

An Exploration of the Relationships among Depression, Anxiety, Crying
and Post-Crying Mood Change

By

Anthony Hernandez

A thesis submitted in partial fulfillment
of the requirements of the
University Honors Program
University of South Florida, St. Petersburg

April 30, 2008

Thesis Director: Mark Pezzo, Ph.D.
Associate Professor, Associate Dean, College of Arts and Sciences

University Honors Program
University of South Florida
St. Petersburg, Florida

CERTIFICATE OF APPROVAL

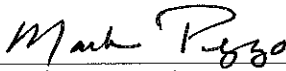
Honors Thesis

This is to certify that the Honors Thesis of

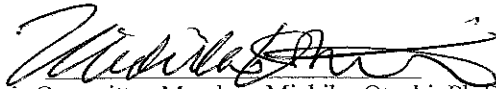
Anthony Hernandez

has been approved by the Examining Committee
on April 30, 2008
as satisfying the thesis requirement
of the University Honors Program

Examining Committee:



Thesis Director: Mark Pezzo, Ph.D.
Associate Professor, Associate Dean, College of Arts and Sciences



Thesis Committee Member: Michiko Otsuki, Ph.D.
Assistant Professor, College of Arts and Sciences

An Exploration of the Relationships among Depression, Anxiety, and Crying and Post-

Crying Mood Change

Anthony Hernandez

Advisor: Dr. Jonathan Rottenberg

University of South Florida

Dr. Mark Pezzo

University of South Florida

Dr. Michiko Otsuki

University of South Florida

Abstract

Crying, the emotional shedding of tears, is most often thought of in response to sad or negative emotional antecedents, and is commonly considered to be of some mental or physical benefit to a person. The present study aims to provide further clarification for the relationship between crying behaviors and mood change after crying moderated by depression and anxiety. Survey data was used to test the hypotheses that the severity of clinical factors would be positively associated with crying indices and that post-crying mood change would be negatively associated. All our research hypotheses were supported. To further explore these relationships, multiple regression analyses were also performed controlling for gender and education as covariates and depression and anxiety as predictors. Specific findings and explanations of results are discussed.

An Exploration of the Relationships among Depression, Anxiety, and Crying and Post-Crying Mood Change

Crying is a universal expression of emotion that appears to be unique to humans and people of all ages across cultures cry at times to express their emotions (Vingerhoets, Cornelius, Van Heck, & Becht, 2000). Crying, also referred to as weeping, can be defined as the secretion of tears in an emotional context without accompanying irritants to the eyes (Vingerhoets et al, 2000). At times crying may be accompanied by reddening of the face, alterations in the muscles of facial expressions, vocalizations and sometimes sobbing, which is characterized by convulsive breathing (Patel, 1993). Despite the ubiquity of crying, understanding of its determinants, moderators and functions in adults is in its preliminary stages.

Crying is a complex phenomenon that is characterized by systematic situational antecedents (e.g. loss of a loved one) and emotional antecedents (e.g. sadness, see Vingerhoets, Boelhouwer, Van Tilburg, & Van Heck, 2001). However, circumstances that evoke tears universally are rare. Given the heterogeneity of crying, this allows room for other factors to be associated with and determine crying. Clinical factors such as depression and anxiety (see Vingerhoets, Rottenberg, Cevaal, & Nelson, 2006) have recently received some empirical attention. The aim of the present study is to build on preliminary existing research to further understand how the clinical factors depression and anxiety are associated with the frequency of crying episodes (cry frequency), and the ease of which people experience the likelihood to cry (crying proneness), as well as mood change following a crying episode.

Crying and Mood Change

One seemingly universal quality of crying is that people claim that, when reporting in retrospect, crying produces a cathartic effect and produces a change in mood state following the crying episode (e.g. Frey, Hoffman-Ahern, Johnson, Lykken & Tuason, 1983; Kraemer & Hastrup, 1986; Lombardo, Crester, Lombardo, & Mathis, 1983). Catharsis is generally defined as relieving emotional tensions through the act of purging or expression (Breuer & Freud, 1955). The notion that crying has a cathartic effect has been a common conception of lay people. For instance, Cornelius (1986) found that most articles assumed and/or asserted that it was good to cry and not crying would seriously endanger one's health. A more recent cross cultural study found that both male and females from thirty different countries report crying to be cathartic and produces mood improvement after a crying episode (Becht & Vingerhoets, 2002).

However, a closer look at the research presents mixed results between self-report measures and lab measures. Descriptive research in the form of self-report studies and diary studies have found that in retrospect people report feeling better after crying (Bindra, 1972; Frey et al, 1983; Kraemer & Hastrup, 1986). For example, Bindra (1972) surveyed a sample of college students and found that students claimed experiencing relief and feeling better after a cry. Similarly, Frey et al. (1983) conducted a 30 day diary study in a large sample and found that most men and women reported a relief of negative affect as a result of crying. However, laboratory studies using film induced emotional crying have yielded different results (Martin & Labott, 1991; Gross & Fredrickson, 1994). For example, Martin and Labott (1991) presented sad films to evoke emotional crying and found no reduction in depressed mood.

Research findings on crying as cathartic are mixed and not definitive. Perhaps one reason for the discrepant findings is that catharsis only occurs in response to an antecedent perceived to be personally relevant in which personal tensions are relieved. When people report post-crying mood change in self-report measures, they are usually assessing the mood change in response to a personal event. However, when eliciting crying in the lab using a sad film, crying is contrived in an unfamiliar and impersonal setting, which may not provide a cathartic effect. Another possible explanation is that for the effects of catharsis to occur, more time than is allotted by researchers must pass (Cornelius, 2001; Gross et al., 1994). Generally, post-cry mood change is measured immediately after the elicitation of tears. Perhaps catharsis does not occur until some time later. Therefore, by measuring mood change too soon after the sad stimulus, laboratory researchers have failed to identify cathartic effect. To further understand the relationship between crying and mood change after crying, clinical factors such as depression and anxiety have recently received some attention (see Vingerhoets et al, 2006).

Crying, Depression, and Mood Change

Clinical commentators throughout the years have noted a relationship between crying and depression. Bright (1586) commented "Of all the actions of melancholie...none is so manifold and diverse in part, as that of weeping." More recently, research has found that sadness is cited as the most common antecedent eliciting crying (Vingerhoets et al, 2000). Depression is characterized by a several symptoms, including sad or low mood, loss of pleasure in daily activities, and several other associated symptoms (American Psychiatric Association, 2000). It is likely then that

depression would predict a higher frequency of crying episodes and a higher likelihood of crying in a given situation. However, depression has been theorized to be associated with crying in contrasting ways (Rottenberg, Cevaal, & Vingerhoets, 2007).

For the purposes of this study, there have been primarily two theories of interest hypothesized about the relationship between crying and depression. The first theory posits that crying and depression will be positively correlated. The severer the experience of depression would produce more frequent crying episode (Beck, Steer, & Brown, 1996). In contrast, a second theory claims that the relationship between depression and crying is nonlinear. Although increases in crying may occur in less severe forms of depression, the most severe cases would experience an inability to cry (Patel, 1993). Clinicians Beck (1978) and Davis Lambert and Ajaks (1967) have also observed that that in more severe forms of depression people lose their ability to cry. Thus, according to this perspective, increased crying is characteristic of milder forms of depression, but severe depression actually suppresses crying, leading to the inability to cry (e.g. "beyond weeping," Hamilton, 1967).

Studies on depression and crying have yielded mixed results (see Vingerhoets, Rottenberg, Cevaal, & Nelson, under review for review). Two studies consisting of non-clinical samples found small differences between crying frequencies for individuals with dysphoria versus individuals without (Frey et al, 1983; Hastrup et al, 1986). However, studies taking a correlational approach have found no relationship between depression severities and reported crying frequency (Kraemer & Hastrup, 1986; Labott & Martin, 1987). Other correlational studies found an association between depression severity and crying frequency for only one gender (females: Frey et al., 1981: males: Choti et al, 1987;

Hammen & Padesky, 1977). Studies using clinical samples have also produced mixed results. One laboratory study found that depressed individuals were no more likely to cry in response to the presentation of a sad film than non-depressed persons (Rottenberg, Gross, Wilhelm, Najmi & Gotlib, 2002). However, Rottenberg, Cevaal and Vingerhoets (in press), more recently compared clinically depressed individuals with non-depressed controls, using a self-report measure, and found patients reported a higher crying frequency in response to negative antecedents and reported significantly greater mood improvement compared to their non-depressed controls. Another study looking at the relationship between depression and mood change following crying found that depression was unrelated to post-crying mood change (Rottenberg, Bylsma, Wolvin, & Vingerhoets, in preparation). In sum, mixed findings have been produced in all these domains of research. The present study has a rather large and diverse sample which will be able to provide some further clarification for the relationship between crying, depression and mood change.

Crying, Anxiety, and Mood Change

Anxiety is also a construct associated with low mood or experiences of sadness. Some typical characteristics include experienced muscle tension, restlessness, panic, or a sense of impending doom (American Psychiatric Association, 2000). People who experience anxiety often have persistent fear based thoughts, such as thoughts of death, humiliation, or of something terrible happening (American Psychiatric Association, 2000). With respect to crying, it seems that anxiety would be similarly associated with crying behaviors as depression is (Vingerhoets et al, 2000). The more anxiety one experiences would provoke a higher frequency of crying episodes and increase the

likelihood to cry. However, there is almost no theoretical work or empirical investigation on this relationship.

Little is known concerning anxiety as a clinical factor contributing to crying or it modifying the mood effects of crying. The only study on anxiety and crying found that people who were found to have higher levels of anxiety reported more frequent crying and were less likely to report post-crying mood improvement (Rottenberg et al, under review). This finding lends preliminary support to the general theory that the more severe the negative affect the higher frequency of crying. However, this sample consisted of approximately 200 females who responded to a magazine article and needs to be replicated in other samples to be generalizable. Research on neuroticism, a construct related to anxiety, also supports a link to crying behaviors. Specifically, neuroticism, which is considered a proneness to experience anxiety and distress (Rusting & Larsen, 1997), has been found to be related to higher frequencies of crying (Vingerhoets, Van Den Berg, Kortekaas, Van Heck & Croon, 1993; De Fruyt, 1997). This finding would be expected in light of the theory that postulates the more severe the negative mood, the more frequently crying would occur. The present study will look at anxiety and its relationship to crying and mood change following crying in a rather large sample to provide further understanding in this domain.

The Present Study

The aim of the present study is to generate a clearer understanding of the relationship between the severity of clinical factors, anxiety and depression, and crying indices (proneness and frequency) and how they relate to post-crying mood change.

Hypothesis 1: The severity of depressive symptoms will be positively correlated with crying frequency and proneness.

This hypothesis operates from the general theory that crying occurs often in response to sadness; therefore, the more severe the depression the more frequent crying would be likely to occur (Beck, Steer, & Brown, 1996). Perhaps the discrepancies in previous findings may be attributed to them lacking appropriate power to detect the correct relationship. With approximately 3000 people surveyed in the present study, there is adequate power to detect a linear relationship. One other strength of the current study is that it is much more generalizable because of its large size and wide age range with participants as young as 12 and as old as 62 participating.

Hypothesis 2: The severity of anxiety will be positively correlated with crying frequency and proneness.

With regards to anxiety, it seems intuitive that the more severe the anxiety the more prone one would be to crying. Since crying has been found to frequently occur in response to learned helplessness or lack of power (Miceli & Castelfranchi, 2003) and anxiety could be viewed as an emotional state characterized by excessive fear and worry, which seems to be strongly related to lack of power. Thus, anxiety and crying frequency and proneness should be positively correlated.

Hypothesis 3: The severity of depression will be negatively correlated with mood improvement following crying.

Hypothesis 4: The severity of anxiety will be negatively correlated with mood improvement following crying.

With regards to mood change following crying, the linear theory would expect a positive association with increased negative mood and crying indices. However, in terms of mood change, we hypothesize that there would be a negative relationship. Thus, the severer the negative mood, characterized by anxiousness and depression in this case, would lead to more frequent crying but less mood improvement. The experience of anxiety and depression would lead to the weakening of the cathartic effect of crying because it would decrease the positive emotions that most report experiencing after they cry.

Methods

Design

This study is a secondary analysis of self-report data collected through the use of an internet survey by researchers from the University of Tilburg in the Netherlands.

Correlational analyses were conducted to examine the relationships between crying behaviors and severity of anxiety and depression levels measured by the Hospital Anxiety and Depression Scale (HADS). The data include quantitative measures of crying indices such as proneness and frequency as well as degrees of depression and anxiety.

Additionally, demographic variables such as gender and age were collected as well as a self-reported measure of catharsis (i.e. general feeling that one feels better after a crying episode) and physical and mental mood change after the most recent cry. To determine the strength of the relationships, if any, the standard Pearson's Product Moment bivariate correlation test were used to detect the linear relationships between depression and anxiety severity and crying indices as well as measures of mood change. In addition, to further explore the relationships among the measures, multiple regression analyses were

performed to find the unique contributions involved while controlling for sex and education as covariates.

Participants

Data were collected from 3032 people, 66.2% female, who volunteered to respond to an online internet survey designed by Dr. Ad Vingerhoets, Ruth Mark and Juliette Schaafsma at the University of Tilburg, the Netherlands. The sample consisted of participants ages 12 to 68 ($M=36.92$, $S=12.13$). The participants in this study were all listeners of a popular radio show, the Top 2000, on the Netherlands' National Radio 2, between December 25th of 2006 and January 1st of 2007. This radio station broadcasts the top two thousand songs every year between Christmas and New Year. The show has a wide audience. In fact, it is estimated that more than 60% of the Dutch population (over 10 million) listens to this program at any given time. On the show's website, a hyperlink was provided to the questionnaire used in this study. However, for the purposes of this study, 244 participants under the age of 18 were excluded from the analyses to focus on crying behaviors in adults. Analyses were performed on the remaining 2,788 participants, 62% female ($M=38.9$, $S=10.71$). Additionally, 44.6% of the participants did not complete high school and 55.4 % reported having obtained a high school education or more.

Measures and Instrumentation

The questionnaire designed by Dr. Ad Vingerhoets, Ruth Mark and Juliette Schaafsma is comprised of questions pertaining to demographics, measures of crying indices and post-cry mood change, written in Dutch (later translated to English).

Demographics and Crying Indices. A modified version of the Adult Crying Inventory (Becht & Vingerhoets, 2002) included demographics, gender and age. Also, crying indices recorded were cry proneness (e.g. how would you estimate your urge to cry on a scale of 1-10 in the past four weeks?) and crying frequency (e.g. are you able to estimate how many times you cried in the past four weeks?).

Mood Change Following Crying. A broad measure of mood change was also adopted from the ACI, the catharsis composite variable. This measure required a total of six answers in response to 6 mood states: relaxed, tense, and depressed before the cry and sad, happy and relieved after the cry. For each mood state, participants had the option of choosing "less," "the same," or "more so than before" (see Becht & Vingerhoets, 2002). For each item, a mood change of less than was rated with a 1, the same 2, and more than before 3. The negative mood states (tense, depressed, sad) were then reverse coded and the average was taken from the 6 ratings. The scale yields a total score ranging between 1 and 3. One signifies the greatest deterioration of one's mood after crying, and three the highest mood improvement. Internal reliability was strong for the catharsis composite, Cronbach's alpha .80.

The survey also asked about the participant's most recent crying episode and the mental and physical mood change which occurred directly afterward. Mental mood improvement (How did you feel mentally after you cried, compared to the moment before you cried?) and physical improvement (How did you feel physically after you cried, compared to the moment before you cried?) was rated on a one to three scale. A rating of one corresponds with negative mood change (worse than before they cried), two the same and three a positive mood change (better than before).

Clinical Constructs: Depression and Anxiety. Finally, measures of anxiety and depression were recorded using the Hospital Anxiety and Depression scale (HADS; Spinhoven, Ormel, Sloekers, Kempen, Speckens & Van Hemert, 1997). The HADS is a 14 question scale, 7 questions each for both anxiety and depression, which has been well validated (Spinhoven et al, 1997; Zigmond & Snaith, 1983; Hermann, 1997). The scale allows four possible answer choices for each question and is rated on a scale from 0 to 3, with a total score range of 0-21 for both anxiety and depression. Higher numbers indicate more severe symptoms but the cut off point for diagnosing clinical depression is not conclusive. However, the test's authors recommended that raw scores of between 8 and 10 identify mild cases, 11-15 moderate cases, and 16 or above marks severe cases (Snaith & Zigmond, 1994). In the present study, raw scores of 16 and above will be used as the clinical cut off point.

Procedure

The respondents volunteered to complete the survey while visiting the National Radio 2 website. When the participants chose to complete the study, and followed the link on the webpage, they were first presented with a short introduction to the study. The introduction explained that this questionnaire was a project by researchers at the University of Tilburg, the Netherlands, concerning the connections between music and emotions. The participants were told about the lack of systematic research in the field and the researchers were attempting to reach some clarification in this area. The questionnaire also explained that uncompleted surveys would not be used in the overall analysis so to be cautious in completely answering each question. The participants were also instructed that it would take 15 to 20 minutes to conclude and were thanked for their

time spent participating. Finally, all were informed that in due time they would report the results of the research on Radio 2.

Results

Descriptive Data

Crying frequency ranged from no crying episodes to a maximum of nine times ($M = 3.00$, $SD = 2.64$) and participants reported experiencing the likelihood to cry ($M = 3.83$, $SD = 2.49$). Participants reported a broad range of anxiety and depression ratings.

Depression scores ranged from low to clinical levels, 7 to 27, ($M = 12.40$, $SD = 3.68$) as did anxiety, 7 to 28, ($M = 11.70$, $SD = 3.05$). One sample t-tests revealed that participants reported mood improvement after crying across all three domains, physical improvement ($M = 2.09$, $SD = .52$), $t(2777) = 10.08$, $p < .01$, mental improvement ($M = 2.3$, $SD = .63$), $t(2777) = 25.62$, $p < .01$, and the catharsis composite ($M = 2.30$, $SD = .64$), $t(2,777) = 56.41$, $p < .01$,

Crying Frequency, Proneness and Clinical Factors

As hypothesized, clinical factors (HADS Depression and Anxiety) were positively correlated with both crying frequency and proneness. With regards to crying frequency, anxiety ($r = .229$, $p < .01$) and depression ($r = .153$, $p < .01$) were moderately correlated. Similarly, anxiety was moderately correlated ($r = .247$, $p < .01$) and depression ($r = .112$, $p < .01$) weakly correlated with crying proneness.

Additionally, we ran a multiple regression analysis predicting crying frequency and proneness. Specifically, first, multiple simultaneous regression model was specified with demographic covariates (educational attainment, gender) and depression and anxiety as predictors. Then, second, to explore whether gender differences exist in the

roles of depression and anxiety in explaining the variability among the dependant variables, the sample was stratified by gender. And the same analyses were repeated.

Crying Frequency (see table 3). The results of the multiple regression analysis showed that overall being female was positively associated with crying frequency such that females cry more often than men do. Both depression and anxiety were also positively associated with crying frequency such that participants with more severe depression and anxiety cried more than those with milder levels. Post-Hoc analyses stratified by sex found that in women, both depression and anxiety remained significant. In men, only depression remained significant, such that the severity of depression led men to cry more often but there was no relationship between anxiety severity and how often men cry.

Crying proneness (see table 4). Multiple regression analyses showed that overall being female was positively associated with proneness to cry such that women were more prone to cry than men. Both depression and anxiety were also positively associated with participant's proneness to cry such that participants with severer depression and anxiety were more prone to cry than those with milder levels. Post-Hoc analyses stratified by sex found no sex differences.

Mood Change and Clinical Factors

As expected, clinical factors were all significantly negatively correlated with measures of mood change following crying, that is the severer the depression and anxiety, the less mood improvement that followed a crying episode (see table 1 for correlation matrix).

Again, we ran a multiple regression analysis predicting physical improvement, mental mood improvement, and the catharsis composite. Specifically, first, multiple simultaneous regression model was specified with demographic covariates (educational attainment, gender) and depression and anxiety as predictors. Then, second, to explore whether gender differences exist in the roles of depression and anxiety in explaining the variability among the dependant variables, the sample was stratified by gender. And the same analyses were repeated.

Physical Improvement (see table 5). The results of the multiple regression analysis showed that overall being female was negatively associated with post crying physical improvement suggesting that male participants had greater physical improvement. Depression was also negatively associated with physical improvement following crying such that participants with severer depression physically did not receive as much benefit as those with milder levels of depression. Post-hoc tests stratified by sex found that these relationships disappeared altogether for women such that neither depression nor anxiety was related to physical improvement post crying. For men, severer depression continued to predict less mood improvement following crying.

Mental Mood Improvement (see table 6). The results of the multiple regression analysis showed that overall being female was negatively associated with mental mood change such that females felt worse mentally after crying than men did. Depression was also negatively associated with mental mood improvement such that the severer the depression led to less mental mood improvement following crying. Post-hoc tests stratified by sex showed that for women, none of the predictors remained significant. That is none of the predictors, depression and anxiety were not related to how they felt

mentally after they cried. For men, depression remained negatively related to mental mood improvement such that men who experienced more depression reported less mental mood improvement than those with milder levels.

Catharsis Composite (see table 6). The results of the multiple regression analysis showed that overall depression was the only significant predictor of the catharsis composite such that the severer the depression the less catharsis participants reported. Analyses stratified by gender found no sex differences in the catharsis composite.

Discussion

The purpose of this study was to generate a clearer understanding of the relationship between the severity of depression and anxiety, crying behaviors and mood change after crying. As Vingerhoets and colleagues (2000) observed in their research, sadness and negative mood are among the most frequently cited antecedents to crying. Thus, depression and anxiety would be positively associated with crying indices proneness and frequency. Additionally, assuming the cathartic effect of crying would be weakened in the presence of these clinical factors, depression and anxiety would be negatively associated with mood change following crying. All our hypotheses were supported.

With regards to the relationship between clinical measures and crying indices, these findings generally support the linear theory. Depression, being mainly characterized by negative affect leads to more frequent crying episodes, in line with other findings (Beck, Steer, & Brown, 1996). However, this finding is contradictory to several studies which found no relationship between the severity of depression and crying frequency (Kraemer & Hastrup, 1986; Labott & Martin, 1987) and others which found severer depression to lead to less crying (Patel, 1993; Beck, 1978; Lambert & Ajaks, 1967).

In terms of anxiety, also characterized by negative affect, our finding is in line with research which found a positive linear relationship between the severity of anxiety and crying frequency (Rottenberg, J., Bylsma, L. M., Wolvin, V., & Vingerhoets, A. J. J. M., under review) and provides further evidence for this relationship.

Simultaneous multiple regression analyses were performed to detect the unique contributions of anxiety and depression on crying indices. After regression analyses, females cry more frequently than men do which is line with other research (Choti, Marston, Holston and Hart, 1987; Frey, 1985; Frey, Hoffman-Ahern, Johnson, Lykken and Tuason, 1983; Kraemer and Hastrup, 1986; Vingerhoets and Becht, 1997). Overall, Depression and anxiety both were positively associated with crying frequency. After stratifying by gender, only depression remained a significant predictor of increased crying in men but both depression and anxiety remained positively associated with crying frequency in females. One possibility for this finding could be because men cried far less often than women did which created a floor effect and the relationships were weaker for men than for women. Another possibility is that women tend to score higher on neuroticism, a scale which is characterized by anxiousness or a proneness to experience anxiety (Rottenberg et al, under review).

With regards to crying proneness, females were more prone to crying and both depression and anxiety were also positively associated with crying proneness. Analyses stratified by gender found no differences in women and men. Because women have been found to cry more often than men, it makes sense that they are more prone to cry as well. These findings provide further evidence for the linear theory which predicts increased crying and proneness to cry with increased depression and anxiety.

With respect to mood change following crying, the hypotheses that both depression and anxiety would be negatively correlated were supported. However, after multiple regression analyses the findings were mixed. Depression alone was negatively associated with the catharsis composite variable. Stratified analyses found no differences

among women and men. Thus, increased depressed mood decreases the cathartic effect of crying frequently reported for the catharsis composite. However, on average, women felt physically worse than men did but felt mentally better than men after crying. After stratifying by gender, only depression was negatively associated with decreased mood improvement on both physical and mental measures for men. These associations for women disappeared. Thus, depression negatively predicts mood improvement for men only. One explanation for these findings is because women cry more often than men do, they may experience greater mood improvement to begin with.

Limitations and Future Directions

One limitation of the study is that although a large sample size produces statistical power to detect significance, the effect sizes of the relationships found were very weak. The relationship between crying frequency and depression was the weakest correlation found in the analyses and disappeared when statistically controlling for anxiety.

Additional limitations of the sample are that, although it was rather large with diverse age and gender, it is still not representative because the participants selected themselves to respond to the questionnaire and asks them to report thinking in retrospect. We cannot be sure that the participants in this study varied from others who did not respond to the online questionnaire. Finally, humans are often influenced by biases, memory distortions, and prejudices when thinking in retrospect. A study using a naturalistic diary report would provide more accurate reports

References

- American Psychiatric Association.(2000). *Diagnostic and statistical manual of mental disorders* (4th revised ed.). Washington, DC: Author.
- Becht, M.C. & Vingerhoets, A.J.J.M. (2002). Crying and mood change: A cross-cultural study. *Cognition and Emotion, 16*, 87-101.
- Beck, A.T., Steer, R.A. & Brown, G.K. (1996). Manual for Beck Depression Inventory-II. San Antonio, TX: Psychological Corporation.
- Bindra, D. (1972). Weeping: A problem of many facets. *Bulletin of the British Psychological Society, 25*, 281-284.
- Breuer, J., & Freud, S. (1955). *Studies on hysteria* (J. Strachey, Trans.) London: Hogarth Press. (Original work published 1895).
- Bright, T. (1586). A treatise of melancholie containing the causes thereof, & reasons of the strange effects it worketh in our minds and bodies: with the physicke, cure, and spiritual consolation for such as have thereto adioyned an afflicted conscience. London: Thomas Vautrollier.
- Choti, S.E., Marston, A.R., Holston, S.G., & Hart, J.T. (1987). Gender and personality variables in film-induced sadness and crying. *Journal of Social and Clinical Psychology, 5*, 535-544.
- Cornelius, R.R. (2001). "Crying and Catharsis" In: Vingerhoets, A.J.J.M. & Cornelius, R.R. *Adult Crying: A Biopsychosocial Approach*. Brunner-Routledge, Hovee, East Sussex.

- Cornelius, R.R. (1986). Prescience in the pre-scientific study of weeping? A history of weeping in the popular press from the mid-1800's to the present" presented at the 57th Annual Meeting of the Psychological Association, New York, 1986.
- Davis D., Lambert, J., & Ajaks, Z.A. (1969). Crying in depression. *Br. J. Psychiatry*, 115, 597-598.
- DeFruyt, F. (1997). Gender and individual differences in adult crying. *Personality and Individual Differences*, 22, 937-940.
- Frey, W.H. (1985). *Crying the Mystery of Tears*. Minneapolis: Winston Press.
- Frey, W.H., Hoffman-Ahern, C., Johnson, R.A., Lykken, D.T., Tuason, V.B. (1983). Crying behavior in the human adult. *Integrative Psychiatry*, Sept-Oct, 94-100.
- Gross, J.J., Fredrickson, B.L. & Levenson, R.W. (1994). The psychophysiology of crying. *Psychophysiology*, 31, 460-468.
- Hamilton, M., 1967. Development of a rating scale for primary depressive illness. *Br. J. Soc. Clin. Psychol.* 6, 278-296.
- Hammen, C.L. & Padesky, C.A.(1977). Sex differences in the expression of depressive responses on the Beck Depression Inventory. *Journal of Abnormal Psychology*, 36, 609-614.
- Hastrup, J.L., Baker, J.G., Kraemer, D.L. & Bornstien, R.F. (1986). Crying and depression among older adults. *Gerontologist*, 26, 91-96.
- Herrmann, C. (1997). International experience with the Hospital Anxiety and Depression Scale A review of validation data and clinical results. *Journal of Psychosomatic Research* 1997, 42, 17-41

- Kraemer, D.L. & Hastrup, J.L. (1988). Crying in adults: self-control and autonomic correlates. *Journal of Social and Clinical Psychology, 6*, 53-68.
- Labott, S.M. & Martin, R.B. (1987). The stress-moderating effects of weeping and humor. *Journal of Human Stress, 13*, 159-164.
- Martin, R.B. & Labott, S.M. (1991). Mood following emotional crying: effects of the situation. *Journal of Research in Personality, 25*, 218-244.
- Miceli, M. & Castelfranchi, C. (2003). Crying: discussing its basic reasons and uses. *New Ideas in Psychology, 21*, 247-273.
- Patel, V. (1993). Crying behavior and psychiatric disorder in adults: A review. *Comprehensive Psychiatry, 34*, 206-211.
- Peter, M., Vingerhoets, A.J.J.M. & van Heck, G. L. (2001). Personality, gender, and crying. *European Journal of Personality, 15*, 19-28.
- Rottenberg, J., Bylsma, L. M., Wolvin, V., & Vingerhoets, A. J. J. M. (in preparation). Personality and Clinical Predictors of Crying and Mood Improvement after Crying."
- Rottenberg, J., Cevaal, A., & Vingerhoets, A. J.J.M. (2007). Do mood disorders alter crying? A pilot investigation. *Depression and Anxiety*.
- Rottenberg, J., Gross, J.J., Wilhelm, F.H., Najmi, S. & Gotlib, I.H. (2002). Crying threshold and intensity in major depressive disorder. *Journal of Abnormal Psychology, 111*, 302-312.
- Rusting, C.L., & Larsen, R.J. (1997). Extraversion, neuroticism, and susceptibility to positive and negative affect: A test of two theoretical models. *Personality and Individual Differences, 22*, 607-612.

- Snaith, R. P., & Zigmond, A. S. (1994). *HADS: Hospital Anxiety and Depression Scale*. Windsor: NFER Nelson.
- Spinhoven, P. H.; Ormel, J.; Sloekers, P. P. A., Kempen, G. I. J.M., Speckens, A.E.M. & Van Hemert, A. M. (1997). A validation study of the Hospital Anxiety and Depression scale (HADS) in different groups of Dutch subjects. *Psychological Medicine*, 27, 363-370.
- Vingerhoets, A.J.J.M., Boelhouwer, A.J.W., Van Tilburg, M.A.L., & Van Heck, G.L. (2001). The situational and emotional context of adult crying. In: A.J.J.M. Vingerhoets & R.R.Cornelius (Eds.) (2001), *Adult crying: a biopsychosocial approach* (pp. 71-90). Hove, UK: Brunner-Routledge.
- Vingerhoets, A.J.J.M, Cornelius, R.R., Van Heck, G.L., & Becht, M.C. (2000). Adult crying: A model and review of the literature. *Review of General Psychology*, 4, 354-377.
- Vingerhoets, A.J.J.M., Rottenberg, J., Cevaal, A. & Nelson, J.K. (in press) Is there a relationship between depression and crying? A review. *Acta Psychiatrica Scandinavica*.
- Vingerhoets, A.J.J.M, Van Den Berg, M.P., Kortekaas, R.T., Van Heck, G.L., & Croon, M.A., (1993). Weeping: Associations with Personality, Coping and Subjective Health Status. *Personality and Individual Differences*, 14, 185-190.
- Zigmond, A.S. & Snaith P.R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavia*, 67, 361-370.

Table 1
Correlation Matrix

	HADS- D	HADS- A	Crying Frequency	Crying Proneness	Physical Improvement	Mental Improvement	Catharsis Composite
HADS-D		.633**	.153**	.112**	-.093**	-.085**	-.167**
HADS-A			.229**	.247**	-.071**	-.049**	-.096**
Crying Frequency				.648**	-.030	-.023	.012
Crying Proneness					-.025	-.028	-.036*
Physical Improvement						.381**	.264**
Mental Improvement							.373**
Catharsis Composite							

** p<.01 level (2-tailed).

* p<.05 level (2-tailed).

Table 2
Reported Mood Change

Physical Improvement	Frequencies	Percent
Less than before	241	8.7
Same as before	2024	72.9
More than before	513	18.5
Mental Improvement	Frequencies	Percent
Less than before	256	9.2
Same as before	1416	51
More than before	1106	39.2

	M	SD
Catharsis Composite	2.47	.44

Table 3
Summary of Multiple Regression Analysis for Variables Predicting Crying Frequency (N=2778)

Variable	Overall			Women			Men		
	B	SE B	β	B	SE B	β	B	SE B	β
Education	-.07	.09	-.01	-.33	.13	-.06	.09	.15	-.02
Female	1.51	.09	.28**						
Depression	.07	.02	.13**	.06	.03	.08*	.09	.03	.14**
Anxiety	.12	.03	.13**	.17	.03	.19**	.04	.04	.05

Note. Total R² = .129

*p<.05

**p<.01

Table 4
Summary of Multiple Regression Analysis for Variables Predicting Crying Proneness (N=2778)

Variable	B	SE B	β
Education	-.04	.09	-.00
Female	1.67	.09	.33**
Depression	.09	.02	.13**
Anxiety	.06	.02	.08**

Note: Total R2 = .15

*p<.05

**p<.01

Table 5
 Summary of Multiple Regression Analysis for Variables Predicting Physical Improvement (N=2778)

Variable	Overall			Women			Men		
	B	SE B	β	B	SE B	β	B	SE B	β
Education	.04	.02	.04	.04	.03	.04	.03	.03	.03
Female	-.09	.02	-.08**						
Depression	-.01	.00	-.10**	-.00	.01	-.46	-.03	.01	-.12**
Anxiety	.00	.01	.04	-.00	.01	-.00	.015	.01	.01

Note. Total R2 = .02

*p<.05

**p<.01

Table 6
 Summary of Multiple Regression Analysis for Variables Predicting Mental Improvement (N=2778)

Overall				Women			Men		
	B	SE B	β	B	SE B	β	B	SE B	β
Variable									
Education	.04	.02	.04	.04	.03	.03	.05	.04	.04
Female		-.12	.02**	-.09					
Depression	-.01	.01	-.07**	-.01	.00	-.05	-.02	.01	-.12**
Anxiety	.01	.01	.02	.00	.00	.00	.01	.01	.05

Note. Total R2 = .014

*p<.05

**p<.01

Table 7
Summary of Multiple Regression Analysis for Variables Predicting Catharsis Composite (N=2788)

Variable	B	SE B	β
Education	.01	.02	.01
Female	-.00	.02	-.00
Depression	-.01	.00	-.11**
Anxiety	-.00	.00	-.03

Note. Total R² = .018

*p<.05

**p<.01