This document is an unedited version of the accepted manuscript **"Is the use of humor associated with anger management? The assessment of individual differences in humor styles in Spain"**

Personality and Individual Differences

Abstract

Individual differences in the use of humor are a growing topic in personality research. This paper presents the psychometric analysis of the Spanish version of the Humor Styles Questionnaire (HSQ; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). A total of 1068 adults whose ages ranged from 18 to 65 years participated in five different studies. First, we tested the dimensionality and internal consistency of the instrument; we also replicated previous relationships between humor styles and well-being and personality (Big Five and HEXACO models). Second, we obtained new external validity evidence regarding the role of humor styles in anger management. Our results showed that self-enhancing humor was associated with a higher ability to reduce angry feelings and to avoid the external expression of anger. Higher scores on maladaptive humor styles, such as aggressive and self-defeating humor, were correlated with a greater inclination to express anger toward other people and with an increased tendency to engage in anger suppression, respectively. Results suggest that the HSQ is a reliable and valid option for measuring humor styles in the Spanish population.

Keywords. Humor styles; HSQ; Spanish version; Well-being; Personality; Anger management.

Is the Use of Humor Associated with Anger Management? The Assessment of

Individual Differences in Humor Styles in Spain

1. Introduction

During the past 20 years, humor as an individual difference variable has generated

growing interest in the field of personality research (Heintz, 2017; Martin, 2004;

Svebak, 2010; Thorson & Powell, 1993). In fact, authors such as Ruch (1998) asserted

that humor would become one of the main reference research topics in personality

studies. One of the most prominent topics in the area of humor research has been the

establishment of individual differences in humor styles, isolating their correlates,

theoretical implications and applied consequences, among others.

Humor styles have been defined as behavioral tendencies related to the use of

humor in everyday life. Although different approaches have operationalized humor

styles (e.g., Craik, Lampert, & Nelson, 1996; Ruch & Heintz, 2016), Martin, Puhlik-

Doris, Larsen, Gray, and Weir (2003) reported one of the most well-known

contributions. Following these authors, humor styles would be divided into four

independent although related dimensions: affiliative, aggressive, self-enhancing, and

self-defeating. To test this model and to explore the relationships of humor styles with

other traits and behaviors, they developed the Humor Styles Questionnaire (HSQ).

The topic of humor styles has produced a considerable amount of research and

has been applied to a variety of fields, such as basic personality dimensions

(Mendiburo-Seguel, Páez, & Martínez-Sánchez, 2015), pathological personality traits

(Zeigler-Hill, McCabe, & Vrabel, 2016), health and psychological well-being (Ruch &

Heintz, 2013), psychosocial adjustment in adolescence (Fox, Hunter, & Jones, 2016),

suicide-related outcomes (Stockton, Tucker, Kleiman, & Wingate, 2016), relationship satisfaction in dating couples (Caird & Martin, 2014), etc.

The HSQ (Martin et al., 2003) focuses on the way in which individuals use humor in their social relationships and when confronting potentially stressful events. This measure consists of 32 items that evaluate the different abovementioned dimensions. *Affiliative humor* is linked with the enhancement of personal interactions. It is characterized by saying amusing remarks or telling jokes, being considered a type of benevolent humor. S*elf-enhancing humor* is related to the maintenance of a humorous outlook during adverse or harmful situations. Hence, it constitutes the closest dimension to the view of humor as an emotion regulation strategy (Martin, 2007; Martin, Kuiper, Olinger, & Dance, 1993). A*ggressive humor* is oriented to denote superiority over other people. In other words, it refers to the hostile expression of humor for the purpose of ridiculing others under the semblance of seeking mere amusement or fun. Lastly, the use of *self-defeating humor* seeks out social acceptance and the approval of others at one's own expense. Individuals who use this humor style tend to disparage themselves (or to expose themselves to possible situations of ridicule) with the prospect of avoiding dealing with a problem and hiding negative emotions. It should be noted here that affiliative and self-enhancing humor styles are categorized as positive and adaptive humorous behaviors, whereas aggressive and self-defeating humor styles have a relatively negative and damaging nature (Martin, 2007).

The HSQ has been used in numerous studies, which have verified its usefulness and good psychometric properties (Chen & Martin, 2007; Martin et al., 2003; Saraglou & Scariot, 2002). Martin et al. (2003) reported adequate internal consistencies for all dimensions of the HSQ (Cronbach's alpha ≥ .77). Other independent studies have also found high reliability for the affiliative, self-enhancing, and self-defeating dimensions

(e.g., Sirigatti, Penzo, Giannetti, & Sefanile, 2014). Nevertheless, the available data regarding the internal consistency of aggressive humor are more inconsistent (see Ruch & Heintz, 2016). As regards the main intercorrelations among humor styles, a positive association between affiliative and self-enhancing humor has consistently been found (Martin et al., 2003; Stockton et al., 2016). In addition, there is evidence that aggressive and self-defeating humors are positively related to one another (Martin et al., 2003; Vaughan et al., 2014). Lastly, it is important to note that inconsistent results have been reported for all other intercorrelations (Ford, Lappi, & Holden, 2016; Ruch & Heintz, 2013; Sirigatti et al., 2014; Vaughan, Zeigler-Hill, & Arnau, 2014).

The main objective of the present research was to develop a comprehensive assessment of the HSQ in independent large samples of the Spanish population. To achieve this goal, we performed traditional psychometric analyses to examine the internal consistency and factor structure of the HSQ. Moreover, we conducted three studies to obtain external validity evidence by replicating the relationships between humor styles and psychological well-being and personality variables.

Regarding psychological well-being variables, we expected to find a positive relationship between adaptive humor styles (i.e., affiliative and self-enhancing) and positive psychological well-being dimensions (e.g., happiness, satisfaction with life, and hope) (Kazarian & Martin, 2006). Higher scores on these humor styles would be associated with lower scores on trait anxiety and depression, that is, negative indicators of well-being (Martin et al., 2003). By contrast, a maladaptive humor style such as self-defeating humor would be negatively associated with positive psychological well-being, and positively associated with anxiety and depression (Dyck & Holtzman, 2013). According to Martin et al. (2003) and Ruch and Heintz (2013), we expected to find zero

correlations between aggressive humor and positive and negative indicators of well-being.

Concerning the personality dimensions, one of the goals of our research was to analyze whether the pattern of relationships between humor styles and personality traits is similar when considering two different models of personality (i.e., Big Five and HEXACO). In the Big Five model, we expected affiliative and self-enhancing humor styles to be correlated with higher scores on extraversion (Mendiburo et al., 2015) and lower scores on neuroticism (Ruch & Heintz, 2013). We also expected to find a positive correlation between self-enhancing humor and agreeableness and openness to experience (Martin et al., 2003). Following these authors, aggressive humor was likely to be associated with lower agreeableness and conscientiousness and higher neuroticism. Finally, self-defeating humor was likely to be correlated with higher neuroticism and lower conscientiousness (Martin et al., 2003; Ruch & Heintz, 2013). Moreover, regarding the relationship between humor styles and the HEXACO dimensions (Vrabel, Zeigler-Hill, & Shango, 2017), higher scores on affiliative and self-enhancing humor styles would indicate higher scores on honesty-humility, extraversion, agreeableness, conscientiousness, and openness to experience. Considering the negative humor styles, self-defeating and especially aggressive humor were likely to have similar but opposite patterns, that is, negative associations with honesty-humility, emotionality, agreeableness, and consciousness. To improve the comparison of the results related to these personality models and the use of humor, in addition to examining the linear relationships reported previously (e.g., Martin et al., 2003; Vrabel et al., 2017), we also explored potential curvilinear associations. To our knowledge, this is the first empirical study that has examined curvilinear relationships between personality traits and humor styles.

Finally, with the aim of obtaining new external validity evidence, we examined the potential relationship between individual differences in the use of humor and anger-related measures. Anger has been conceptualized as an emotional state characterized by angry feelings or episodes derived from unsatisfied personal needs (Spielberger, 1999). Traditional humor approaches have suggested that humor could be associated with coping with negative emotional states such as, for example, anger (Martin, 2007). For this reason, in this research we explored the relationship between humor styles and trait anger, anger expression, and anger control. In particular, given that self-enhancing humor is considered a personal coping mechanism or reappraisal strategy (Martin et al., 2003), we expected this type of humor to be associated with a higher control of anger. Furthermore, given that harmful HSQ dimensions (i.e., aggressive humor and self-defeating humor) have been correlated with maladaptive personality traits (Veselka, Schermer, Martin, & Vernon, 2010; Zeigler-Hill et al., 2016), negative emotional adjustment indicators (Vaughan et al., 2014), and hostile or aggressive behaviors (Martin, 2007), we expected these injurious humor styles to be related to a greater expression of anger. More specifically, aggressive humor, which is oriented to others, was likely to be positively correlated with the external expression of anger; by contrast, self-defeating humor, which is oriented to oneself, was likely to be positively associated with the internal expression of anger. To our knowledge, there is no empirical evidence of the relationship between humor styles and anger management.

1.1.   *Development of the Spanish version of the HSQ: Initial stages*

Two bilingual specialists translated the 32 original items of the HSQ (eight items for each humor style) to Spanish, and then, two different bilingual specialists translated items to English. After that, the new and the original English versions were compared to check that no differences could be found in items in the translations (Hambleton & de

Jong, 2003). Furthermore, another four experts completing test construction reviewed these items to get validity evidence based on the test content. The evaluation consisted of identifying the humor style (target dimension) to which each item belonged as well as rating the representativeness or relevance of each item for its dimension. Additionally, the items were evaluated according to classic formal criteria (Angleitner, John, & Löhr, 1986; Carretero-Dios, Benítez, Delgado-Rico, Ruch, & López-Benítez, 2014): comprehension (i.e., to what extent the item was correctly understood), ambiguity (i.e., whether the item could be interpreted in another way), and clarity (i.e., to what extent the item was concise/accurate/direct). All of the items showed adequate content validity indexes (CVIs above .70; an inter-judge agreement Kappa index above the .40–.59 reference range).

2. Materials and methods

2.1. Sample

Five different samples ($N = 1068$) were recruited to develop the Spanish version of the HSQ.

Sample 1 (*construction sample*) consisted of 300 adults (159 females and 141 males) with a mean age of 29.47 ($SD = 11.53$; range from 18 to 60). Almost half of the participants held a university degree (44%), 42.6% had a high school diploma, 9.8% held vocational training education, and the rest of the participants had completed secondary education (1.4%), had finished primary school (2.4%), or did not provide information about their educational attainment (1.3%).

Sample 2 (*replication sample I: psychological well-being variables*) was made up of 261 adults (153 females and 108 males) with ages between 18 and 65 ($M = 31.79$; $SD = 10.95$). In this sample, the majority of the participants (59.4%) indicated having

completed university studies, 21.8% held a high school diploma, 9.2% had completed

vocational training education, 5% reported having completed secondary education and,

finally, 4.6% of the participants had completed primary education.

Sample 3 (*replication sample II: Big Five personality model*) comprised 238

undergraduate students (126 females and 112 males). The participants' ages ranged

from 18 to 50 years (M = 22.99; SD = 4.47).

Sample 4 (*replication sample III: HEXACO personality model*) was made up of

105 undergraduate students (55 females and 50 males) whose ages ranged from 18 to 39

years (M = 22.56; SD = 3.75).

Sample 5 (*new external validity evidence: anger management)* included a total

of 164 adult participants (87 females and 77 males). Their mean age was 28.80 (SD =

9.52; range from 18 to 63). Most participants reported having completed university

studies (52.6%), 36% held a high school diploma and, lastly, 6.7% and 4.9% indicated

having completed secondary studies or primary school, respectively.

2.2.   *Instruments*

The Spanish form of the HSQ, which is based on the original version of this

instrument that Martin et al. (2003) deployed, was used in all samples of this research.

As in the original version, the Spanish adaptation comprises 32 items corresponding to

four dimensions: (a) affiliative; (b) self-enhancing; (c) aggressive; and (d) self-defeating

(eight items for each of the four scales). The items were rated on a seven-point Likert-

scale format ranging from 1 (*totally disagree*) to 7 (*totally agree*).

The subjective Psychological Well-Being Scale (Sánchez-Cánovas, 1994) was

used in Sample 2. It consists of 30 items, with a Likert-type answer format with five

options ranging from 1 (*never*) to 5 (*always*). This self-report questionnaire assesses

five well-being dimensions: (a) life satisfaction (11 items); (b) happiness (six items); (c) sociability (four items); (d) health (four items); and (e) hope (five items).

The Beck Depression Inventory (BDI-IA; Beck, Rush, Shaw, & Emery, 1979; Sanz, Perdigón, & Vázquez, 2003) was administered to Sample 2 as well. It consisted of 21 multiple-choices items for the assessment of the severity of depression "over the past week, including today." It used a four-point answer format (from 0 = *not at all* to 3 = *extreme form of each symptom*).

The trait form of the State-Trait Anxiety Inventory (STAI; Buela-Casal, Guillém-Riquelme, & Seisdedos, 2011; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) was also administered to Sample 2. This measure, which comprises 20 items, was used to evaluate trait anxiety. Scores were provided on a four-point Likert scale (from 0 = *never* to 3 = *always*).

The NEO Five-Factor Inventory (NEO-FFI; Cordero, Pamos, & Seisdedos, 2008; Costa & McCrae, 1992), which was administered to Sample 3, is a short version of the NEO Personality Inventory-Revised (NEO-PI-R). This instrument has 60 items that measure: (a) neuroticism; (b) extraversion; (c) openness to experience; (d) agreeableness; and (e) conscientiousness. Each factor is composed of 12 items, with a five-point Likert scale ranging from 0 (*completely disagree*) to 4 (*completely agree*).

The HEXACO-60 (Ashton & Lee, 2009; Romero, Villar, & López-Romero, 2015), a short inventory that measures the 6 dimensions of the HEXACO Personality Inventory-Revised (HEXACO-PI-R), was administered to Sample 4. It consisted of 60 items that assess a) honesty-humility; b) emotionality; c) extraversion; d) agreeableness; e) conscientiousness; and f) openness to experience. Scores were provided on a five-point Likert scale (from 1 = *completely disagree* to 5 = *completely agree*).

Finally, Sample 5 completed the trait form of the State-Trait-Anger-Expression Inventory-2 (STAXI-2; Miguel-Tobal, Casado, Cano-Vindel, & Spielberger, 2001; Spielberger, 1999). It consists of 34 items, with a Likert-type answer format with four options ranging from 1 (*rarely*) to 4 (*almost always*). This instrument comprises the following scales: (a) trait-anger (10 items) which is, in turn, divided into two sub-scales: anger temperament (five items) and angry reaction (five items); (b) anger expression/out (six items); (c) anger expression/in (six items); (d) anger control/out (six items); and (e) anger control/in (six items).

2.3.   Procedure

The total sample was recruited through two procedures. In Samples 1, 3 and 4, participants were assessed in small groups in different public spaces (e.g., bus stations) and university centers. The data from Samples 2 and 5 were collected using an online questionnaire. With the paper-pencil method (Samples 1, 3 and 4), two previously trained evaluators informed participants about the main objective of this research and the estimated duration needed to complete the questionnaire booklet. In online administration (Samples 2 and 5), the same information was included. Previous research indicated that data derived from the online method are as reliable and valid as data derived from the paper-pencil method (Gosling, Vazire, Srivastava, & John, 2004). All participants were told that their participation was voluntary and that their data would be kept confidential. Any participant of the sample received economic compensation for their cooperation.

3. Results

3.1.   *Item analysis and exploratory factor analysis*

The 32 items of the Spanish version of the HSQ were evaluated in Sample 1 (*construction sample*). All of the items of the HSQ showed adequate variability ($SD >$ 1), with scores removed from a potential floor effect ($M > 2.20$), and adequate skewness and kurtosis values. The discrimination indices (corrected item-total correlation) were acceptable in all cases, ranging from .31 for item 1 to .58 for items 25 and 29 (affiliative humor), from .23 for item 22 to .61 for item 18 (self-enhancing humor), from .42 for item 7 to .56 for item 31 (aggressive humor), and from .32 for item 24 to .59 for item eight (self-defeating humor). Cronbach's alpha was > .70 for all subscales (i.e., affiliative humor = .80, self-enhancing = .75, aggressive humor = .78, and self-defeating = .74).

Following the classic criteria established by Snook and Gorsuch (1989), we decided to perform a principal component analysis (PCA) with the aim of examining the internal structure of HSQ in the construction sample in an exploratory way. According to these authors, when the number of items is higher than 20, there is an adequate intercorrelation among these items (KMO and Bartlett's test), and the sample consists of at least 300 participants, the differences between the emerged factorial solutions obtained with different methods (e.g., PCA and EFA) are considered negligible. Therefore, taking into account that PCA is easier to apply and interpret than other methods, these authors recommended its use. Given that humor styles are intercorrelated, we used an oblique rotation (direct oblimin). KMO value was .81, and Bartlett's test showed statistical significance (Chi-square = 2832.97, $df = 496$, $p < .001$). These data revealed that the sample met enough criteria for interpreting factor solutions.

Since the Kaiser criterion (eigenvalues greater than 1) frequently leads to an overestimation of the number of factors to be retained, a parallel analysis (PA) was performed following Horn (1965). When PA was used, the PCA resulted in four factors that explained 42.8% of the total variance. An examination of the factor solution showed a four-factor internal structure with eigenvalues of 4.43, 3.68, 3.29, and 3.72 respectively. These factors were clearly associated with the different humor styles (Table 1). The factor structure remained stable when applying common factor analysis instead of PCA and varimax instead of oblimin rotation.

Insert Table 1 about here

Taking into account previous research (Martin et al., 2003), the intercorrelations among HSQ dimensions (see Table 2) replicated that affiliative humor exhibited a strong positive correlation with self-enhancing humor ($r = .44, p < .01$) and also that aggressive humor is related to high levels self-defeating humor ($r = .27, p < .01$). In addition, the results showed a positive relationship between self-defeating humor and the positive humor styles [affiliative ($r = .16, p < .01$) and self-enhancing humor ($r = .15, p < .01$)], as well a non-significant association between affiliative and aggressive humor ($r = .04$).

Insert Table 2 about here

Finally, possible gender effects were analyzed. No effect of gender was found on affiliative humor [$F(1, 299) = 1.23, p = .27$], self-enhancing humor [$F(1, 299) = .17, p = .69$], or self-defeating humor [$F(1, 299) = .22, p = .64$]. Nevertheless, a significant effect of gender was found on aggressive humor [$F(1, 299) = 21.81, p < .001$], with males having higher scores ($M = 3.25; SD = 1.22$) than females did ($M = 2.64; SD =$

1.02). Concerning age, a lower willingness to use interpersonal humor styles (affiliative and aggressive) was found among older participants ($r = -.30$, $p < .01$, and $r = -.17$, $p < .01$, respectively).

3.2. Confirmatory factor analysis

We conducted a confirmatory factor analysis (Mplus 7.11; Muthén & Muthén, 2012) with the aim of exploring whether the dimensional structure observed in Sample 1 was replicated across the different samples of the current research with $N > 150$ (at least 10 participants by indicator). First, we created item parcels to separate measurement errors from true differences. We used item parcels following previous studies about the criteria to be considered to decide on their fitness (Little, Cunningham, Shahar, & Widaman, 2002; Little, Rhemtulla, Gibson, & Schoemann, 2013), and assuming that parcels can clarify representations of multidimensional scales as well (Graham, Tatterson, & Widaman, 2000). Our goal was to understand the construct and its interrelations and relationships with other constructs of interest. In this case, well-applied parceling can be used to minimize the specific variances of each item and to make the measurement model a parsimonious representation of the construct (Little, et al., 2013).

We created item parcels using the single-factor method (Landis, Beal, & Tesluk, 2000). Four indicators for each humor style were constructed (16 indicators). The MLR estimator was used, which takes into account the non-independence of observations and also the possible non-normality of the data. The model fit was assessed with the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA) with a 90% confidence interval (CI). TLI and CFI values greater than .90 and RMSEA values less than .08 indicate an acceptable model fit, whereas TLI and CFI values greater than .95 and RMSEA values less than .05 indicate

good model fit (Kaplan, 2000). Two different models were tested (see Table 3): a four-factor model (Model 1) composed of the four correlated humor styles that Martin et al (2003) proposed; and a two-factor model (Model 2) composed of positive humor styles (i.e., affiliative and self-enhancing) versus negative humor styles (i.e., aggressive and self-defeating).

As can be seen in Table 3, Model 2 showed a very poor fit. However, CFA confirmed that a structure defined by the four original factors (affiliative, self-enhancing, aggressive and self-defeating humor styles) showed an acceptable-to-good model fit in the assessed samples. All of the standardized factor loadings were statistically significant ($p <.001$).

Insert Table 3 about here

3.3. Relationships with other variables: psychological well-being

In order to obtain external validity evidence, we decided to test the relationships between humor styles and psychological well-being in Sample 2. Regarding the affiliative and self-enhancing humor styles, as seen in Table 4, we found the following patterns. These adaptive humor styles correlated significantly with all (positive and negative) well-being measures included. Interestingly, we found stronger correlations for affiliative humor and some psychological well-being variables in comparison to self-enhancing humor. For example, affiliative humor and hope were moderately correlated ($r = .35$, $p < .001$) with smaller values between self-enhancing and hope ($r = .27$, $p < .001$). Furthermore, again, smaller correlations were found for self-enhancing humor and sociability ($r = .28$, $p < .001$) compared to affiliative humor ($r = .37$, $p < .001$).

We did not find the predicted correlations between self-defeating humor and indicators of psychological well-being. Our results showed correlations around zero

between self-defeating humor and almost all positive psychological well-being indicators (with the exception of a positive correlation between this type of humor and happiness [$r = .17, p < .01$]) as well as anxiety and depression. Finally, aggressive humor was not related to any well-being variables (all $ps > .05$).

Insert Table 4 about here

3.4. Relationships with other variables: Big Five personality model

With the purpose of replicating previous relationships between humor styles and basic personality dimensions, we examined this pattern of correlations in Sample 3. Our results revealed that affiliative humor was positively associated with extraversion ($r = .54, p < .001$). Moreover, we found a negative correlation between affiliative humor and neuroticism ($r = -.26, p < .001$). Additionally, the results showed a positive relationship between affiliative humor and agreeableness ($r = .23, p < .001$) and conscientiousness ($r = .28, p < .001$). Concerning self-enhancing humor, we found a positive correlation of this humor style with extraversion ($r = .37, p < .001$), openness to experience ($r = .25, p < .001$), and agreeableness ($r = .24, p < .001$). The results also indicated a negative association among self-enhancing humor and neuroticism ($r = -.37, p < .001$). Furthermore, aggressive humor was linked to lower agreeableness ($r = -.50, p < .001$) and conscientiousness ($r = -.18, p < .01$). Nevertheless, the positive relationship expected between aggressive humor and neuroticism was not found ($r = -.01, p = .84$ .001). Finally, we observed a trend between self-defeating humor and high neuroticism ($r = .16, p = .012$) and low conscientiousness ($r = -.16, p = .015$), but with low values, and their statistical significance ($p < .05$) emerged due to the sample size (in Table 5, only the values of $p < .01$ are reported as statistically significant).

Insert Table 5 about here

To test for a curvilinear relationship between NEO-FFI factors and humor styles, quadratic product terms were computed by squaring the NEO-FFI personality scores (Cohen, Cohen, West, & Aiken, 2003), and multilevel hierarchical regression analyses were conducted. In the first step, a regression analysis was performed for each humor style onto each of the different NEO-FFI factors separately. In the second step, the quadratic product term was added as a predictor. A statistically significant change in the square of the multiple correlation would indicate the presence of a quadratic and curvilinear relation. The results of these analyses indicated that the quadratic product terms resulted in a statistically significant change only for the agreeableness-affiliative humor relation. Agreeableness served as a predictor for affiliative humor (model 1: β = 0.23, t = 3.55, $p < 0.001$, ΔR^2 = 5.1%). Addition of the quadratic product terms resulted in a statistically significant change in the multiple correlation squared (model 2: β = 1.04, t = 3.33, $p < 0.01$, ΔR^2 = 4.3%), thereby indicating a curvilinear relationship between agreeableness and affiliative humor. The function of the agreeableness-affiliative humor effect was U shaped, suggesting that low and especially high levels of agreeableness are most conducive to affiliative humor (see Fig. 1).

Insert Figure 1 about here

3.5. Relationships with other variables: HEXACO personality model

With the aim of looking into the associations between humor styles and personality variables, we included the HEXACO model in Sample 4. As shown on Table 6, affiliative humor was positively associated with extraversion ($r = .46$, $p < .01$) and openness to experience ($r = .21$, $p < .05$). Moreover, we also found that self-enhancing humor was linked to higher agreeableness ($r = .35$, $p < .01$). Regarding the negative humor styles, aggressive humor was negatively related to honesty-humility (r

= -.20, $p < .05$) and emotionality ($r = -.30$, $p < .01$), whereas self-defeating humor was negatively associated with conscientiousness ($r = -.25$, $p < .05$). Some expected relationships between humor styles and the HEXACO dimensions (e.g., affiliative and honesty-humility), were in the expected direction but did not reach statistical significance (all $ps > .05$).

Insert Table 6 about here

Following the strategy carried out for the NEO-FFI, curvilinear relationships between HEXACO factors and humor styles were explored. Multilevel hierarchical regression analyses were conducted with quadratic product terms of HEXACO personality scores. In the first step, a regression analysis was performed for each humor style onto each of the different HEXACO factors separately. In the second step, the quadratic product term was added as a predictor. The quadratic product terms resulted in a statistically significant change only for the honesty/humility-affiliative humor relation. For this pair, the hierarchical regression analyses revealed the following: (1) there was no linear effect of honesty/humility on affiliative humor (model 1: $\beta = 0.13$, t $= 1.33$, $p = 0.18$, $\Delta R2 = 1.1\%$); and (2) the quadratic effect of honesty/humility on affiliative humor was significant (model 2: $\beta = 1.78$, t $= 2.11$, $p < 0.05$, $\Delta R2 = 4.1\%$). The function of the honesty/humility-affiliative humor effect was U shaped, suggesting that low and high levels of honesty/humility are linked to the highest affiliative humor scores (see Fig. 2).

Insert Figure 2 about here

3.6. Relationships with other variables: trait anger, anger expression, and anger control

As can be seen in Table 7, the results obtained indicated that aggressive humor was associated with a higher inclination to express anger behaviors toward other people (expression/out; $r = .39$, $p < .001$). Our data also show that although with a low value, self-defeating humor is positively correlated with anger suppression (expression/in; $r = .17$, $p < .05$). With regard to self-enhancing humor, a higher ability to reduce angry feelings (control/in; $r = .29$, $p < .001$) and to avoid the external expression of anger (control/out; $r = .16$, $p < .05$) was found among the participants with high scores on this humor style. Additionally, the results revealed that trait anger was positively correlated with the use of aggressive humor ($r = .16$, $p < .05$), and it was negatively correlated with self-enhancing humor ($r = -.21$, $p < .01$).

Insert Table 7 about here

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4. Discussion

The main purpose of the present research was to examine the psychometric properties of the Spanish form of the HSQ in several independent samples. This version proved to be a reliable instrument in terms of internal consistency (with alpha coefficients ranging from .72 to .84 in construction and replication samples) to evaluate the distinctive uses of humor. The internal structure of the HSQ was supported across exploratory and confirmatory factor analyses. Indeed, our results indicated that the four-factor model (i.e., affiliative, self-enhancing, aggressive, and self-defeating), unlike the two-factors model [positive humor styles (affiliative and self-enhancing) vs. negative styles (aggressive and self-defeating)], had the best fit. Interestingly, the administration procedure did not influence the reliability and factor structure of the Spanish version of

the HSQ, finding a similar pattern of results across paper-pencil (Samples 1, 3 and 4) and online methods (Samples 2 and 5).

In line with previous research (Martin et al., 2003; Ruch & Heintz, 2016), we replicated the main patterns of intercorrelations among humor styles. However, we found an unexpected positive relationship between self-defeating humor and positive humor styles in all our studies. This may be because, in the Spanish population, self-defeating humor can be considered a more common humorous manifestation among people who are more prone to humor production. Moreover, we also replicated the most relevant effects of age and gender on humor styles (see Martin, 2007). Specifically, we found that older participants showed a lower predisposition to affiliative and aggressive humor styles. Furthermore, higher scores on aggressive humor were found among males in comparison to female participants.

Additionally, our replication studies reproduced the correlates of humor styles with other relevant psychological variables. Thus, we confirmed the external validity of the Spanish version of the HSQ. First of all, we replicated the main correlations between the majority of humor styles (i.e., affiliative, self-enhancing and aggressive) and well-being variables (Kazarian & Martin, 2006; Martin et al., 2003; Ruch & Heintz, 2013). However, contrary to other authors (Dyck & Holtzman, 2013), self-defeating humor was not positively associated with negative dimensions of psychological well-being, and it was not negatively associated with positive dimensions either. In fact, a positive relationship with happiness emerged. These results may provide further evidence of the specific role of this humor style in the Spanish population. Nevertheless, overall, our results are in line with past research indicating that positive humor styles, compared to negative humor styles, are related to more desirable psychological outcomes (Dyck & Holtzman, 2013).

In addition, we also reproduced the main previous findings about the correlations between humor styles and personality traits considering both the Big Five and the HEXACO personality model (Martin et al., 2003; Mendiburo et al., 2015; Ruch & Heintz, 2013; Vrabel et al., 2017). The incorporation of the HEXACO model of personality (see Ashton & Lee, 2009) in Sample 4 allowed us to corroborate that these reproduced patterns between humor styles and personality traits are similar across personality models. It is worth noting that, in comparison to the Big Five model, the relationship between different uses of humor and HEXACO factors has been scarcely examined. Studies involving samples from different countries are needed to identify potential differences in the relationships between these variables. In this regard, our research provides additional evidence of these relationships in the Spanish population. For example, our results indicated that the relationship between affiliative humor and openness to experience varies depending on the personality model. When openness to experience was evaluated using the HEXACO-60, the relationship between this personality variables and affiliative humor was positive and significant; by contrast, this association did not emerge with the NEO-FFI. However, other authors (e.g., Martin et al., 2003) reported this positive relation; therefore, further studies are necessary to elucidate potential differences between these models of personality in predicting the use of humor.

Furthermore, the analysis of the curvilinear relationships showed that individuals with low and high scores compared to medium scores on agreeableness (NEO-FFI) and honesty-humility (HEXACO-60) are more prone to use affiliative humor. Although some humor-related manifestations such as smiling are widely considered as a sign of positive affect, these expressions may also have other motivations (e.g., to mask negative feelings) (see Niedenthal, Mermillod, Maringer, & Hess, 2010). Perhaps, even

though it may seem paradoxical, people with low levels of agreeableness or honesty-humility use affiliative humor as a prosocial way to approach others and to take advantage of them. In fact, it could be an strategy to mask negative intentions, which is in line with prior studies showing that low agreeableness is related to a higher inclination to use coercive tactics (e.g., Jensen-Campbell & Graziano, 2001), and that a lower honesty-humility predicts psychopathic tendencies such as manipulation of others (Ashton, Lee, & de Vries, 2014). By contrast, we did not find the same curvilinear relationship between the agreeableness factor assessed using the HEXACO-60 and affiliative humor. However, it is important to note that the operationalization of the agreeableness dimension in the Big Five and the HEXACO models of personality is not equivalent (Romero et al., 2015). Moreover, and in connection with our results, Ashton et al. (2014) indicated that Big Five agreeableness and HEXACO honesty-humility share common variance.

Finally, in Sample 5 we tested the potential associations between humor styles and anger-related measures (i.e., trait anger, anger expression, and anger control) to obtain new external validity evidence of the HSQ. Our results revealed that self-enhancing correlated with higher external and internal control of anger and lower trait-anger, with its two subscales: angry temperament and angry reaction. These data are consistent with the approach that considers self-enhancing humor to be a strategy or mechanism for regulating emotions and coping with stressful events (Dozois, Martin, & Bieling, 2008). Maintaining a humoristic outlook on life may be linked with the ability both to reappraisal situations that elicit angry feelings, as well to control anger-related behaviors against other people. Our results are in line with Samson and Gross's (2012) study, where it was observed that compared to negative humor, positive and benevolent humor was related to the ability to regulate emotions. They found that positive humor

was the most effective tool for down-regulating negative and up-regulating positive emotions. On the other hand, aggressive humor correlated with higher trait-anger and external expression of anger, whereas self-defeating humor correlated with higher internal expression of anger. It is also likely that people who tend to express—external or internally—anger use maladaptive humor styles, such as aggressive or self-defeating, respectively, as a way of manifesting this predisposition in a more socially acceptable form. Indeed, Martin (2007) suggested that the ambiguous nature of humor may represent an opportunity to make potentially injurious remarks under the semblance of mere amusement. Furthermore, past research has suggested that humor styles might be an explanatory mechanism of the relationship between some personal vulnerability factors (e.g., early maladaptive schemas) and psychological adjustment (Cann, Norman, Welbourne, & Calhoun, 2008; Dozois et al., 2008). Taking into account the relationship obtained between humor styles and anger management, future studies could analyze whether individual differences in humor styles can interact with anger management for accounting for other variables such as well-being, among others. Indeed, poor anger regulation is considered as a risk factor for well-being (Phillips, Henry, Hosie, & Milne, 2006). The use of humor might be a new variable that improves our understanding of this relation.

Finally, some limitations of the present study should be taken into account: (1) the use of a cross-sectional design does not allow establishing causal explanations; (2) a non-probabilistic convenience sampling method was used; however, our samples were not only restricted to undergraduate students, with a similar number of males and females in the different studies; (3) although we reproduced the main intercorrelations, gender and age effects, and the predicted correlations between humor styles and other theoretically relevant variables (i.e., well-being and basic personality dimensions), we

also found an unusual pattern of relationships for self-defeating humor. Future research should explore potential cultural differences in the use of this humor style.

5. Conclusions

In conclusion, the results obtained in this research entail the first psychometric data of the Spanish form of the HSQ. These data corroborated the adequacy and usefulness of this instrument aimed at assessing individual differences in the uses of humor. Furthermore, our data revealed that humor could be a relevant component for predicting (or accounting for) the way in which individuals handle angry feelings or episodes. It entails a further evidence of the therapeutic potential of humor for psychological interventions. New empirical studies have to be implemented to clarify this. For instance, it would be advisable to use experimental methodological strategies in order to test whether individual differences in the use of humor may be associated with different degrees of affective induction to anger.

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Table 1

Loadings of the 32 items of the Spanish form of the HSQ on the four rotated factors.

Items	F1	F2	F3	F4	h^2
Affiliative					
AF 1 (*)	.52	-	-	-	.28
AF 5	.53	-	-	-	.53
AF 9 (*)	.70	-	-	-	.49
AF 13	.64	-	-	-	.48
AF 17 (*)	.64	-	-	-	.41
AF 21	.61	-	-	-	.48
AF 25 (*)	.69	-	-	-	.51
AF 29 (*)	.69	-	-	-	.52
Self-enhancing					
SE 2	-	-	-	.58	.43
SE 6	.30	-	-	.49	.46
SE 10	-	-	-	.78	.59
SE 14	.32	-	-	.50	.50
SE 18	-	-	-	.84	.68
SE 22 (*)	-	.32	-	.38	.30
SE 26	-	-.40	-	.50	.39
SE 30	-	-	-	.47	.24
Aggressive					
AG 3	-	.56	.28	-	.43
AG 7 (*)	-	.60	-	-	.40
AG 11	-	.64	-	-	.47
AG 15 (*)	-	.69	-	-	.48
AG 19	-	.51	-	-	.36
AG 23 (*)	-	.64	-	-	.41
AG 27	-	.52	-	-	.33
AG 31 (*)	-	.71	-	-	.53
Self-defeating					
SD 4	-	-	.60	-	.43
SD 8	-	-	.70	-	.57
SD 12	-	-	.58	-	.34
SD 16 (*)	.44	-	.29	-	.33
SD 20	-	-	.60	-	.47
SD 24	-	-	.53	-	.29
SD 28	-	-	.51	-	.30
SD 32	-	-	.63	-	.42
Eigenvalues	4.43	3.68	3.29	3.72	

Note. $N = 300$. AF = affiliative humor; SE = self-enhancing humor; AG = aggressive

humor; SD = self-defeating humor; (*) = recoded; F = rotated factors (oblimin); h^2 =

communality.

Table 2

Descriptive statistics, reliability and intercorrelations of the four humor style dimensions

Scales	*M*	*SD*	(1)	(2)	(3)	(4)
HSQ						
(1) Affiliative	5.54	1.00	*.80*			
(2) Self-enhancing	4.61	1.03	.44**	*.75*		
(3) Aggressive	2.93	1.16	.04	-.05	*.78*	
(4) Self-defeating	3.60	1.08	.16*	.15*	.27**	*.74*

Note. $N = 300$. Cronbach alphas in italics. Due to sample size the significance threshold was set at .01.

* $p < .01$; ** $p < .001$

Table 3

Confirmatory factor analysis of the HSQ.

Variable	$\chi^2(df)$	CFI	TLI	RMSEA [90% CI]
Construction Sample ($N = 300$)				
Model 1	162.332 (98)	.949	.937	.047 [.034, .059]
Model 2	481.832 (103)	.697	.647	.111 [.101, .121]
Replication Sample I ($N = 261$)				
Model 1	201.553 (98)	.925	.906	.066 [.053, .078]
Model 2	617.266 (103)	.640	.581	.138 [.128, .149]
Replication Sample II ($N = 238$)				
Model 1	172.015 (98)	.924	.905	.058 [.044, .072]
Model 2	539.327 (103)	.564	.492	.134 [.123, .145]
New external validity evidence Sample ($N = 164$)				
Model 1	134.733 (98)	.951	.939	.050 [.028, .068]
Model 2	377.031 (103)	.654	.597	.127 [.114, .141]

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root-mean-square error of approximation; CI = confidence interval. Model 1 = original four factors model (Affiliative, Self-enhancing, Aggressive and Self-defeating humor styles); Model 2 = two factor model: Positive humor styles (Affiliative and Self-enhancing) vs. Negative humor styles (Aggressive and Self-defeating).

Table 4

Means, standard deviations, Cronbach alphas, and intercorrelations between the Humor Styles Questionnaire (HSQ) and the psychological well-being

scales.

Scales		M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
HSQ														
(1)	Affiliative	5.35	1.04	.80										
(2)	Self-enhancing	4.32	1.16	.56*	.84									
(3)	Aggressive	2.86	1.04	.10	-.04	.74								
(4)	Self-defeating	3.39	1.02	.34*	.44*	.26*	.74							
Well-being														
(5)	Happiness	3.49	0.70	.37**	.48**	.01	.17*	.79						
(6)	Hope	3.14	0.81	.35**	.27**	.01	.04	.68**	.85					
(7)	Health	3.67	0.65	.21*	.16*	-.01	-.09	.49**	.49**	.51				
(8)	Sociability	3.98	0.72	.37**	.28**	.08	.10	.53**	.42**	.38**	.70			
(9)	Life satisfaction	3.87	0.67	.38**	.31**	.01	-.04	.66**	.71**	.57**	.46**	.88		
(10)	Anxiety	19.34	11.41	-.31**	-.33**	-.03	.04	-.62**	-.60**	-.49**	-.38**	-.70**	.92	
(11)	Depression	7.40	6.93	-.25**	-.22**	.02	.04	-.45*	-.54**	-.51**	-.29**	-.62**	.74**	.88

Note. $N = 261$. Cronbach alphas in italics. Due to sample size the significance threshold was set at .01.
* $p < .01$; ** $p < .001$

Table 5

Means, standard deviations, Cronbach alphas, and intercorrelations between the Humor Styles Questionnaire (HSQ) and the NEO Five-Factor

Inventory (NEO-FFI).

Scales		M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
HSQ												
(1)	Affiliative	5.63	0.90	.80								
(2)	Self-enhancing	4.57	1.04	.42**	.77							
(3)	Aggressive	3.01	1.07	-.02	.01	.74						
(4)	Self-defeating	3.68	1.05	.14	.21*	.19*	.76					
NEO-FFI												
(5)	Neuroticism	1.96	0.77	-.26**	-.37**	-.01	.16	.87				
(6)	Extraversion	2.64	0.65	.54**	.37**	-.12	-.03	-.41**	.86			
(7)	Openness	2.65	0.59	.07	.25**	.04	-.05	.03	.06	.77		
(8)	Agreeableness	2.45	0.58	.23**	.24**	-.50**	.02	-.26**	.33**	-.02	.77	
(9)	Conscientiousness	2.53	0.66	.28**	.15	-.18*	-.16	-.36**	.30**	.01	.09	.85

Note. $N = 238$. Cronbach alphas in italics. Due to sample size the significance threshold was set at .01.

* $p < .01$; ** $p < .001$

Table 6

Means, standard deviations, Cronbach alphas, and intercorrelations between the Humor Styles Questionnaire (HSQ) and the HEXACO-60.

| Scales			M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
HSQ														
	(1)	Affiliative	5.67	.86	*.78*									
	(2)	Self-enhancing	4.71	.99	.43**	*.77*								
	(3)	Aggressive	3.09	1.08	.10	-11	*.75*							
	(4)	Self-defeating	3.83	.99	.24*	.35**	.30**	*.73*						
HEXACO-60														
	(5)	Honesty-Humility	3.55	.65	.11	.13	-.20*	-.02	*.71*					
	(6)	Emotionality	3.29	.66	-.18	-.08	-.30**	.01	-.01	*.74*				
	(7)	Extraversion	3.32	.58	.45**	.17	-.14	-.06	-.09	-.12	*.71*			
	(8)	Agreeableness	3.07	.60	.12	.35**	-.15	.08	.37**	-05	.01	*.67*		
	(9)	Conscientiousness	3.52	.64	-.04	-.14	-.16	-.25*	.14	.10	.09	-.08	*.77*	
	(10)	Openness	3.56	.71	.21*	.08	.04	.10	.22*	-.08	-.03	-.13	.03	*.75*

Note. $N = 105$. Cronbach alphas in italics.

* $p < .05$; ** $p < .01$

Table 7

Means, standard deviations, Cronbach alphas, and intercorrelations between the Humor Styles Questionnaire (HSQ) and the State-Trait Anger Expression

Inventory (STAXI-2).

| Scales	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
HSQ													
(1) Affiliative	5.75	0.89	.77										
(2) Self-enhancing	4.79	1.12	.47***	.82									
(3) Aggressive	2.88	1.17	.07	.16*	.80								
(4) Self-defeating	3.69	1.02	.23**	.44***	.24**	.72							
STAXI-2 (T)													
(5) Trait-Anger	20.76	5.30	-.15	-.21**	.17*	-.09	.82						
(6) Temperament	8.28	3.01	-.10	-.18*	.09	-.13	.77***	.85					
(7) Reaction	12.48	3.55	-.14	-.17*	.15	-.02	.84***	.30***	.80				
(8) Expression/Out	11.07	3.06	.02	.01	.39***	.03	.57***	.59***	.35***	.62			
(9) Expression/In	13.16	3.90	-.14	-.03	.06	.17*	.26**	.09	.30***	.05	.75		
(10) Control/Out	18.59	4.48	.10	.17*	-.05	.10	-.50***	-.63***	-.21**	-.54***	.13	.88	
(11) Control/In	15.01	4.32	.09	.29***	-.05	.13	-.22**	-.30***	-.08	-.19*	.04	.46***	.83

$N = 164$. Cronbach alphas in italics.

* $p < .05$; ** $p < .01$; *** $p < .001$
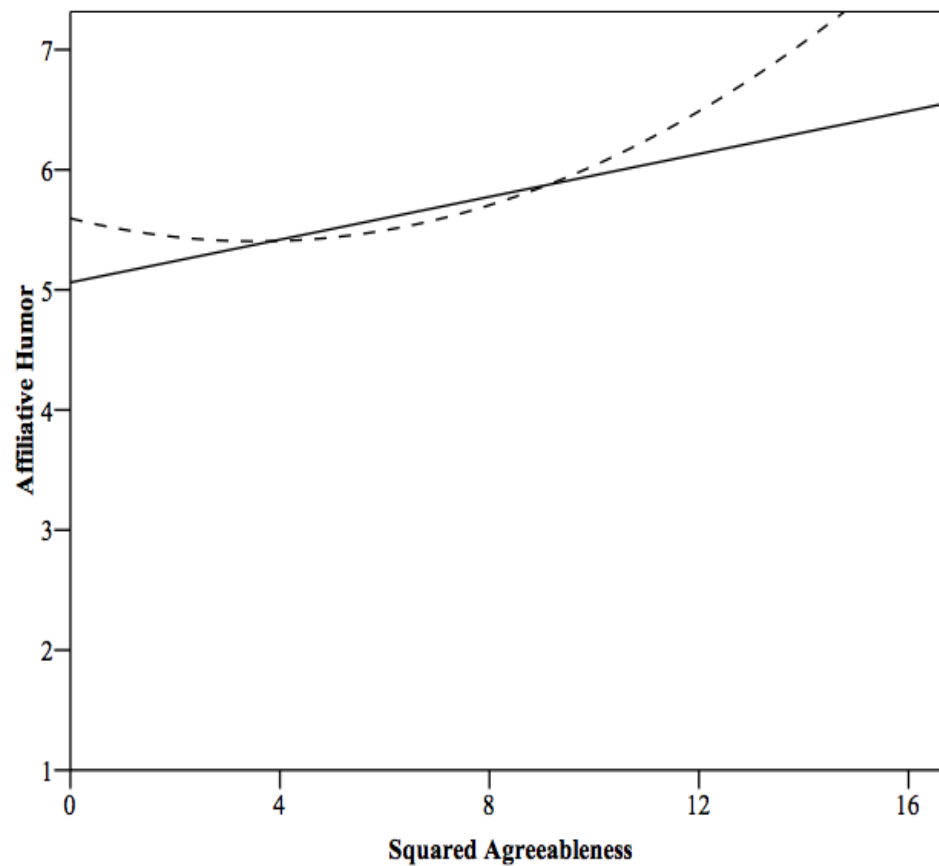
Figure 1. Relationship between NEO-FFI agreeableness factor and affiliative humor.
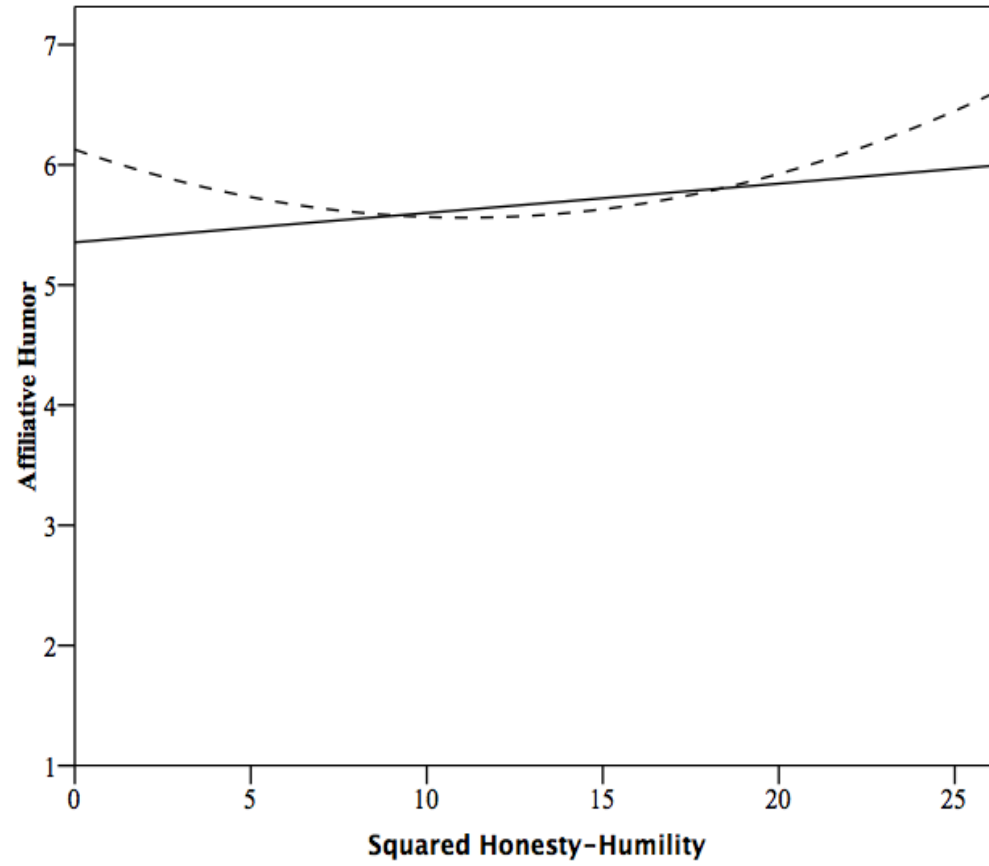
Figure 2. Relationship between HEXACO honesty-humility factor and affiliative humor.