



Tears of sorrow, tears of joy: An individual differences approach to crying in Dutch females

Jonathan Rottenberg^{a,*}, Lauren M. Bylsma^a, Vanessa Wolvin^a, Ad J.J.M. Vingerhoets^b

^a Department of Psychology, 4202 E. Fowler Avenue, PCD4118G, University of South Florida, Tampa, FL 33620, USA

^b Department of Psychology and Health, Tilburg University, P.O. Box 90. 153, 5000 LE Tilburg, The Netherlands

ARTICLE INFO

Article history:

Received 12 November 2007

Received in revised form 25 April 2008

Accepted 8 May 2008

Available online 17 June 2008

Keywords:

Crying

Personality

Mood

Individual differences

ABSTRACT

Many people report that crying relieves distress and is soothing; however, others report no change in mood after crying, and a minority of people even report worsened mood. What accounts for individual differences in the sequelae of crying? To examine this question, 196 adult Dutch women completed personality and clinical functioning measures, which were used to predict mood change after crying, as well as the frequency and ease of crying episodes. The personality characteristics of neuroticism, extraversion and empathy predicted variation in the frequency and ease of crying episodes, but did not predict mood change. Conversely, clinical characteristics were less related to the frequency and ease of crying episodes than to variation in mood change. Specifically, alexithymia, anhedonia, depression, and anxiety were associated with worsened post-crying mood. Individual difference characteristics are systematically related to different facets of crying. Implications for understanding the heterogeneity of adult crying are discussed.

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1. Introduction

Crying is a common form of human emotional expression that includes behaviors such as tears in the eyes, respiratory changes, and vocalized sobbing. It can be elicited in a variety of contexts and humans of all ages and from all cultures cry on certain occasions to express their emotions (Vingerhoets, Cornelius, Van Heck, & Becht, 2000). Despite the significance of crying, scientific understanding of the determinants, moderators, and consequences of crying in adulthood remains preliminary.

Although crying has systematic antecedents—situational antecedents such as losses, conflicts, and perceived inadequacy, as well as emotional antecedents, such as sadness (see Vingerhoets, Boelhouwer, Van Tilburg, & Van Heck, 2001)—circumstances that evoke tears across all persons are extremely rare. In fact, crying is often induced by idiosyncratic, minor, even trivial events (Vingerhoets, Boelhouwer et al., 2001). Given heterogeneity in its antecedents, there is considerable room for intra- and inter-personal factors to co-determine when crying occurs. Unfortunately, the role of these factors, and particularly, of individual differences in crying is poorly understood. This report sought to build on limited prior research on individual differences in crying by examining how personality and clinical functioning relate to three important aspects of crying: the ease of crying (crying proneness), the num-

ber of times that crying occurs over a given interval (crying frequency), as well as mood changes that follow crying episodes, a less explored area (see Vingerhoets et al., 2000). Our investigation focused on women because gender differences are often observed in crying-related outcomes (Bekker & Vingerhoets, 2001). Before reviewing the relevant literature, we explain our general approach to studying adult crying.

1.1. The heterogeneity of adult crying

Historically, crying research has downplayed individual differences. Scholars have posited universal functions and consequences for crying, such as that it is an arousing, distress-related communicative behavior (e.g., Kottler, 1996), or that it is a cathartic, soothing behavior (e.g., Frey, 1985). Hendriks, Rottenberg, and Vingerhoets (2007) recently concluded, however, that none of the universalist positions are uniformly supported by the data. Hendriks et al. also observed that the major warring views of crying (e.g., arousing versus calming effects) may even be reconcilable, since crying may have different effects on different response systems at different times, depending on when measurements are taken during the course of a crying episode. For example, psychophysiological studies indicate that increased parasympathetic activity, associated with homeostasis and restoring psychological balance, is not observed until later phases of a crying episode (e.g., Hendriks et al., 2007), whereas increased sympathetic activity, associated with increased arousal, is typically

* Corresponding author. Fax: +1 813 974 6701.

E-mail address: jrottenb@cas.usf.edu (J. Rottenberg).

observed in early phases of a crying episode (e.g., Rottenberg, Gross, Wilhelm, Najmi, & Gotlib, 2002). In many ways, the complexity and context-specificity of crying effects suggests that searching for universal laws may be less productive than isolating the sources of heterogeneity in this behavior.

One major illustration of how difficult it is to find true universals in crying literature concerns mood improvement after crying. In retrospective survey designs, it is widely replicated that people on average report experiencing mood improvement after crying (e.g., Frey, Hoffman-Ahern, Johnson, Lykken, & Tuason, 1983; Kraemer & Hastrup, 1986; Lombardo, Crester, Lombardo, & Mathis, 1983). Perhaps most persuasively, in a large international sample, Becht and Vingerhoets (2002) found that men and women in 30 countries reported feeling better after crying. At the same time, however, there is important qualifying evidence to the idea that crying improves mood. First, post-crying mood improvement is much less common when crying is elicited in laboratory settings (e.g., Choti, Marston, Holston, & Hart, 1987; Rottenberg et al., 2002; see Cornelius, 2001 for review). Why little mood improvement accompanies laboratory crying is not yet understood; it may be that the lab is an unusual social context for eliciting and observing crying, and lacks features that foster mood improvement (e.g., social support), and/or that the measured time course in laboratory studies (i.e., a few minutes) is too brief to detect mood improvement. Second, even in naturalistic designs, where substantial mood improvement is typically reported, mood change varies across individuals. For example, more than a quarter of the Lombardo et al. (1983) sample reported adverse effects of crying (e.g., increased depression).

1.2. Predictors of post-crying mood change

To elucidate why the mood effects of crying so often vary, we have been studying cultural, situational, and psychological factors that influence post-crying mood change. In an international dataset, analyses of cultural variation in attitudes towards crying on mood change revealed that self-reported post-crying mood improvement was most likely in wealthy countries that accept feminine gender roles, and where crying frequency was high and shameful feelings about crying were low (Becht & Vingerhoets, 2002). Early evidence also indicates that situational factors influence mood change after crying: Mood improvement after crying was related to receiving social support during the crying episode and experiencing resolution to the event that caused the crying episode, whereas mood deterioration was associated with suppressing crying or experiencing shame from crying (Bylsma, Vingerhoets, & Rottenberg, *in press*). Finally, psychological characteristics, such as depression symptoms, may influence post-crying mood change: individuals with diagnosable mood disorders reported less post-crying mood improvement than did non-disordered persons (Rottenberg, Cevaal, & Vingerhoets, 2008).

We believe these studies illustrate the potential for individual differences in the domains of personality and clinical functioning to elucidate the heterogeneity of adult crying behavior. Unfortunately, there is limited past research on individual differences in crying and it has generally not focused on mood change. Thus far, most work has examined personality characteristics and their link to variations in the ease of crying (crying proneness) and the number of times that crying occurs over a given period (crying frequency).

1.3. Personality characteristics and crying-related outcomes

Neuroticism, or proneness to experience anxiety and distress, has been repeatedly related to crying more frequently (DeFruyt, 1997; Vingerhoets, Van Den Berg, Kortekaas, Van Heck, & Croon,

1993) and more easily (Peter, Vingerhoets, & van Heck, 2001). It is unclear whether neuroticism is also a predictor of mood change after crying: The only study to examine this prediction found no differences in mood change as a function of neuroticism (Peter et al., 2001).

Extraversion is characterized by a desire for social interaction and stimulation. Peter et al. (2001) found that extraversion related to greater crying proneness to negative situations (but not positive situations). It is plausible that extraverts recruit social support via crying, and thereby generate mood improvement through others' ministrations (Vingerhoets, Van Tilburg, Boelhouwer, & Van Heck, 2001). Although De Fruyt (1997) found that extraverts reported crying related benefits, such as optimism after crying, feeling states after crying were not explicitly investigated. Moreover, Peter et al. (2001) failed to find a relationship between extraversion and mood change after crying.

Empathy, or the ability to share and comprehend the momentary psychological state of another person, has robustly predicted increased crying frequency in previous work (Choti et al., 1987; Van Tilburg, Unterberg, & Vingerhoets, 1998; Williams, 1982). To our knowledge, empathy has not been evaluated as a predictor of mood change after crying.

1.4. Clinical characteristics and crying-related outcomes

Diagnostic systems often note crying as a clinically significant behavior and sign of mental illness (e.g., Vingerhoets, Rottenberg, Cevaal, & Nelson, 2007). Nevertheless, empirical study of the relationship between clinical functioning and crying-related outcomes has been exceedingly modest, outside of neurological disorders (i.e., "pathological" crying, Cummings et al., 2006).

The most important clinical characteristic examined for its effects on crying has been depression (for detailed review, see Vingerhoets et al., 2007). Two studies found statistically significant, albeit small, effects for reported crying frequency in non-clinical samples, with dysphoric individuals reporting more frequent crying than non-dysphoric individuals (Frey et al., 1983; Hastrup, Baker, Kraemer, & Bornstein, 1986). However, studies employing correlational analyses have either found no association between depression severity and reported crying (Kraemer & Hastrup, 1986; Labott & Martin, 1987), or associations that held for only one studied gender (females: Frey et al., 1983; males: Choti et al., 1987). Contradictory findings have also been obtained in patient samples. One laboratory study found that depressed individuals were not more likely to exhibit crying to a sad film than nondepressed persons (Rottenberg et al., 2002). However, Rottenberg et al. (2008) found that mood disordered participants reported increased cry proneness to negative antecedents, increased crying frequency, and reported less post-crying mood improvement than a nonpsychiatric group.

Alexithymia, characterized by difficulty expressing and cognitively processing emotions, including an inability to verbalize about emotions, difficulty fantasizing, and avoiding thoughts about emotion (Taylor, Bagby, & Parker, 1997) is another clinical characteristic receiving modest attention in crying research. Alexithymia has been associated inversely with crying frequency and crying proneness (Vingerhoets et al., 1993). It has been observed clinically that alexithymic individuals experience unpleasant and undifferentiated arousal during crying episodes (Taylor et al., 1997). However, the influence of alexithymia on mood change after crying has not received systematic study.

Finally, the field has overlooked several clinical characteristics with theoretical relevance to crying and mood change. For example, anhedonia, or a reduced capacity for pleasure, is observed in disorders such as depression and schizophrenia (Andreasen, 1982). Anhedonia has been related to emotional indifference and

affective blunting (Germans & Kring, 2000), suggesting that it may predict decreased crying and a lack of mood improvement after crying. Likewise, anxiety is relevant to numerous psychiatric conditions (Barlow, 2002), but its relation to crying has not been explored. Since anxious individuals are more likely to perceive situations as potentially dangerous and harmful, these appraisals of anticipated losses and harmful encounters might plausibly increase their crying proneness and crying frequency. The consequences of anxiety for mood change after crying are unknown.

1.5. The present study

The present study took an individual differences approach to crying, examining the domains of personality and clinical functioning and focusing on the determinants of mood change after crying. To examine whether predictors of mood change are distinct from predictors of crying frequency and crying proneness, all three crying-related outcomes were included. Based on past findings, we predicted that the personality characteristics of extraversion, empathy, and neuroticism would be positively associated with crying frequency and crying proneness, but *not* with mood change after crying. In addition, we expected alexithymia to be inversely related to the ease and frequency of crying. Otherwise, prior work in the clinical domain afforded no strong basis for hypotheses.

2. Method

2.1. Participants

One hundred and ninety-six female participants from the Netherlands were recruited. Respondents spanned a wide age range (ranges 17–84; M 45.72, SD 14.07). See Table 1 for demographic characteristics. Participants were volunteers who responded to a brief call for research participation in a study of crying in *Psychologie Magazine*, a popular psychology magazine in the Netherlands.

2.2. Measures

2.2.1. Neuroticism and extraversion

The Eysenck Personality Questionnaire Short Scale (EPQ-R) was used to define neuroticism and extraversion. The EPQ-R has 48 questions with 12-item scales assessing extraversion, psychoticism, and neuroticism, and a lie scale (Eysenck, Eysenck, & Barrett, 1985; translation by Sanderman, Arrindell, Anchor, Eysenck, & Eysenck, 1995). The extraversion and neuroticism scales have good psychometric properties (Francis, Brown, & Philipchalk, 1992).

2.2.2. Empathy

The 33-item Questionnaire Measure of Empathetic Tendency, which has been shown to be reliable, valid in diverse settings, and distinct from social desirability, was used to measure empathy

(Mehrabian & Epstein, 1972). Inadvertently in the translation process, question answer choices were converted from Likert format to yes or no responses. Because the translated measure exhibited low internal consistency ($\alpha = .36$), factor analysis was conducted to extract items loading on a single factor. The shortened scale had acceptable reliability (16 items, $\alpha = .66$).

2.2.3. Depression and anxiety

Depression and anxiety were measured using the Hospital Anxiety and Depression Scale (HADS; Spinhoven et al., 1997). The HADS depression and anxiety subscales both included seven items. Each item is rated from 0 to 3, with higher numbers indicating more severe symptoms. The HADS has been widely used and has good reliability and validity (Herrmann, 1997; Zigmond & Snaith, 1983).

2.2.4. Anhedonia

Anhedonia was measured using the 21-item Anhedonia Scale (Rombouts & Van-Kuilenburg, 1988). This scale measures pleasure from sex, physical activity, hearing, seeing, touching, tasting, and smelling. Items are rated in a 4-point Likert format ranging from “not” to “a great deal.” The anhedonia scale has acceptable psychometric characteristics (Rombouts & Van-Kuilenburg, 1988, $\alpha > .75$ across groups).

2.2.5. Alexithymia

An extended 40-item version of the Bermond–Vorst Alexithymia questionnaire (Vorst & Bermond, 2001; BVAQ) was used to assess alexithymia. Total scale alexithymia composite scores range from 40 to 200, with higher scores indicating higher alexithymia. Preliminary studies found supportive evidence for the reliability and validity of the BVAQ composite (Vorst & Bermond, 2001).

2.3. Crying proneness, crying frequency, and mood change

Crying related variables were derived from Part A of the Adult Crying Inventory (ACI; Becht & Vingerhoets, 2002). The ACI has been used widely in crying research and has promising psychometric characteristics (Scheirs & Sijtsma, 2001). Test–retest correlations over 10 weeks were .74 for crying proneness, .71 for crying frequency (unpublished data). Part A of the ACI comprised 63 items. Questions concerning ease of crying (crying proneness) were in Likert response format ranging from 1 (never) to 7 (always), with 54 questions measuring ease of crying to various antecedents (positive and negative). Ease of crying to negative antecedents was the primary measure because crying to positive antecedents is less common than crying to negative antecedents. Nevertheless, data on positive antecedents was collected, and reported for comparative purposes. Consistent with previous work (e.g., Peter et al., 2001), crying frequency was measured by a single item that asked participants to report crying episodes over the past 4 weeks.

Mood change after crying was measured with the following seven items: (1) relaxed, (2) in control, (3) happy, (4) relieved, (5) tense, (6) depressed, and (7) sad. For each mood indicator, participants chose whether they felt “less,” “same,” or “more” after crying (see Becht & Vingerhoets, 2002). For each mood indicator, positive change was scored with +1 (“more” for mood states 1–4, “less” for mood states 5–7), no change was scored as 0, and negative change was scored as –1. The scale yielded total mood change scores ranging between –7 and +7 (–7 indicating maximum mood deterioration and +7 maximum mood improvement). The ACI mood change scale has acceptable psychometric characteristics (Peter et al., 2001) and is sensitive to individual differences (Rottenberg et al., 2008). Internal consistency of the mood change scale was good ($\alpha = .85$).

Table 1
Sample characteristics

<i>Relationship status</i>	
Single	14.3%
Married/in relationship	65.3%
Divorced/Widowed	19.9%
<i>Education level</i>	
Elementary school	1.5%
Middle school	12.8%
High school	25.0%
Some college	16.8%
Graduated 2-year college	29.6%
University	14.3%

2.4. Procedure

Participants who responded to the research announcement received questionnaire packets (in Dutch) at home, which were completed and returned within 1 month.

3. Results

3.1. Crying frequency and crying proneness

Results conformed to expectation that personality characteristics would be associated with crying proneness and crying frequency. As shown in Table 2, higher levels of neuroticism, extraversion and empathy were associated with higher self-reported ease of crying. Moreover, higher levels of neuroticism and empathy were also associated with reporting more frequent crying.

By contrast, only three of eight associations between clinical characteristics and crying proneness and crying frequency were significant. Higher levels of anhedonia and alexithymia were associated with reduced crying proneness. Finally, higher levels of anxiety symptoms were associated with reporting more frequent crying.

To examine whether significant predictors of crying proneness and crying frequency offered independent prediction, analyses were conducted with the significant predictors simultaneously regressed (see Table 3). Regression of the five predictors of crying proneness revealed that neuroticism, empathy, and alexithymia continued to be significant predictors. Parallel regression of the three predictors of crying frequency (neuroticism, empathy, and anxiety) revealed that empathy and anxiety remained significant predictors of increased crying frequency.

3.2. Post-crying mood change

Consistent with past research, participants overwhelmingly (88.8%) reported some degree of post-crying mood improvement, with only 8.4% reporting feeling worse after crying, and 2.8% reporting no change in mood. Importantly, crying proneness and crying frequency were unrelated to the degree of post crying mood improvement (proneness, $r = .07$, $p = .36$; frequency, $r = .06$, $p = .39$).

Consistent with expectations, none of the personality characteristics were related to post-crying mood-improvement (see Table 2). By contrast, *all* of the clinical characteristics were predictive of post-crying mood change. More specifically, higher levels of

Table 2
Correlations between personality and clinical characteristics with crying frequency crying proneness, and mood improvement after crying

Measure	Crying proneness to positive antecedents ($M = 53.3$, $SD = 23.4$)	Crying proneness to negative antecedents ($M = 111.2$, $SD = 47.1$)	Crying frequency ($M = 9.0$, $SD = 21.9$)	Mood improvement ($M = 3.2$, $SD = 3.4$, $\alpha = .85$)
<i>Personality measures</i>				
Neuroticism ($M = 6.54$, $SD = 3.13$, $\alpha = .76$)	.15	.28***	.20**	-.10
Extraversion ($M = 7.32$, $SD = 3.16$, $\alpha = .79$)	.17*	.16*	.09	.09
Empathy ($M = 9.86$, $SD = 2.19$, $\alpha = .66$)	.28***	.29***	.20*	-.03
<i>Clinical characteristics</i>				
Alexithymia ($M = 96.84$, $SD = 22.63$, $\alpha = .89$)	-.39***	-.45***	-.08	-.27***
Anhedonia ($M = 62.49$, $SD = 10.03$, $\alpha = .90$)	-.39***	-.26***	-.03	-.17*
Anxiety ($M = 7.36$, $SD = 4.58$, $\alpha = .86$)	.01	.10	.16*	-.18*
Depression ($M = 5.04$, $SD = 4.36$, $\alpha = .85$)	-.08	.00	.05	-.19*

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3
Summary of multiple regression analyses

Dependent variable predictors	R^2	B	SE	β	Correlations		
					Zero-order	Partial	Part
Crying proneness to negative events	.34***						
Neuroticism		3.18**	1.16	.21	.29	.24	.20
Extraversion		-.73**	1.20	-.05	.14	-.06	-.04
Empathy		6.39**	1.88	.29	.48	.29	.25
Anhedonia		-.67**	.38	-.15	-.30	-.16	-.13
Alexithymia		-.55**	.19	-.26	-.43	-.25	-.21
Crying frequency past 4 weeks	.12***						
Neuroticism		.94**	.33	.29	.30	.23	.22
Anxiety		-.08*	.48	-.02	.22	-.01	-.01
Empathy		1.28*	.54	.19	.21	.19	.18
Mood improvement after crying	.09**						
Anxiety		-.08	.08	-.11	-.17	-.08	-.08
Depression		-.05	.10	-.06	-.20	-.04	-.05
Anhedonia		-.02*	.03	-.06	-.17	-.06	-.06
Alexithymia		-.03	.01	-.20	-.24	-.18	-.17

* $p < .05$, ** $p < .01$, *** $p < .001$.

alexithymia, anxiety, depression, and anhedonia were associated with reported mood deterioration after crying.

To examine whether these significant predictors of post-crying mood change offered independent prediction, these predictors were simultaneously regressed on post-crying mood change. When the contributions of other variables were accounted for, only alexithymia survived and continued to predict less post-crying mood improvement (see Table 3).

4. Discussion

Crying is increasingly understood as a heterogeneous behavior. To better understand the role of individual differences in variations in adult crying, the present study examined the relationship between measures of personality and clinical functioning and several important aspects of crying behavior. The major findings were that personality characteristics of neuroticism, extraversion and empathy predicted variation in the frequency and ease of crying, but failed to predict mood change. Conversely, clinical characteristics exhibited closer associations with post-crying mood change than with the frequency and ease of crying. Several aspects of these findings merit comment.

First, we replicated past work showing a robust positive relationship between the ease and frequency of crying episodes and the personality characteristics neuroticism, extraversion, and empathy (Choti et al., 1987; De Fruyt, 1997; Peter et al., 2001; Van Tilburg et al., 1998; Vingerhoets et al., 1993; Williams, 1982). In particular, neuroticism exhibited a notably strong and independent relationship with frequent and easy crying. Second, and also consistent with previous studies, variations in personality characteristics were unrelated to mood change after crying. Although studies with large samples are needed to reach conclusive judgments, the consistency of null results across studies, renders it less likely that these personality characteristics have robust relations with mood change after crying.

The notion that one's mood generally improves after crying episodes is both a popular lay belief and a replicated finding in the crying research literature (Cornelius, 2001). Not unexpectedly the overwhelming majority of our participants reported mood improvement after crying. Nevertheless, several individual difference characteristics predicted the degree to which participants reported mood improvement after crying. It is notable that we could predict mood change despite the truncated range of mood change in the sample, and sample heterogeneity with respect to age and education level. To our knowledge our study is the first demonstrating systematic relationships between individual difference characteristics and variations in the mood effects of crying.

Fourth, we found rich interconnections between clinical characteristics and crying-related outcomes, which have been speculated upon but rarely demonstrated. For example, anhedonia and alexithymia were associated with being less cry prone, the latter finding replicating Vingerhoets et al. (1993). Our study was to our knowledge the first to report a relationship between anxiety and increased crying frequency, underscoring the relevance of this clinical construct to crying. Moreover, anhedonia, alexithymia, depression, and anxiety, were also associated with reporting a relatively worse mood after crying. Regression analysis suggested that alexithymia exhibited the strongest independent relationship with worsened post-crying mood. Although we cannot be certain why alexithymia interferes with mood improvement after crying, it is plausible that this result emerges from alexithymic individuals' difficulties in understanding the sources and meanings of their emotional behavior. To the extent that crying provides information about urgent problems that must be solved, alexithymics' limited

insight into the causes of their crying may interfere with behavioral guidance processes that promote mood improvement.

These results may have also implications for clinical interventions. Currently there is only anecdotal evidence that learning how to cry and how to derive positive effects from it could help people who are having difficulty expressing sadness or crying (Linton, 1985). To the extent that crying offers psychological benefits, our findings support the idea that people with alexithymic or anhedonic tendencies may profit from therapeutic interventions that encourage crying (see Elliott, Watson, Goldman, & Greenberg, 2004).

In addition to strengths, this study also had limitations that suggest future research directions. First, data were correlational and thus do not afford causal inferences between associated variables. Thus, for example, from these data it is indeterminate whether being high in empathy leads one to cry more frequently, whether crying more frequently leads one to be high in empathy, or whether there is a third variable that accounts for all observed relationships (i.e., genotype). Second, and relatedly, we identified broad individual difference characteristics that may underlie heterogeneity in adult crying, but not the responsible proximal mechanisms. Future research can examine reasons why personality functioning influences crying frequency, such as increasing exposure to emotional events, altering characteristic appraisals, contributing to temperamental differences that influence crying threshold; or altering self-regulatory capacity (see Bekker and Vingerhoets; 2001; Vingerhoets et al., 2000). Likewise, future research should examine why clinical problems interfere with mood improvement after crying, such as physiological deficits, impaired recruiting of social support, insensitivity to offered social support, or poor problem solving during stressors (see Vingerhoets et al., 2007).

Third, a single method was used to measure all crying outcomes. Self-report methodology was a sensible means to measure mood change and afforded comparability to existing literature on crying and mood change. An important next step is to examine whether these mood change results replicate with observer-defined crying episodes. Finally, only women were studied, suggesting a need to replicate findings in men.

In closing, these findings underscore the idea that crying is a heterogeneous, multiply-determined behavior with complex correlates. Although exciting, the heterogeneity of crying also poses challenges for future investigation. Achieving insight into the origins, nature, and functions of crying will require collaboration between different experts, including developmental, clinical, social, biological, and cross-cultural psychologists, as well as neurobiologists and ethologists.

Acknowledgement

The authors would like to thank Patricia Vos for assistance with data collection and the members of the Mood and Emotion Laboratory for comments on an earlier draft of this article.

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