

# Genetic and Environmental Contributions to Humor Styles: A Replication Study

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One thousand and seventy three pairs of adult monozygotic (MZ) twins and 895 pairs of same sex adult dizygotic (DZ) twins from the United Kingdom (UK) completed the Humor Styles Questionnaire: a 32-item measure which assesses two positive and two negative styles of humor. MZ correlations were approximately twice as large as DZ correlations for all four humor styles, and univariate behavioral genetic model fitting indicated that individual differences in all of them can be accounted for entirely by genetic and nonshared environmental factors, with heritabilities ranging from .34 to .49. These results, while perhaps not surprising, are somewhat at odds with a previous study that we conducted in North America (Vernon et al., in press) in which genetic factors contributed significantly to individual differences in the two positive humor styles, but contributed far less to the two negative styles, variance in which was instead largely due to shared and nonshared environmental factors. We suggest that differences between North American and UK citizens in their appreciation of different kinds of humor may be responsible for the different results obtained in these two studies.

Sense of humor is a construct that has long been of interest to personality researchers. Although it is often assumed to be a unitary trait, research over the past few decades indicates that it is best conceived as a cluster of loosely related traits and abilities. For example, individual differences exist in humor creation abilities, enjoyment of particular types of humorous stimuli, the tendency to tell jokes and amuse others, and to use humor as a coping mechanism (for reviews, see Martin, 2007; Ruch, 1998). These different facets of sense of humor lend themselves to different measurement approaches, and they are not necessarily highly intercorrelated.

Over the years, a small number of behavior genetic (BG) studies have investigated the degree to which genetic and environmental factors contribute to individual differences in some of these humor-related dimensions. These investigations have produced differing results, depending on the way sense of humor is

defined and measured. When humor is defined in terms of humor appreciation and measured by means of funniness ratings of jokes and cartoons, twin studies have generally found evidence of both shared and nonshared environmental contributions, but little evidence of a genetic contribution (Cherkas et al., 2000; Nias & Wilson, 1977; Wilson et al., 1977). Thus, people's tendency to enjoy or to prefer particular types of humorous stimuli seems to develop largely as a consequence of learning experiences both within and outside the family environment, rather than being innate.

On the other hand, a genetic contribution has been found in studies employing self-report measures of various aspects of sense of humor. For example, evidence of genetic as well as nonshared environmental influences was found with a one-item self-rating scale assessing the degree to which adolescent participants thought they had a 'good sense of humor' (Loehlin & Nichols, 1976). Similar results were obtained using a self-report measure of the degree to which adolescents engage in humorous interactions (joking, witty banter, laughter, etc.) in their relationships with their mother and siblings (Manke, 1998). However, the latter study showed only shared and nonshared environmental contributions to individual differences in these types of humorous interactions with close friends. Thus, genetic factors seem to contribute to individual differences in some aspects of humor, but not others.

Recently, Vernon et al. (in press) reported a twin study investigating the Humor Styles Questionnaire (HSQ), a questionnaire developed in Canada that assesses four general styles of humor use in everyday life (Martin et al., 2003). The HSQ was developed for use in research on mental health correlates of humor, and was based on the assumption that humor may be used in ways that are detrimental as well as beneficial for psychosocial wellbeing. It comprises four scales,

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two relating to potentially beneficial styles of humor (affiliative and self-enhancing) and two potentially detrimental styles (aggressive and self-defeating). *Affiliative humor* refers to the tendency to say funny things, to tell jokes, and to engage in spontaneous witty banter in order to amuse others, to facilitate relationships, and to reduce interpersonal tensions. *Self-enhancing humor* involves the tendency to maintain a humorous outlook on life even when not with others, to be frequently amused by the incongruities of life, and to use humor as a means of coping with stress. *Aggressive humor* is the use of humor for the purpose of criticizing or manipulating others, as in sarcasm, teasing, ridicule, and disparagement humor, as well as the use of potentially offensive (e.g., sexist or racist) forms of humor. Finally, *self-defeating humor* involves excessively self-disparaging humor, attempts to amuse others by doing or saying funny things at one's own expense, and the use of humor as a form of defensive denial.

The HSQ has demonstrated very good psychometric properties (Martin et al., 2003) and correlational research with this measure has demonstrated differential and theoretically relevant patterns of correlations between the four humor styles and a variety of other personality traits, including psychological wellbeing, prevailing positive and negative moods, self esteem, optimism, hostility, competitiveness, loneliness, shyness, intimacy, emotional intelligence, and agency and communion (Doris, 2004; Hampes, 2005, 2006; Kuiper et al., 2004; Martin, 2007; Martin et al., 2003; Olson et al., 2005; Yip & Martin, 2006). Since many of these variables have been shown in twin studies to have a genetic contribution, it might be expected that the four humor styles, with which they are differentially correlated, might also have some heritability.

Our previous study (Vernon et al., in press) involved 300 pairs of monozygotic (MZ) twins and 156 pairs of dizygotic (DZ) twins ranging in age from 18 to 74 years, who were recruited by means of advertisements in newspapers and at the 2006 Twinsburg, Ohio Twins Days Festival. The majority of these participants were from Canada or the United States. The results of our analyses indicated that individual differences in affiliative and self-enhancing humor styles were largely attributable to genetic and nonshared environmental factors, whereas individual differences in aggressive and self-defeating humor styles were largely attributable to shared and nonshared environmental factors. All four humor styles did show evidence of some genetic influence, although heritabilities of aggressive and self-defeating humor were substantially lower (.17 and .05, respectively) than were heritabilities of affiliative and self-enhancing humor (.44 and .41, respectively).

In sum, these results indicated that positive uses of humor (amusing others to facilitate relationships, and using humor to cope with stress) develop partly as a consequence of innate genetic factors and partly

through unique life experiences. In contrast, negative uses of humor (aggressive teasing of others, and excessively self-disparaging humor) develop largely as a consequence of learning experiences both within and outside the family environment. The purpose of the present study was to see whether these findings would replicate with a larger sample of twins.

## Method

### Participants

One thousand and seventy three pairs of adult MZ twins (967 female pairs, 106 male pairs) and 895 pairs of same sex adult DZ twins (835 female pairs, 60 male pairs) took part in this study. The twins ranged in age from 17 to 90 years and are participants in an ongoing twin study conducted by The Twin Research and Genetic Epidemiology Unit at St Thomas' Hospital in London, England. This study mails out questionnaires to approximately 9000 individual twins about once a year. The twins' zygosity has been previously established either by genome scans (100% accurate), DNA tests (99.5% accurate), or via their responses to the 'Peas in the pod' zygosity questionnaire (95% accurate). The twins are not paid or otherwise compensated for their participation.

### Measures

The Humor Styles Questionnaire (HSQ) contains 32 items designed to measure four styles of humor: affiliative, self-enhancing, aggressive, and self-defeating. Participants rate the extent to which they agree with different statements about their sense of humor on a 7-point Likert scale (1 = *disagree completely*, 7 = *agree completely*). Examples of items for each humor style are: 'I laugh and joke a lot with my friends' (affiliative), 'If I am feeling depressed, I can usually cheer myself up with humor' (self-enhancing), 'If I don't like someone, I often use humor or teasing to put them down' (aggressive), and 'I let people laugh at me or make fun at my expense more than I should' (self-defeating).

### Procedure

In November 2006, approximately 9000 individual twins were mailed a package of questionnaires which included the HSQ and a number of other questionnaires which are not pertinent to the present report. Approximately 5000 individual twins (56%) returned the completed questionnaires and, of these, a total of 3936 made up the 1073 MZ and 895 DZ same sex twin pairs who comprise our sample. Twins completed the questionnaires on their own time at their homes and returned them to St Thomas' Hospital.

## Results

Shown in Table 1 are the MZ and same sex DZ twin correlations for the four humor styles. Also shown are genetic and environmental parameter estimates derived from univariate behavioral genetic model-fitting analyses performed with the software program

**Table 1**  
MZ and DZ Twin Correlations and Univariate Genetic Analyses

	MZr	DZr	a <sup>2</sup> (95% CI)	c <sup>2</sup> (95% CI)	e <sup>2</sup> (95% CI)
Humor scales					
Affiliative	.48	.23	.49 (.37–.53)	.00 (.00–.10)	.51 (.47–.56)
Self-enhancing	.40	.17	.39 (.27–.43)	.00 (.00–.10)	.61 (.57–.66)
Aggressive	.43	.19	.39 (.24–.46)	.02 (.00–.15)	.58 (.54–.63)
Self-defeating	.40	.21	.34 (.18–.44)	.05 (.00–.18)	.61 (.56–.66)

Note: MZr = MZ twin correlation; DZr = DZ twin correlation; a<sup>2</sup> = additive genetic effects; c<sup>2</sup> = shared environmental effects; e<sup>2</sup> = nonshared environmental effects; 95% CI = 95% confidence interval.

Mx (Neale et al., 1999): a<sup>2</sup>, c<sup>2</sup>, and e<sup>2</sup> represent the proportion of the variance attributable to additive genetic, shared, and nonshared environmental factors, respectively.

As can be seen, MZ correlations are approximately twice as large as DZ correlations for all variables, and the full ACE model-fitting results indicate that individual differences in all variables can be accounted for almost entirely by additive genetic and nonshared environmental factors. Heritabilities for the four humor styles range from .34 to .49. All a<sup>2</sup> and e<sup>2</sup> parameter estimates in Table 1 are significant as shown by their 95% confidence intervals, none of which contains zero. In contrast, none of the c<sup>2</sup> estimates are significant (all of their confidence intervals contain zero), and, although this may be attributable to low power, the upper limit for the influence of the shared environment is only 18%, which is markedly lower than the influences of genetic and nonshared environmental effects (whose upper limits are 53% and 66%, respectively).

## Discussion

The purpose of the present study was to attempt to replicate the Vernon et al. (in press) finding that individual differences in affiliative and self-enhancing humor were largely attributable to additive genetic and nonshared environmental factors, whereas individual differences in aggressive and self-defeating humor were largely attributable to shared and nonshared environmental factors.

In contrast to Vernon et al. (in press), we found here that all four styles of humor were best fit by an additive genetic and nonshared environmental model, with the styles showing heritabilities ranging from .34 to .49. Although this result is compatible with that of BG studies of other personality traits — which have consistently reported AE models for virtually every trait that has ever been investigated (see Johnson et al., in press, for a review of over 50 years of BG research on personality), it raises the interesting question as to why Vernon et al. (in press) found different results using the identical measure of humor styles.

One possibility is that because the HSQ was developed in Canada its items may be more salient

for North American than for United Kingdom (UK) citizens. If this were the case, however, it might be argued that this would have yielded the reverse pattern of results to those that were actually found: i.e., all scales showing heritabilities in our North American sample rather than in our UK sample.

A second possibility is that the Vernon et al. (in press) results were simply an artifact of their particular twin sample. Evidence suggesting that this is unlikely comes from the fact that Vernon et al. also included the NEO-PI-R in their study, and its model-fitting results were completely in line with those of other BG studies of the Big 5. In other words, the twins in their sample yielded results for the Big 5 which ‘behaved properly’, and which thereby suggests that their sample is representative of twins in general.

Like the present sample, Vernon et al. (in press) had a wide age range (18–74 years) and had many more female than male pairs. Age and sex, therefore, can be ruled out as possible factors that might have contributed to differences in the results. The major difference between the Vernon et al. sample and the present sample is nationality: virtually all of the first sample was North American whereas virtually all of the present sample are citizens of the UK. It is an interesting possibility that differences exist between these nations in their sense of humor and that these may have led to different patterns of genetic and environmental influences. UK citizens, for example, may have a greater tolerance for a wide range of expressions of humor, including what many North Americans might consider aggressively sarcastic or denigrating: such as is found in the UK’s highly popular TV shows ‘Fawlty Towers’ and ‘Blackadder’. It is also noteworthy that in the North American version of ‘The Office’ the lead character (the boss) is much less insensitive and intolerant than is his counterpart in the original UK version.

In conclusion, our present study successfully replicated the Vernon et al. (in press) finding that individual differences in two positive styles of humor — affiliative and self-enhancing — are largely attributable to genetic and nonshared environmental factors. Unlike Vernon et al. (in press), however, our present study found little evidence for an influence of shared

environmental factors on individual differences in negative styles of humor. We are currently collecting humor data in other countries, and it will be interesting to see whether different patterns of genetic and environmental influences are found in these samples as well.

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