The present study examined the relationship between humor styles and depression using two methods of examination: (1) the mean humor style differences between individuals who reported that they had been diagnosed with depression versus those who did not report being depressed; and (2) the phenotypic, genetic, and environmental correlations between humor styles and a short scale assessing depressed affect created from preexisting measures in archival data. Participants were 1154 adult Australians, consisting of 339 monozygotic twin pairs and 238 dizygotic twin pairs. With respect to mean differences, depressed individuals were found to use self-defeating humor more and self-enhancing humor less than non-depressed adults. When the depressed affect scale score was analyzed, negative correlations were found with both affiliative and self-enhancing humor. A positive correlation was found between depressed affect and both aggressive and self-defeating humor. These phenotypic correlations were also found to have some significant genetic and environmental correlations.

Keywords: humor styles, depression, adult, behavior genetics

1 Introduction

The most recent diagnostic definition of depressive disorders from the Diagnostic and Statistical Manual of Mental Disorders-5th Edition (DSM-V; American Psychiatric Association 2013), defines “Depressive Disorders” as the feelings of sadness, emptiness or irritableness in addition to other cognitive or physiological symptoms that interfere with one’s ability to function. Depression impedes both personal and social relationships, and is associated with an increased sensitivity to criticism (Barrett and Barber 2007; Dinger et al. 2015; Natoli et al. 2016). As humor styles play an important role in how an individual
feels about their self and their relationships with others, the present study furthers the understanding of depression and depressed affect by examining the relations with humor styles.

1.1 Humor and mental health

Positive psychology research has demonstrated that humor has powerful effects on both physical and mental health (Cann et al. 2010; Chen and Martin 2007). For example, humor has been shown to benefit those suffering from cancer, mental health disorders, and even the dying (Richman 2006; Rose et al. 2013). Martin et al. (2003) proposed humor to have both positive and negative functions. Specifically, the four styles of humor in Martin et al.’s (2003) theory include two positive styles (affiliative and self-enhancing) and two negative humor styles (aggressive and self-defeating).

Positive styles of humor have been shown to benefit mental health, specifically in feelings of happiness, good overall health, and social self-esteem (Kuiper and McHale 2009; Yue et al. 2014). Affiliative humor includes teasing, practical joking, and playful humor and is used to amuse others, relieve tension, and to form positive interpersonal relationships. Self-enhancing humor includes coping with mishaps and stressors in life with a positive and humorous perspective, similar to Freud’s view of a healthy defense mechanism (Martin et al. 2003).

Negative styles of humor have been shown to be benign or even detrimental to one’s wellbeing and mental health and have been found to be correlated with neuroticism, social anxiety, depressive symptoms, and suicide ideation (Scherrmer et al. 2013; Tucker et al. 2013a, Tucker et al. 2013b). Because negative humor styles can make it difficult to connect with others, and often demonstrates inadequate self-esteem, negative humor styles have also been linked to a specific vulnerability to depression (Frewen et al. 2008). Aggressive humor includes hostile and rude jokes and is used to threaten or manipulate others by putting them down. Self-defeating, or self-deprecating, humor includes putting one’s self down for the sake of the joke. Therefore self-defeating humor is used to gain approval from others or to avoid one’s own negative thoughts and feelings (Martin et al. 2003). This suggests that exhibiting humor styles that are perceived as disparaging or rude to someone else (aggressive), as well as avoidant or self-deprecating (self-defeating), have negative consequences on the self. Not only is it seen as hurtful towards others, but negative humor styles may also hinder the social connection someone is trying to achieve with humor. Therefore, it is valuable to understand the personal and social consequences associated with certain styles of humor.
2 Heritability of depression and humor

Although no specific gene has been identified to cause depression, twin and adoption studies have demonstrated that the risk of depression among first-degree relatives is high (Jang et al. 2004; Lohoff 2010) and that the heritability estimates of depression are equal for men and women (Kendler and Prescott 1999). Sullivan et al. (2000) performed a meta-analysis that looked at adult major depression disorder in families and concluded that approximately 40% of the likelihood of depression was due to genetic factors (see also review by Lohoff 2010). Jang et al. (2004) examined the heritability estimates for specific symptoms of depression and depressed affect and found variability in the genetic estimates. For example, some physiological symptoms of depression (such as loss of appetite and libido) as well as depressed affect including feelings of guilt and hopelessness were heritable with estimates ranging from 18% for positive affect and suicidal thoughts to 35% for insomnia across 14 depression factors. In contrast, depression dimensions such as phobias, tearfulness, and nausea and headaches were not found to have a significant heritability estimate. Wichers et al. (2007) also found that twins with a genetic vulnerability to depression were biased toward negative affect when exposed to major life stressors. These findings suggest that some of the components of depression have a genetic basis.

Humor is an essential component of interaction with a strong evolutionary history (Polimeni and Reiss 2006) and humor styles have been found to be heritable with heritability estimates ranging from 5% for self-defeating humor to 47% for both the aggressive and self-defeating humor styles (Baughman et al. 2012; Schermer et al. 2017; Vernon et al. 2008). Because both humor styles and depression have been found to have a genetic component, the present study examines the genetic and environmental correlations between depression and humor styles to assess if the observed phenotypic correlations have any possible common genetic and/or environmental factors.

3 Depression and humor predictions

Recent literature suggests that self-directed styles of humor (including self-enhancing and self-defeating) are the most relevant in terms of coping with and buffering stressors in life (Cann et al. 2010; Oktug 2017). As self-directed humor styles are defined by intrapersonal thinking and evaluation, which involves the reflection of one’s self and the attempt to connect with others, it
may not be surprising that self-directed humor styles have been found to be correlated with borderline personality disorder, loneliness, perceptions of social support, and spitefulness (Schermer et al. 2015, Schermer et al. 2017; Vrabel et al. 2017; Zhao et al. 2014). These findings suggest that both self-enhancing and self-defeating humor styles are crucial when looking at factors that relate to psychological well-being and mood disorders such as depression. The self-defeating humor style, which is associated with negative self-evaluative standards, lower social self-esteem, greater self-report loneliness, and overall lower psychological wellbeing, may be one of the strongest correlates with depression (Kuiper and McHale 2009; Schermer et al. 2017).

The present study explores the relationships between humor styles and depression in an adult population from an archival data set. Mean differences in humor styles were tested to better understand the possible differences in the use of humor in depressed versus non-depressed individuals. The study also examines the correlations between a depressed affect measure (created from the scales completed by the participants) and humor styles at the phenotypic level and the bivariate genetic level. It was hypothesized that participants who identified as being diagnosed with depression would exhibit higher levels of self-defeating humor than non-depressed participants. It was also hypothesized that individuals who have reported to have been diagnosed with depression would exhibit lower levels of both positive humor styles (affiliative and self-enhancing) than the non-depressed group. Finally, it was hypothesized that positive correlations may be found between negative humor styles (self-defeating and aggressive) with depressed affect; that negative correlations will be found between positive humor styles (affiliative and self-enhancing) and depressed affect; and that these phenotypic correlations may themselves have significant genetic and/or environmental correlations.

4 Method

4.1 Participants

Participants were 1154 adult Australians, consisting of 339 monozygotic (MZ) twin pairs (236 MZ female and 103 MZ male) and 236 same-sex dizygotic (DZ) twin pairs (177 DZ female and 61 DZ male), who partook in The Twin and Family Study at The Queensland Institute of Medical Research. The average age of the sample was 34.76 years ($SD = 2.53$, range = 30 to 45).
4.1.1 Measures and procedure

Participants completed a set of questionnaires including demographic information (age, sex, marital status, general health, and family history) as well as the scale and items described below (see Wright and Martin 2004). Randomly selecting one twin from each pair, 145 individuals were found to have stated that they were diagnosed with depression after age of 14. Responses to this item were used to distinguish the depressed versus non-depressed groups.

4.2 Humor styles questionnaire (HSQ; Martin et al. 2003)

The 32-item Humor Styles Questionnaire (HSQ; Martin et al. 2003) measures four constructs of humor, including: two positive dimensions, affiliative humor (engaging in humor to relieve tension, to form relationships, to be amusing), and self-enhancing humor (the use of humor to cope or regulate one’s negative emotions); and two negative dimensions, aggressive humor (sarcastic or disparaging humor used without regard for other’s feelings) and self-defeating humor (putting one’s own self down to be humorous, gain approval, or defend one’s self). The humor style model is based on the assumption that every person uses humor in ways that are indicative of their personality traits. Affiliative humor, which may be used to enhance relationships with others (example item, “I enjoy making people laugh”), and self-enhancing humor, which may be used to alleviate one’s own stress (example item, “If I am feeling depressed, I can usually cheer myself up with humor”) have both been linked to positive personality traits such as openness, agreeableness, as well as psychological wellbeing and social relatedness (Martin et al. 2003). In contrast, the aggressive humor style (example item, “If I don’t like someone, I often use humor or teasing to put them down”) and the self-defeating humor style (example item, “I will often get carried away in putting myself down if it makes my family or friends laugh”) have both been linked to constructs including hostility, and negative personality traits such as neuroticism (Martin et al. 2003). The HSQ demonstrates construct validity, correlating with other personality measures, as well as other humor scales, (Martin et al. 2003). Items in the HSQ are responded to using a 7-point Likert scale, which measures the extent to which participants disagree (1) or agree (7) with each item. Each of the four subscales consists of eight items. Martin et al. (2003) has shown that the four subscales of the HSQ are reliable, and in the present sample, the internal consistency values were 0.86 for affiliative, 0.82 for self-enhancing, 0.71 for aggressive, and 0.83 for self-defeating.
4.3 Selected depression items

Although the sample did not complete a depression scale, to better understand the relationship between depressed affect and humor styles, three items were selected from the larger battery of questionnaires given to participants as they pertain to depression and the DSM-5 definition of Depressive Disorders, specifically, “the feelings of sadness, emptiness or irritableness in addition to other cognitive or physiological symptoms that interfere with one’s ability to function” (American Psychiatric Association 2013) to create a continuous measure. The diagnostic features as outlined by the DSM-5 updated criterion guided the selection of these three items. The first item was, “Sometimes I feel terribly empty inside” taken from the PAI-BOR: Personality Assessment Inventory- Borderline Features Questionnaire (Morey 1991). This item addresses what is labelled as criterion A1 of the DSM-5 Major Depressive Disorder, in which the individual feels “sad, empty, hopeless” (American Psychiatric Association 2013). By subjective report, one may feel emptiness and tearfulness in the presence of a depressive disorder, in a period longer than two weeks, including loss of interest and depressed mood most of every day. The second item was, “Sometimes I feel completely worthless” from the NEO-FFI: Five Factor Inventory Questionnaire (McCrae and Costa 2004). Unrealistic negative cognitions in depressive disorders may result in disproportionate feelings of worthlessness and guilt (Criterion A7 for Major Depressive Disorder; American Psychiatric Association 2013). This is due to the individual’s hindered ability to correctly interpret day-to-day events in a neutral manner, leading in some cases to a strong sense of blame, personal defect, and worthlessness. The final item was, “I am seldom sad or depressed” from the NEO-FFI: Five Factor Inventory Questionnaire, (McCrae and Costa 2004). This item, when negatively keyed, pertains to criterion A1 as well, in which the individual experiences feelings of sadness, a “down in the dumps” outlook on life (American Psychiatric Association 2013). Due to the secondary data nature of the present study, these three items were used to generate a depressed affect scale to better justify depressive disorders beyond the single item “Diagnosed with Depression” in the demographic information, in which participants answered yes or no. The content of these items may reflect depression as a trait because, as is recognized by the American Psychiatric Association (2013), depression can reflect periods of negative affect and not constant negative states, suggesting that terms such as “sometimes” may be tapping into the negative emotions.
5 Results

5.1 Sex differences and correlations with age for the humor styles

Table 1 lists the sex differences for the humor style scale scores. Specifically, males tend to use aggressive, affiliative, and self-defeating humor more than females. Age did not have robust correlations with humor styles with the correlations ranging from 0.03 with self-enhancing to −0.08 with affiliative.

Table 1: Humor style differences for men and women.

<table>
<thead>
<tr>
<th>Humor Style</th>
<th>Men (N = 951)</th>
<th>Women (N = 1755)</th>
<th>F</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Affiliative</td>
<td>45.42 (7.16)</td>
<td>43.14 (8.18)</td>
<td>15.17*</td>
<td>7.51*</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>36.81 (7.11)</td>
<td>35.83 (8.08)</td>
<td>18.62*</td>
<td>3.14</td>
</tr>
<tr>
<td>Aggressive</td>
<td>28.40 (7.57)</td>
<td>23.51 (6.81)</td>
<td>16.70*</td>
<td>16.62*</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>26.01 (8.58)</td>
<td>24.09 (9.11)</td>
<td>7.58</td>
<td>5.33*</td>
</tr>
</tbody>
</table>

*p < 0.001, two-tailed

5.2 Sex and age analyses for depression groups

Chi-square analyses showed a significant association between sex and depression status ($\chi^2 = 67.68$, $p < 0.001$). Consistent with previous literature (Nolen-Hoeksema and Girgus 1994), females were nearly two and a half times more likely to be depressed than males, odds ratio = 2.391. Age was not significantly different for the depressed versus non-depressed groups ($t = 0.04$, $p < 0.60$).

5.3 Humor style differences by depression

Table 2 provides the means for the humor styles for depressed versus non-depressed individuals. The pattern confirms the hypothesis that individuals diagnosed with depression exhibit higher levels of the self-defeating (defensive) humor style. In addition, adults diagnosed with depression tend to use positive styles of humor less than non-depressed adults, including both affiliative and
self-enhancing humor. This difference was most apparent for the self-enhancing humor style. The depressed group was also found to have greater variability (based on F-tests) in the affiliative, self-enhancing, and self-defeating scales than the non-depressed group. The mean difference in aggressive humor by depression status was not significant.

5.4 Depression affect scale

Cronbach’s alpha for the three items chosen to measure depressive affect was 0.53 suggesting that the scale was moderately reliable with respect to internal consistency for such a short scale and because of the fact that the items were from different scales and were responded to with different response options (the NEO-FFI utilizes a 5-point scale and the PAI-BOR has a 3-point scale). The mean inter-item correlation was 0.30 and Cronbach’s alpha did not increase after the removal of any item. A scale score was created by aggregating across the three items. Men (M = 6.19, SD = 2.01) were not found to differ significantly from women (M = 6.24, SD = 2.01; F = 0.41, t = −0.75) on the depressive affect scale score. A small negative correlation was found between age and the depressive affect scale score (r = −0.10, p < 0.001).

The depressive affect scale scores were then compared for the depressed (M = 7.58, SD = 2.13) versus not depressed (M = 5.83, SD = 1.79) groups. A significant difference was found for both the test of variances (F = 30.48, p < 0.001) in that there was greater scale variance in the depressed group, and for the test of means (t = 18.58, p < 0.001) with higher depressive affect scale scores in the depressed group. These findings suggest that the depressive affect scale score provides an additional measure of depression for analyses with the humor styles.

<table>
<thead>
<tr>
<th>Humor Style</th>
<th>Depressed Mean (N = 612)</th>
<th>Not depressed Mean (N = 2094)</th>
<th>F</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliative</td>
<td>42.38 (SD = 8.91)</td>
<td>44.39 (SD = 7.54)</td>
<td>35.38*</td>
<td>−5.56</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>32.93 (SD = 8.86)</td>
<td>37.12 (SD = 7.15)</td>
<td>44.27*</td>
<td>−12.04*</td>
</tr>
<tr>
<td>Aggressive</td>
<td>24.64 (SD = 7.44)</td>
<td>25.40 (SD = 7.46)</td>
<td>0.88</td>
<td>−2.22</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>26.77 (SD = 9.92)</td>
<td>24.18 (SD = 8.59)</td>
<td>21.93*</td>
<td>5.86*</td>
</tr>
</tbody>
</table>

*p < 0.001, two-tailed
6 Behavior genetic analyses

For the depressed affect scores, the MZ intra-class correlation of 0.25 was found to be higher than the DZ correlation of 0.16. Following standard univariate genetic analyses using the software Mx (Neale et al. 2006), the additive genetic ($a^2$), common environment ($c^2$), and unique environment ($e^2$) estimates were estimated. In particular, the full ACE model was tested against the reduced AE, CE, and E-only models and fit was assessed. The AE model was found to be the best fitting model based on the lowest chi-square per degree of freedom and most negative AIC value. The additive genetic estimate was found to be 0.26 (95% confidence interval = 0.17 to 0.35) and the unique environmental estimate was found to be 0.74 (95% confidence interval = 0.65 to 0.83).

The results of the univariate genetic analyses for the HSQ for this sample were recently published (see Schermer et al. 2017), with additive genetic effects averaging 0.32 and unique environmental effects averaging 0.58 across the four humor styles.

Table 3 reports the phenotypic correlations ($r_p$) between the depressed affect scale and the humor style scales. Significant negative correlations were found between the depressive affect scale score and the two socially positive humor styles of affiliation and self-enhancing. In contrast, the depressive affect scale had positive correlations with the socially negative humor styles of aggressive and self-defeating. Bivariate genetic analyses were then calculated to further examine the covariance between the humor scales and the depressed affect scale scores. Cholesky or triangular decomposition (see Neale and Cardon 1992) was applied to the MZ and DZ mean square between- and within-pair covariance matrices to calculate genetic and environmental correlations using the program Mx (Neale et al. 2006). Similar to the univariate results, the AE model was found

<table>
<thead>
<tr>
<th>Humor Style</th>
<th>Phenotypic</th>
<th>Genetic</th>
<th>Unique Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affiliative</td>
<td>−0.17*</td>
<td>−0.14 (−0.34 to 0.08)</td>
<td>−0.14 (−0.05 to −0.24)</td>
</tr>
<tr>
<td>Self-enhancing</td>
<td>−0.36*</td>
<td>−0.33 (−0.09 to −0.52)</td>
<td>−0.37 (−0.29 to −0.45)</td>
</tr>
<tr>
<td>Aggressive</td>
<td>0.12*</td>
<td>0.08 (−0.11 to 0.27)</td>
<td>0.14 (0.05 to 0.24)</td>
</tr>
<tr>
<td>Self-defeating</td>
<td>0.30*</td>
<td>0.55 (0.38 to 0.72)</td>
<td>0.20 (0.11 to 0.29)</td>
</tr>
</tbody>
</table>

*p < 0.001; two-tailed; 95% confidence intervals are in the brackets; those which do not contain zero are deemed to be significant and are in bold text. All cross-correlations were best fit by an AE model.
to have the best fit for each of the bivariate genetic models, indicating that the phenotypic correlations were best explained by common genetic and unique environmental factors.

The results of the bivariate genetic analyses are reported in Table 3. Correlations with a 95% confidence interval (values within the brackets) that do not include zero are considered to be statistically significant. Because the results were found to be very similar (or the same) when the uncorrected and the corrected (age and sex regressed) data were analyzed, the uncorrected results are presented in the present study. As reported in Table 3, the self-enhancing and self-defeating genetic correlations were significant, suggesting that there may be a common genetic factor influencing the phenotypic correlations. All of the unique environmental correlations were significant, suggesting that the phenotypic correlations are also due to overlapping unique environmental influences which includes measurement error as well as individualized experiences within the twin pair. For example, unique environmental influences reflect different classroom environments and different peer experiences for each twin (Vernon et al. 1997).

7 Discussion

The present study furthers our understanding of how humor relates to depression. Humor styles that are detrimental to psychological well-being, in particular self-defeating humor, were associated with depression and higher scores on the depressed affect scale. This finding is similar to previous research which has found that self-defeating humor is associated with loneliness (Schermer et al. 2017), difficulty in both identifying and describing feelings and general alexithymia (Atkinson et al. 2015), and borderline personality characteristics including: affect instability, identity disturbance, negative relationships, and self-harm (Schermer et al. 2015).

Individuals diagnosed with depression also tend to not use positive styles of humor as often as the non-depressed individuals. Therefore, in accordance with previous research, the pattern of high self-defeating humor and low social and self-enhancing humor may result in a vulnerability to depression (Frewen et al. 2008). These findings reflect the results by Stockton et al. (2016) who reported that self-enhancing and affiliative humor are positively correlated with reasons for living and gratitude.

The use of aggressive humor was not significantly different between depressed and non-depressed individuals, likely because this type of humor
has more to do with hurting another individual rather than hurting one’s self (Martin et al. 2003). If someone uses aggressive humor, it could also imply that they are not employing the self-awareness needed to control the desire to ridicule or tease. Aggressive humor has been positively linked to neuroticism and negatively correlated with conscientiousness (Schermer et al. 2013). Therefore, aggressive humor may have less to do with depression and one’s intrapersonal interactions, and more to do with general aggression and a lack of awareness towards others.

Age was found to not correlate significantly with humor styles, consistent with previous findings (Martin et al. 2003). This result suggests that there were no generational differences for humor styles in the present sample which may not be surprising as the age range was quite narrow. Age also did not have a significant relationship with depression. Females were nearly two and a half times more likely to be depressed, consistent with the literature showing that women are more vulnerable to depressive symptoms, as well as depression in general (Frewen et al. 2008; Nolen-Hoeksema and Girgus 1994).

The short depressive affect scale, which was generated from three items taken from other measures, was found to have a genetic component with a heritability estimate of 25% which is similar to the values reported by Jang et al. (2004). Because humor styles have also been found to be heritable, the observed phenotypic correlations were examined for possible genetic and/or environmental correlations. All of the correlations between the humor styles and depressed affect had significant unique environmental correlations. Of great interest were the moderately strong genetic correlations between depressed affect and self-defeating humor (in the positive direction) and self-enhancing humor (in the negative direction). These results may not be too surprising as self-enhancing humor has been shown to correlate with positive affect and self-defeating humor has been shown to strengthen the relationship between life stress and depression, specifically strengthening the link between social anxiety and depression outcomes (Tucker et al. 2013a, Tucker et al. 2013b). Self-defeating humor involves self-disparaging acts which are used to gain approval from others and to avoid the underlying negative thoughts and feelings an individual may have about their self (Rnic et al. 2016) which may result in more feelings of emptiness and depression. Self-defeating humor may, therefore, have its roots in depression itself, in that depressed individuals may use humor in an attempt to alleviate feelings of emptiness and sadness. Coyne’s (1976) interpersonal theory of depression supports this hypothesis, suggesting that depressed individuals seek reassurance from others, but then doubt this reassurance afterward. Therefore, the use of self-defeating humor may actually hinder the depressed individual’s ability to overcome their self-doubt and sadness. Self-defeating
humor is therefore an important construct for future research investigating mood disorders as well as aspects of mood disorders such as distorted cognitions, psychological well-being, and treatment.

8 Limitations and future research

In this study, participants self-reported to be diagnosed with depression, therefore, there is a possibility that some participants were diagnosed with depression, but did not report that fact. Ideally independent verification of depression diagnoses should be obtained in future studies. Also, the participants in this study were diagnosed with depression after the age of 14. Due to the cross-sectional nature of this data, it is unknown whether these participants had stable humor styles before the diagnosis of depression. The present study is also limited in that a recognized and more reliable depression scale was not utilized but, because of the archival nature of the data, a short scale was created from three items from different measures and used in the analyses. Future research may also want to investigate different types of depressive disorders in order to clarify the relationship between humor styles and depression.

9 Conclusions

As predicted, the self-directed humor styles, which include the socially positive self-enhancing and the socially negative self-defeating, had the strongest relationships with depression both with respect to mean differences and correlational strength. The correlations between the self-directed humor styles and the depressed affect were also found to have significant genetic correlations suggesting that the phenotypic correlation is influenced by common genetic factors.

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References


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