcissistic statements.

1. A  I have a natural talent for influencing people.
   B  I am not good at influencing people.

2. A  Modesty doesn't become me.
   B  I am essentially a modest person.

3. A  I would do almost anything on a dare.
   B  I tend to be a fairly cautious person.

4. A  When people compliment me I sometimes get embarrassed.
   B  I know that I am good because everybody keeps telling me so.

5. A  The thought of ruling the world frightens the hell out of me.
   B  If I ruled the world it would be a much better place.

6. A  I can usually talk my way out of anything.
   B  I try to accept the consequences of my behavior.

7. A  I prefer to blend in with the crowd.
   B  I like to be the center of attention.

8. A  I will be a success.
   B  I am not too concerned about success.

9. A  I am no better or no worse than most people.
   B  I think I am a special person.

10. A  I am not sure if I would make a good leader.
    B  I see myself as a good leader.
11. **A** I am assertive.
   **B** I wish I were more assertive.

12. **A** I like having authority over people.
   **B** I don't mind following orders.

13. **A** I find it easy to manipulate people.
   **B** I don't like it when I find myself manipulating people.

14. **A** I insist upon getting the respect that is due me.
   **B** I usually get the respect that I deserve.

15. **A** I don't particularly like to show off my body.
   **B** I like to display my body.

16. **A** I can read people like a book.
   **B** People are sometimes hard to understand.

17. **A** If I feel competent, I am willing to take responsibility for making decisions.
   **B** I like to take responsibility for making decisions.

18. **A** I just want to be reasonably happy.
   **B** I want to amount to something in the eyes of the world.

19. **A** My body is nothing special.
   **B** I like to look at my body.

20. **A** I try not to be a show off.
   **B** I am apt to show off if I get the chance.

21. **A** I always know what I am doing.
   **B** Sometimes I am not sure of what I am doing.
22. A I sometimes depend on people to get things done.
    B I rarely depend on anyone else to get things done.

23. A Sometimes I tell good stories.
    B Everybody likes to hear my stories.

24. A I expect a great deal from other people.
    B I like to do things for other people.

25. A I will never be satisfied until I get all that I deserve.
    B I take my satisfactions as they come.

26. A Compliments embarrass me.
    B I like to be complimented.

27. A I have a strong will to power.
    B Power for its own sake doesn't interest me.

28. A I don't very much care about new fads and fashions.
    B I like to start new fads and fashions.

29. A I like to look at myself in the mirror.
    B I am not particularly interested in looking at myself in the mirror.

30. A I really like to be the center of attention.
    B It makes me uncomfortable to be the center of attention.

31. A I can live my life in any way I want to.
    B People can't always live their lives in terms of what they want.

32. A Being an authority doesn't mean that much to me.
    B People always seem to recognize my authority.

33. A I would prefer to be a leader.
    B It makes little difference to me whether I am a leader or not.
34. A  I am going to be a great person.  
    B  I hope I am going to be successful.

35. A  People sometimes believe what I tell them.  
    B  I can make anybody believe anything I want them to.

36. A  I am a born leader.  
    B  Leadership is a quality that takes a long time to develop.

37. A  I wish somebody would someday write my biography.  
    B  I don't like people to pry into my life for any reason.

38. A  I get upset when people don't notice how I look when I go out in public.  
    B  I don't mind blending into the crowd when I go out in public.

39. A  I am more capable than other people.  
    B  There is a lot that I can learn from other people.

40. A  I am much like everybody else.  
    B  I am an extraordinary person.
Appendix D: Items of the HEXACO Personality Inventory (HEXACO-60)


*Note. *Items marked with an asterisk are reverse keyed.

Honesty-Humility

1. I wouldn’t use flattery to get a raise or promotion at work, even if I thought it would succeed.
2. If I knew that I could never get caught, I would be willing to steal a million dollars.*
3. Having a lot of money is not especially important to me.
4. I think that I am entitled to more respect than the average person is.*
5. If I want something from someone, I will laugh at that person’s worst jokes.*
6. I would never accept a bribe, even if it were very large.
7. I would get a lot of pleasure from owning expensive luxury goods.*
8. I want people to know that I am an important person of high status*
9. I wouldn’t pretend to like someone just to get that person to do favors for me.
10. I’d be tempted to use counterfeit money, if I were sure I could get away with it.

Emotionality

1. I would feel afraid if I had to travel in bad weather conditions.
2. I sometimes can’t help worrying about little things.
3. When I suffer from a painful experience, I need someone to make me feel comfortable.
4. I feel like crying when I see other people crying.
5. When it comes to physical danger, I am very fearful.
6. I worry a lot less than most people do*
7. I can handle difficult situations without needing emotional support from anyone else.*
8. I feel strong emotions when someone close to me is going away for a long time.
9. Even in an emergency I wouldn’t feel like panicking.
10. I remain unemotional even in situations where most people get very sentimental.
Extraversion

1. I feel reasonably satisfied with myself overall.
2. I rarely express my opinions in group meetings.*
3. I prefer jobs that involve active social interaction to those that involve working alone.
4. On most days, I feel cheerful and optimistic.
5. I feel that I am an unpopular person.*
6. In social situations, I’m usually the one who makes the first move.
7. The first thing that I always do in a new place is to make friends.
8. Most people are more upbeat and dynamic than I generally am.*
9. I sometimes feel that I am a worthless person.*
10. When I’m in a group of people, I’m often the one who speaks on behalf of the group.

Agreeableness

1. I rarely hold a grudge, even against people who have badly wronged me.
2. People sometimes tell me that I am too critical of others.*
3. People sometimes tell me that I’m too stubborn.*
4. People think of me as someone who has a quick temper.
5. My attitude toward people who have treated me badly is “forgive and forget.”
6. I tend to be lenient in judging other people.
7. I am usually quite flexible in my opinions when people disagree with me.
8. Most people tend to get angry more quickly than I do.
9. Even when people make a lot of mistakes, I rarely say anything negative.
10. When people tell me that I’m wrong, my first reaction is to argue with them.*

Conscientiousness

1. I plan ahead and organize things, to avoid scrambling at the last minute.
2. I often push myself very hard when trying to achieve a goal.
3. When working on something, I don’t pay much attention to small details.*
4. I make decisions based on the feeling of the moment rather than on careful thought.*
5. When working, I sometimes have difficulties due to being disorganized.*
6. I do only the minimum amount of work needed to get by.*
7. I always try to be accurate in my work, even at the expense of time.
8. I make a lot of mistakes because I don’t think before I act.*
9. People often call me a perfectionist.
10. I prefer to do whatever comes to mind, rather than stick to a plan.*

Openness to Experience

1. I would be quite bored by a visit to an art gallery.*
2. I’m interested in learning about the history and politics of other countries.
3. I would enjoy creating a work of art, such as a novel, a song, or a painting.
4. I think that paying attention to radical ideas is a waste of time.*
5. If I had the opportunity, I would like to attend a classical music concert.
6. I’ve never really enjoyed looking through an encyclopedia.*
7. People have often told me that I have a good imagination.
8. I like people who have unconventional views.
9. I don’t think of myself as the artistic or creative type.*
10. I find it boring to discuss philosophy.*
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