Research Reports

Humor Styles and the Intolerance of Uncertainty Model of Generalized Anxiety

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Abstract

Past research suggests that sense of humor may play a role in anxiety. The present study builds upon this work by exploring how individual differences in various humor styles, such as affiliative, self-enhancing, and self-defeating humor, may fit within a contemporary research model of anxiety. In this model, intolerance of uncertainty is a fundamental personality characteristic that heightens excessive worry, thus increasing anxiety. We further propose that greater intolerance of uncertainty may also suppress the use of adaptive humor (affiliate and self-enhancing), and foster the increased use of maladaptive self-defeating humor. Initial correlational analyses provide empirical support for these proposals. In addition, we found that excessive worry and affiliative humor both served as significant mediators. In particular, heightened intolerance of uncertainty lead to both excessive worry and a reduction in affiliative humor use, which, in turn, increased anxiety. We also explored potential humor mediating effects for each of the individual worry content domains in this model. These analyses confirmed the importance of affiliative humor as a mediator for worry pertaining to a wide range of content domains (e.g., relationships, lack of confidence, the future and work). These findings were then discussed in terms of a combined model that considers how humor styles may impact the social sharing of positive and negative emotions.
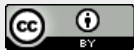
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Introduction

In this study we describe and empirically test several proposed relationships between an individual's sense of humor and their level of anxiety. Initial support for exploring these relationships has been obtained in several prior research studies in the humor domain. As one illustration, Abel (2002) found that those with a greater sense of humor reported less anxiety and stress pertaining to everyday life experiences than those with less humor. Drawing upon previous humor research by Kuiper, McKenzie, and Belanger (1995), Abel attributed this distinction to differences in the cognitive appraisal process, suggesting that those with greater levels of humor also generate more positive challenge appraisals and fewer negative threat appraisals when encountering stressful life events. Abel and Maxwell (2002) also reported similar findings, with more humorous individuals coping better with stress and displaying less anxiety. Furthermore, it has been found that individuals with a greater sense of humor generally report fewer worries on a daily basis (Kelly, 2002).

In light of these findings, additional research has provided further investigations of possible relationships between sense of humor and anxiety. Using the Humor Styles Questionnaire (HSQ) to assess four distinct individual difference styles of humor (i.e., affiliative, self-enhancing, aggressive, and self-defeating), investigators have found different patterns of relationships between these humor styles and anxiety (Kuiper, Grimshaw, Leite, & Kirsh, 2004; Martin 2007; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003). In particular, greater affiliative humor, which involves generating and sharing humor in a social context to improve relationships and make others laugh, has been associated with lower anxiety. In a similar manner, a higher level of self-enhancing humor, which involves using humor as an effective coping technique for dealing with life stressors, has also been linked to reduced anxiety. In contrast, a higher level of self-defeating humor, which involves the use of humor in a self-disparaging, negative manner to put oneself down, has been linked to higher levels of anxiety. Finally, the remaining humor style of aggressive humor has generally been found to be unrelated to anxiety level.

Taken together, the above research clearly points to different types of relationships between various humor styles and anxiety. In particular, the two adaptive styles of affiliative and self-enhancing humor appear to be beneficial, as increased use of these styles helps to reduce anxiety levels. In contrast, the maladaptive self-defeating humor style appears to be detrimental, as increased use of this style is associated with greater anxiety.

This prior research has also suggested several possible mechanisms that may help explain why the humor styles are differentially related to anxiety (Kuiper, 2012; Kuiper et al., 2004; Martin, 2007). These proposed underlying processes include humor style differences in employing: (1) reframing strategies for stressful events (e.g., cognitive reappraisals and/or a change of perspective via self-enhancing humor); (2) distraction and distancing techniques (via affiliative humor), (3) emotion regulation strategies (via both self-enhancing and affiliative humor), and (4) the use of a self-degrading interpersonal presentation style (via self-defeating humor). Overall, this research provides some initial empirical support for the intriguing notion that certain humor styles may actually contribute to increased anxiety, whereas other styles may help buffer the individual from anxiety.

The present study builds upon this prior work by conducting a conceptually driven examination of the various relationships between humor styles and anxiety. Although the research described above has certainly been informative, it has generally been conducted with only minimal consideration of contemporary theory-based models of anxiety. In other words, our conceptual understanding of the role of humor styles in anxiety has not yet been well-grounded in the anxiety research literature. Little regard has been given thus far to prominent theoretical models of anxiety, and their associated research findings, when attempting to understand the possible contribution of humor styles to anxiety.

The present study directly addresses this issue by conceptually integrating the humor styles approach with an intolerance of uncertainty model of generalized anxiety (Behar, DiMarco, Hekler, Mohlman, & Staples, 2009; Dugas, Marchand, & Ladouceur, 2005). We begin by briefly describing this intolerance of uncertainty model of anxiety. This is followed by a detailed consideration of how humor styles may also be involved in this model, to either reduce or enhance levels of anxiety. This combined model is then empirically assessed in terms of its utility in furthering our understanding of the role of humor in anxiety.

The Intolerance of Uncertainty Model of Generalized Anxiety

Considerable research has now accrued to empirically support an intolerance of uncertainty model of generalized anxiety (Behar et al., 2009; Dugas et al., 2005; McEvoy & Mahoney, 2013). Generalized anxiety is a pervasive

negative mood state, with the key feature being chronic and intense worry. This excessive worry can focus on a wide variety of life events and experiences, including relationships with others, safety and health concerns about one's self or others, performance at school or work, financial issues, and what the future may hold (Behar et al., 2009; Dozois & Westra, 2004). Individuals experiencing generalized anxiety also display further cognitive, behavioral, physical, and emotional manifestations. These include disruptions in cognitive flexibility and concentration, a perceived lack of control and confidence in problem solving, heightened irritability, nausea, headaches, profuse sweating, and sleep disturbance. As such, generalized anxiety can be extremely debilitating and interfere significantly with daily functioning.

In this model, generalized anxiety stems from a fundamental personality disposition to be highly intolerant of uncertainty (Dugas et al., 2005; Koerner & Dugas, 2008; McEvoy & Mahoney, 2013). This underlying cognitive vulnerability factor consists of a strong negative bias in perceiving and responding to daily life situations. Routine life events and experiences are typically viewed as being ambiguous or uncertain, resulting in increased worry. Heightened intolerance of uncertainty thus results in chronic and excessive worry that can span several major content domains, including concerns over relationships, finances, work, and the future.

In order to provide a theoretical-empirical foundation for examining the role of humor in anxiety, we tested the predictive utility of the above model by using mediator analysis. Here, we expected that excessive worry would serve as a mediator between heightened levels of intolerance of uncertainty and increased anxiety. Such a pattern would be consistent with the basic premise of this model, namely, that heightened intolerance of uncertainty serves to increase worry, which then results in greater anxiety.

Humor Styles in the Intolerance of Uncertainty Model of Anxiety

In general, we propose that the certain humor styles may serve as additional mediators between intolerance of uncertainty and anxiety. Individuals with a greater intolerance of uncertainty typically exhibit greater levels of negative arousal and stress (Koerner & Dugas, 2008). In turn, we suggest that this detrimental impact of heightened intolerance of uncertainty also has a suppressing effect on the use of affiliative humor, which is typically interjected into light-hearted and spontaneous conversational banter. This chronic negative arousal and stress may also has a detrimental impact on cognitive and social information processing abilities, as it restricts cognitive flexibility and breadth of attention. These information processing restrictions then limit the ability to engage in beneficial cognitive reappraisals and/or changes in perspective, two of the primary processes underling effective coping via self-enhancing humor (Kuiper, 2012). As such, the increased stress associated with heightened levels of intolerance of uncertainty may also suppress the use of self-enhancing humor. Furthermore, in an attempt to alleviate this negative arousal and stress, we also propose that individuals with heightened intolerance of uncertainty would also favor the increased use of maladaptive coping strategies, such as self-defeating humor. Further details of these aspects of our combined model of humor and anxiety are described below.

Affiliative Humor — The nonhostile jokes, witty comments, and spontaneous lighthearted banter associated with affiliative humor can help enhance social relationships, reduce interpersonal tension and conflict, maintain group cohesiveness, and increase group morale (Martin, 2007; Samson, Lackner, Weiss, & Papousek, 2012). However, for those with greater intolerance of uncertainty, the negative arousal and stress they chronically experience makes it more difficult to act in this spontaneous, carefree, and playful manner; and thus enjoy and benefit from innocuous affiliative humor with others. As such, we expected that heightened intolerance of uncertainty would have a considerable suppressing effect on affiliative humor.

In turn, this suppressing effect on affiliative humor use would limit the social sharing of both positive and negative emotions (Rimé, 2009). Affiliative humor generates enhanced opportunities for a variety of positive emotions to be expressed and shared, including mirth, amusement, joy and exhilaration (Martin, 2007; Samson et al., 2012). These emotions, which can contribute to the growth of a more positive and healthy self-concept (Kuiper, 2012), are reduced, however, by the suppression of affiliative humor use by those with heightened intolerance of uncertainty. This reduction also limits opportunities to humorously share negative emotions of stress and arousal with others (in an attempt to emotionally regulate these undesired emotions), again resulting in greater levels of anxiety for those with heightened intolerance of uncertainty. Thus, we expected that affiliative humor would also be a significant mediator in our model, with heightened untolerance of uncertainty leading to the suppression of affiliative humor, which, in turn, would contribute to greater anxiety.

Self-Enhancing Humor — Individuals who use self-enhancing humor generally view their life circumstances and surroundings from a contemplative humorous stance, and maintain a positive perspective despite adversity and stress. Self-enhancing humor is used as a coping strategy to both buffer the self against this stress and regulate negative emotions, but not at the expense of others (Martin, 2007). The use of self-enhancing humor may be suppressed, however, by the chronic negative arousal and stress that accompanies intolerance of uncertainty. In addition, the reduced cognitive attention and flexibility that accompanies heightened intolerance of uncertainty interferes significantly with the ability to look at thoughts or ideas from a different perspective, making the generation and effective use of self-enhancing humor much more difficult and unlikely. This reduction in a particularly effective humorous coping strategy for dealing with stress and other negative emotions then leaves these individuals susceptible to increased anxiety.

Self-Defeating Humor — This maladaptive humor style is typically used in a misguided attempt to reduce stress, and also to try and gain the approval of others via ingratiating and self-degrading humorous comments (Martin, 2007). As such, the use of this humor style ultimately serves to hide negative feelings about the self and avoid dealing with problems of emotional neediness. The end result is that self-defeating humor is related to less resilience in dealing with life's problems, reduced satisfaction with social support, lower self-esteem, and greater depression (Kuiper, 2012).

The negative arousal and stress that accompanies heightened intolerance of uncertainty is quite aversive for the individual, resulting in various coping attempts to reduce this unwanted state. Consistent with their cognitive bias towards negative interpretations of their own abilities, we propose that individuals with greater intolerance of uncertainty also favor a self-defeating humor style, as this style intersects well with their negative view of self. Unfortunately, however, the increased use of self-defeating humor also leads to greater rejection by others, not only during social interactions, but also in terms of less willingness to interact with that individual in future situations (Kuiper, Kirsh, & Leite, 2010). This increasing social isolation reduces social support for the individual with heightened intolerance of uncertainty, thus limiting further opportunities for the social sharing of both positive and negative emotions (Rimé, 2009). Ultimately, this contributes to the enhanced levels of generalized anxiety exhibited by these individuals.

Aggressive Humor — This humor style is used to put down others, with little concern for how they might subsequently feel or react (Martin, 2007). Aggressive styles of humor, such as teasing, ridicule, sarcasm, and disparagement tend to alienate other individuals; and thus impair social and interpersonal relationships. As such, aggressive humor use could ultimately limit opportunities for genuine and sustained social sharing of both positive

and negative emotions (Rimé, 2009), possibly resulting in an increase in anxiety. It is important to note, however, that past research offers no support for a relationship between aggressive humor and anxiety (Kuiper et al., 2004; Martin, 2007; Martin et al., 2003). As such, we do not expect this particular humor style to be related significantly to anxiety.

Humor Styles and the Content Domains of Worry

Finally, we investigated the potential role of humor styles with regards to each of the five worry content domains in the intolerance of uncertainty model of anxiety (Dugas et al., 2005; Koerner & Dugas, 2008). Thus, in addition to our primary focus on excessive worry, as described earlier, we also examined how the humor styles may relate to each specific domain of worry in this model. These domains include worry about relationships, the future, amount of confidence, work issues, and financial matters (Behar et al., 2009). Here, we first considered the degree to which worry in each of these five content domains was associated with the possible reduction of affiliative and self-enhancing humor use, as well as the increased use of self-defeating humor. Following this, we then tested the degree to which these three humor styles may also mediate the relationships between worry in a specific content domain and increased levels of generalized anxiety. By doing so, we could then determine more precisely the degree to which specific content domains of worry may also enter into our combined model of generalized anxiety.

Method

Participants

Ninety-one students (76 females and 15 males) enrolled in psychology courses at the University of Western Ontario participated in this study. Participants ranged in age from 17 to 25 years ($M = 18.62$, $SD = 1.13$), and were recruited from the Psychology Department Research Participation Pool, using standard sign-up procedures. Participants received research credit for their participation.

Measures

Intolerance of Uncertainty — The Intolerance of Uncertainty Scale (IUS; Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994) consists of 27 self-report items, each rated on a 5-point Likert scale ranging from 1 (*not at all characteristic of me*) to 5 (*entirely characteristic of me*). This scale investigates degree of apprehension towards uncertain future situations, reactivity to ambiguity, and responses to general uncertainty. Example items are, "My mind can't be relaxed if I don't know what will happen tomorrow," and "The ambiguities in life stress me." The psychometric characteristics of the IUS are very good, with strong internal consistency, test-retest reliability, and high construct validity (Freeston et al., 1994).

Excessive Worry — The Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) consists of 16 items designed to assess excessive worry over time and across situations. Participants rate each item on a 1 to 5 scale, with 1 indicating the item was not at all typical, and 5 indicating the item was very typical of them. Examples items are "My worries overwhelm me," and "I've been a worrier all my life." The PSWQ displays good internal consistency and construct validity.

Generalized Anxiety — The Costello-Comrey Anxiety Scale (CCAS; Costello & Comrey, 1967) consists of 9 items that assess symptoms of anxiety in the general population. Participants rate each item on a 1 to 4 scale; with 1 indicating that they had rarely or never experienced the symptom during the past week, and 4 indicating

that they experienced the symptom most of the time during the past week. Example items are, "I am a very nervous person," and "I am a tense, 'high-strung' person." There is good construct validity for the CCAS, with scores correlating significantly with other measures of anxiety. Reliability for the CCAS is also quite acceptable.

Humor Styles — The Humor Styles Questionnaire (HSQ; Martin et al., 2003) consists of 32 self-report items, divided into four separate sub-scales (8 items each) measuring each humor style (affiliative, self-enhancing, aggressive, and self-defeating). Items are rated on a 7-point Likert scale ranging from 1 (*Totally Disagree*) to 7 (*Totally Agree*). Example items are: "I laugh and joke a lot with my closest friends" (affiliative humor); "If I am feeling depressed, I can usually cheer myself up with humor" (self-enhancing humor); "If someone makes a mistake, I will often tease them about it" (aggressive humor) and; "I let people laugh at me or make fun at my expense more than I should" (self-defeating humor). Considerable research has shown that these measures of the four humor styles are distinct, reliable, and valid (Kuiper, 2012; Martin, 2007).

Worry Content — The Worry Domains Questionnaire (WDQ; Tallis, Eysenck, & Mathews, 1992) consists of 25 items used to assess the amount of worry across five major domains of everyday concern; namely, relationships (e.g., "I worry that I will lose close friends"), lack of confidence (e.g., "I worry that I feel insecure"), an aimless future (e.g., "I worry that I'll never achieve my ambitions"), work incompetence (e.g., "I worry that I will not keep my workload up to date"), and financial issues (e.g., "I worry that I am not able to afford things"). Participants rate each item on a 5 point rating scale, with 1 indicating no worry at all and 5 indicating extreme worry. The WDQ shows high internal consistency, high reliability, and good convergent validity (Stöber & Joormann, 2001).

Procedure

Participants were tested in small groups of approximately 15 to 20. After completing an informed consent form, participants were administered a booklet of questionnaires. Each booklet was in a different randomized order, and required approximately 30 minutes to fill out. After completion, each participant was given a debriefing form about the study and its purpose.

Results

The correlations between each of the four humor styles and the three main components of the intolerance of uncertainty model of generalized anxiety are shown in Table 1, along with the means and standard deviations for these measures. As expected, greater intolerance of uncertainty was associated with reduced levels of both affiliative and self-enhancing humor. Also as expected, increases in both of these adaptive humor styles were significantly correlated with decreases in excessive worry and generalized anxiety. For self-defeating humor, however, the sole significant correlation was the expected relationship between greater intolerance of uncertainty and increased levels of this maladaptive humor style. Self-defeating humor was not significantly associated with excessive worry or generalized anxiety levels. Finally, the pattern of non-significant correlations for aggressive humor is congruent with previous research demonstrating that this maladaptive style is not related to any of the components of anxiety.

Table 1

Correlations Between the Humor Styles and Primary Components of the Intolerance of Uncertainty Model of Generalized Anxiety.

| | Humor Styles | | | |
Model Component	Affiliative $M = 46.71$; $SD = 6.64$	Self-Enhancing $M = 37.57$; $SD = 8.39$	Aggressive $M = 29.25$; $SD = 7.75$	Self-Defeating $M = 28.22$; $SD = 8.36$
Intolerance of Uncertainty $M = 61.93$; $SD = 17.49$	-.42**	-.27**	.04	.25*
Excessive Worry $M = 46.10$; $SD = 16.44$	-.31**	-.29**	.01	.19
Generalized Anxiety $M = 17.81$; $SD = 5.28$	-.37**	-.39**	.02	.14

*$p < .05$. **$p < .025$. ***$p < .01$.

Overall, the pattern of correlations shown in Table 1 supports the proposal that certain humor styles do bear on the various components of the intolerance of uncertainty model of generalized anxiety. In particular, it appears that adaptive humor may play a more prominent role (particularly affiliative humor), and that self-defeating humor may also be involved in this model of anxiety. Aggressive humor, however, is not relevant to this model.

Accordingly, we next investigated how the two adaptive styles (affiliative and self-enhancing humor), along with self-defeating humor, may be involved as multiple mediators in a combined model of anxiety which also includes excessive worry as a mediator. We did not include aggressive humor in this analysis, given its lack of a relationship with any of the three primary components of the intolerance of uncertainty model of anxiety.

As described by Preacher and Hayes (2008) multiple mediation analysis allows for the simultaneous significance testing of relationships between a predictor (intolerance of uncertainty in the current analysis), a set of mediators (excessive worry, affiliative humor, self-enhancing humor and self-defeating humor), and a criterion variable (generalized anxiety). These tests include determining the significance of: (1) the overall mediation model, (2) each of the four separate mediator paths between intolerance of uncertainty and anxiety, and (3) the direct relationship path between intolerance of uncertainty and anxiety, after taking into account all significant mediator paths.

Multiple mediation analysis involves a bootstrap sampling procedure, in which 1000 random samples are taken from the data set with replacement. All of the path coefficients specified in the hypothesized model (i.e., the proposed links between the predictor, each mediator and the criterion), are then assessed in each sample. Following this, the mean direct and mediator effects are calculated, as well as their confidence intervals (set at 95%). All effects are considered simultaneously in the proposed model, with age and gender controlled for.

The results of our multiple mediation analysis indicated that the overall model of intolerance of uncertainty for generalized anxiety was significant, $F (5, 85) = 25.23$, $p < .001$; adjusted $R^2 = .57$. As shown in Figure 1, there were two significant mediator paths in this model, out of the four possible paths tested. In support of the original model, higher levels of intolerance of uncertainty led to the expected increase in excessive worry ($p < .001$), which, in turn, resulted in greater generalized anxiety ($p < .01$). Also as expected, higher levels of intolerance of uncertainty lead to a decrease in the use of affiliative humor ($p < .001$), which, in turn, resulted in greater anxiety ($p < .05$). Neither self-enhancing nor self-defeating humor were significant mediators in this analysis. It should be noted

that the direct effect path between intolerance of uncertainty and generalized anxiety remained significant ($p <$ .001), indicating that both excessive worry and affiliative humor served as partial mediators in this model.
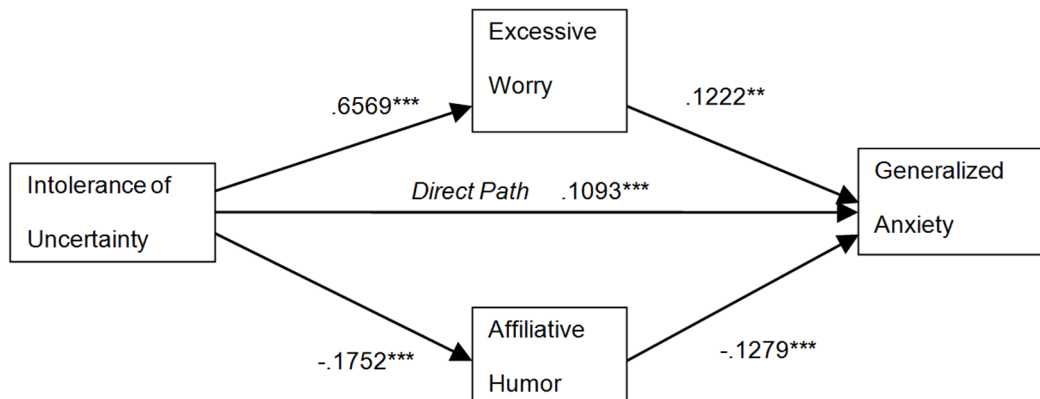

Figure 1. Significant mediators in the combined model for generalized anxiety.

**$p <$ .025. ***$p <$ .01.

In other words, greater intolerance of uncertainty still had a significant direct effect on increasing anxiety, above and beyond the significant mediator effect that runs through both excessive worry and affiliative humor. Overall, these findings support the proposal that a combined intolerance of uncertainty model of anxiety should also include affiliative humor as a further significant mediator, in addition to excessive worry. These findings also indicate, however, that the two remaining humor styles (self-enhancing and self-defeating) do not play a significant mediating role in this combined model.

Humor Styles and the Worry Content Domains

The correlations between each of the five worry content domains in the intolerance of uncertainty model of anxiety and the four humor styles are shown in Table 2, along with the means and standard deviations for each worry content measure. Higher levels of affiliative humor were associated with lower levels of worry for four of the five worry content domains, with the only exception being financial worry. In a similar fashion, higher levels of self-enhancing humor were also associated with significantly lower levels of worry, but in this case for all five worry content domains. For self-defeating humor the pattern was precisely opposite, with higher levels of this maladaptive humor style being associated with greater worry for all five worry content domains. Finally, aggressive humor was generally unrelated to the worry content domains, with the one exception being financial worry. Here, higher aggressive humor was related to greater financial worry.

When taken together, the pattern of correlations shown in Table 2 points to significant relationships between three of the four humor styles (affiliative, self-enhancing, and self-defeating) and the five different worry content domains. As such, our final set of multiple mediator analyses investigated how the two adaptive styles (affiliative and self-enhancing humor), along with self-defeating humor, may be involved as multiple mediators between each of these five worry content domains (e.g., relationship worry) and generalized anxiety. We did not include aggressive humor in these analyses, given its lack of any significant relationship with almost all of the worry content domains. As such, the mediators tested in each analysis were the three humor styles (affiliative, self-enhancing, and self-defeating), whereas the criterion variable was always generalized anxiety. Each analysis also controlled for age and

gender. However, a different predictor variable was used for each analysis, beginning with relationship worry content and then proceeding through all of the worry content domains listed in the left-most column of Table 2.

Table 2

Correlations Between Humor Styles and Worry Content Domains.

Worry Content Domains	Humor Styles			
	Affiliative	Self-Enhancing	Aggressive	Self-Defeating
Relationship Worry (*M* = 7.70 *SD* = 4.99)	-.22*	-.33**	.07	.32**
Lack of Confidence Worry (*M* = 8.56 *SD* = 5.12)	-.35**	-.33**	-.05	.32**
Aimless Future Worry (*M* = 8.24 *SD* = 4.92)	-.24*	-.47**	-.15	.27**
Work Incompetence Worry (*M* = 10.60 *SD* = 4.49)	-.25*	-.33**	.12	.27**
Financial Worry (*M* = 6.76 *SD* = 4.92)	-.18	-.29**	.27**	.31**

*$p < .05$. **$p < .025$. ***$p < .01$.

These analyses showed significant overall model effects for all five of the worry content domains, with F-values ranging from 10.76 to 13.64, all p's $< .001$. As shown in Table 3, adjusted R^2 values ranged from .29 to .36 for the multiple mediator analyses associated with these worry content domains. It was only in the case of financial worry that the humor styles did not have a significant mediator effect on subsequent anxiety levels.

Table 3

Significant Humor Style Mediators for Each Worry Content Domain

Worry Content Domain	Significant Humor Style Mediator	Total Adjusted R-squared	A path Coefficient	B path Coefficient
Relationships	Affiliative	.29***	-.3218*	-.2637**
Lack of Confidence	Affiliative	.36***	-.4980***	-.2082**
Aimless Future Worry	Affiliative	.30***	-.3583*	-.2734***
Work Incompetence	Affiliative	.35***	-.4086**	-.2475***
Financial	none	.31***	ns	ns

*$p < .05$. **$p < .025$. ***$p < .01$.

For the other four worry content domains, affiliative humor was the sole significant humor style mediator in all of these models. In particular, increases in worry about relationships, lack of confidence, an aimless future, and incompetence at work or school, all served to suppress affiliative humor use (all p's $< .001$). In turn, these reductions in affiliative humor resulted in more anxiety (all p's $< .025$). An illustrative example of one of these significant multiple mediation path analyses (for relationship worry content) is shown in Figure 2.
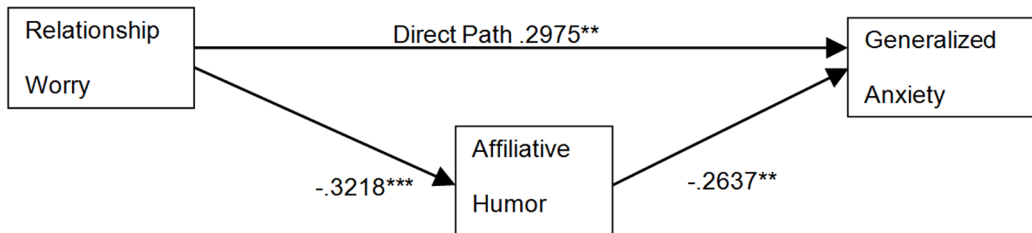
Figure 2. Affiliative Humor as a significant mediator between Relationship Worry and Anxiety.

**p < .025. ***p < .01.

Discussion

Previous research has provided some evidence for an association between sense of humor and anxiety (Abel 2002; Kuiper et al., 2004; Martin, 2007). Although informative, this initial work did not really consider how sense of humor might be integrated more fully with contemporary research on anxiety. As such, the main goal of the present study was to address this issue by providing a theory-based integration of the humor styles with an intolerance of uncertainty model of generalized anxiety.

We began this integration by describing the key sequence of events in the intolerance of uncertainty model of generalized anxiety (Behar et al., 2009; Dugas et al., 2005; McEvoy & Mahoney, 2013). In particular, this model proposes that greater intolerance of uncertainty generates excessive worry, which, in turn, results in higher generalized anxiety. We then used this model as the theoretical-empirical foundation for assessing the possible additional role of humor in reducing or enhancing anxiety. This was done by including excessive worry and three of the humor styles (affiliative, self-enhancing, and self-defeating) as potential multiple mediators in a combined model.

The findings from this multiple mediator analysis were clear. As expected, and in support of the original model, greater intolerance of uncertainty resulted in significantly more excessive worry, which in turn, increased anxiety. Of particular interest in the present context, however, was that affiliative humor was also a significant mediator in this combined model. Consistent with our expectations, greater intolerance of uncertainty also served to suppress the use of affiliative humor, which in turn, also contributed to increased anxiety levels.

The significant mediating path for affiliative humor suggests that the chronic stress and negative arousal associated with greater intolerance of uncertainty may interfere with both the generation and enjoyment of this adaptive humor style. Earlier, we proposed that this interference may be attributable to two factors. First, the chronic negative arousal and stress experienced by individuals with greater intolerance of uncertainty may be basically incompatible with the carefree and lighthearted positive state that facilitates affiliative humor use. In addition, however, this negative arousal may also impede the cognitive processes that underlie the effective use of affiliative humor, primarily by restricting cognitive flexibility and breadth of attention (Kuiper, 2012). These cognitive processing deficits would then make it much more difficult to generate and benefit from the use of this adaptive humor style.

It is still necessary, of course, for future research to document and test each aspect of this proposed causal chain. This might be accomplished, for example, by directly assessing stress and negative arousal levels for those with

greater intolerance of uncertainty, as well as measuring any observed reductions in their degree of cognitive flexibility and breadth of attention. If documented, such changes would then need to be empirically linked in a direct manner to the suppression of affiliative humor, perhaps by using a longitudinal research design that also includes observational aspects, in addition to self-report measures.

Further research would also need to empirically test our notion that the suppression of affiliative humor use can then reduce its effectiveness as an appropriate social interaction tool for sharing both positive and negative emotions with others (Rimé, 2009). Although past research has generally supported the notion that affiliative humor use can enhance social relationships and reduce interpersonal tensions (Kuiper, 2012; Martin, 2007), the *intrapersonal* effects of affiliative humor on the individual using this adaptive humor style are much less well understood and documented. As such, future research should directly test our proposal that reductions in the positive emotions of mirth and joy that accompany the suppression of affiliative humor use would also impact negatively on positive self-concept growth, mastery, and resilience (Kuiper, 2012). This future work should clearly document how any reductions in opportunities for the emotional regulation of negative emotions, via this adaptive humor style, may then lead to an accompanying loss of social support that buffers against disruptive emotions, such as anxiety. Again, this would require a move towards research designs that observe and measure these various constructs across time, and in different real-life settings.

Further work in this domain should be cognizant of other possible aspects of intolerance of uncertainty that might contribute to the suppression of affiliative humor use. As one example, dispositional intolerance of uncertainty is marked by a fundamental aversion to ambiguous life situations, with these events being extremely stressful for the individual, and thus avoided or minimized (Behar et al., 2009; Koerner & Dugas, 2008). Notably, this intense fear of ambiguity is the antithesis of a fundamental component of humor, namely the enjoyment of ambiguity to cognitively play with ideas and interpretations from varying perspectives (Martin, 2007). Those who use humor most effectively also relish its ambiguity and accompanying suspension of certainty, making this a very difficult social and interpersonal tool to be used by those that fundamentally avoid and reject ambiguity. Again, however, future research would need to precisely document how this fundamental component of humor would also contribute to limiting its effective use by those with greater intolerance of uncertainty.

Overall, our study also showed that the links between anxiety and humor appears to be strongest for the affiliative humor style, and virtually non-existent for aggressive humor. This pattern of findings was not surprising for aggressive humor, as past research has consistently shown that this maladaptive humor style is not related to anxiety (Kuiper et al., 2004; Martin et al., 2003). The analysis of our combined model of anxiety also revealed that, beyond affiliative humor, neither self-enhancing or self-defeating humor were significant mediators. The lack of a significant mediating path for self-enhancing humor in the combined model was somewhat unexpected; as the simple correlation pattern revealed that greater intolerance of uncertainty was indeed associated with significantly less self-enhancing humor use and that less use of self-enhancing humor was also associated with greater worry and anxiety. That these paths were not significant, however, in the subsequent mediator analysis, suggests that self-enhancing humor does not play a strong mediating role in our overall combined model of generalized anxiety.

This failure to find a mediating effect for self-enhancing humor in the combined model may reflect, in part, the strong mediator path that was evident through affiliative humor. In addition, however, it may also reflect the possibility that self-enhancing humor may play a much more circumscribed role in anxiety. This may be the case, as self-enhancing humor also did not play a significant mediating role in any of the worry content domain analyses.

Here, it was only affiliative humor that continued to show strong mediating effects. As such, the possible role of self-enhancing humor in generalized anxiety development and maintenance certainly requires further theoretical clarification and testing. This testing should also include the examination of humor styles use in actual life settings that are particularly problematic for the individual, as these may be more relevant to coping attempts which rely mostly on self-enhancing humor use, rather than affiliative humor.

It is also interesting to note that self-defeating humor was not a significant mediator in our combined model; nor did it mediate any of the specific worry content domains in the intolerance of uncertainty model of generalized anxiety. Even the pattern of simple correlations showed that self-defeating humor use was only related to intolerance of uncertainty, and not to excessive worry or generalized anxiety. Taken together, these findings are somewhat puzzling, as prior work has shown that increased use of self-defeating humor is associated with greater anxiety (Kuiper et al., 2004; Martin et al., 2003). As such, it is clear that future work should continue to investigate the possible role of self-defeating humor in anxiety. One possibility, for example, is this particular humor style may be more pertinent to the development and maintenance of specific forms of anxiety, such as social anxiety, rather than the generalized anxiety *per se*. Consistent with this proposal, recent work in our lab has shown that individuals portrayed as being socially anxious are much more rejected by their peers when they use self-defeating comments that are either humorous or non-humorous (Kuiper, Aiken, & Pound, in press). What is still required, however, is a demonstration that compares the use of self-defeating humor by socially anxious individuals with the use of this same style by those with generalized anxiety. This may then begin to elucidate more clearly the specific relationships that this maladaptive humor style may have with various forms of anxiety.

Conclusions and Summary

Overall, our findings for affiliative humor make it quite clear that a decrease in the use of this adaptive style can exert a strong impact on increasing anxiety levels. This mediating effect was evident not only in our overall combined model, but also for most of the specific worry content domains associated with the intolerance of uncertainty model of anxiety. Thus, in addition to excessive worry, increases in worry content across four specific domains (relationships, lack of confidence, an aimless future, and incompetent performance at work or school), all led to a suppression of affiliative humor use, with this reduction in adaptive humor then resulting in more anxiety. Overall, this pattern of findings supports the notion that affiliative humor is the most important humor style with respect to generalized anxiety.

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