



## When and for whom does crying improve mood? A daily diary study of 1004 crying episodes

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### ABSTRACT

We aimed to examine the connections between individual affective characteristics and crying, and to evaluate Rottenberg, Bylsma, and Vingerhoets' (2008) framework for studying crying and mood. We analyzed the relationship among features of the social environment, mood characteristics of the crier, crying frequency/urge to cry, and mood change across 1004 detailed crying episodes sampled from 97 females. Urge to cry and crying frequency were associated with poorer mood, and urge to cry was associated with greater mood variability. Poorer mood was observed both before and after crying episodes, and one-third of crying episodes resulted in reported mood improvement following crying. Benefits of crying, when they occur, are shaped by the social environment and the affective characteristics of the crier.

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### 1. Introduction

Crying is a common, human form of emotional expression that can be elicited in diverse contexts (Vingerhoets, Bylsma, & Rottenberg, 2009). Given that human crying is typically triggered by emotionally meaningful events, this behavior has import for our understanding of emotion and emotion regulation. Yet even strong emotional stimuli will not evoke tears in all people, leaving considerable room for individual differences, such as psychological (mood) and physical (sleep loss) states to shape whether or not emotional tears are shed in a given situation. Consistent with a role for individual differences, a robust predictor of increased crying is neuroticism, a trait characterized by emotional instability, whereas, alexithymia, a trait characterized by a difficulty in expressing and processing emotions, predicts reduced crying frequency and poorer mood following crying (Peter, Vingerhoets, & van Heck, 2001; Rottenberg, Bylsma, Wolvin, & Vingerhoets, 2008).

A main focus of prior research on crying has been on its hypothesized adaptive functions, especially on putative psychological benefits (Rottenberg, Bylsma, & Vingerhoets, 2008; see Vingerhoets et al., 2009, for review). Many scientific theorists from multiple perspectives have posed an adaptive function of crying as serving a cathartic function to relieve tension or stress through possible

physiological (Breuer & Freud 1895/1968; Efran & Spangler, 1979; Gross, Fredrickson, & Levenson, 1994; Heilbrunn, 1955; Sadoff, 1966), biochemical (Frey, Hoffman-Ahern, Johnson, Lykken, & Tuason, 1983); behavioral coping (Miceli & Castelfranchi, 2003; Scheff, 1979), or social mechanisms (e.g., Cornelius, 1997; Kottler & Montgomery, 2001; Nelson, 2005). The idea that crying is beneficial for psychological and even physical well-being has been widespread in both popular literature and scientific theory (Cornelius, 1986); however, the empirical evidence suggests a more complicated picture.

Naturalistic survey designs typically find that when people retrospectively report about past crying episodes, most report mood benefits from crying (e.g., Bindra, 1972; Bylsma, Vingerhoets, & Rottenberg, 2008; Frey et al., 1983; Kraemer & Hastrup, 1986; Lombardo, Cretser, Lombardo, & Mathis, 1983), including reduced tension and feelings of relief (e.g., catharsis; Scheff & Buschnell, 1984). For example, Bylsma and colleagues (2008) examined over 4000 crying reports from men and women across over 30 countries and found that a majority of participants reported experiencing mood benefits from crying.

Importantly, not all participants report mood benefits from crying in retrospective survey designs, and a sizeable minority even reports negative effects on mood. For example, Lombardo et al. (1983) found that about one fifth of their sample reported negative effects of crying such as feeling depressed, embarrassed, tired, or weak. Indeed, we have been intrigued by this variation and have sought to systematically study it. In our international study analyses (Bylsma et al., 2008), receipt of social support, experienc-

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ing a resolution or a new understanding of the event that caused the crying, or crying in the context of a positive event all predicted improved mood after crying. In contrast, receipt of negative social responses from crying, experience of embarrassment or shame, or crying due to witnessing the suffering of others predicted worsened mood after crying (Bylsma et al., 2008). Thus, preliminary evidence suggests that variations in contextual characteristics may explain systematic variation in the effects of crying, and attention to these variables may help elucidate for whom and in what contexts crying may be beneficial.

Consistent with the importance of context, studies that elicit crying in a laboratory setting rarely find mood benefits from crying. Unlike what is seen in retrospective surveys, most laboratory studies find that people who cry to an eliciting stimulus (e.g., a sad film clip) report increased distress, sadness, or arousal relative to people who view the same stimulus without crying (e.g., Gross et al., 1994; Labott & Martin, 1987; Martin & Labott, 1991; Rottenberg, Gross, Wilhelm, Najmi, & Gotlib, 2002). Although laboratory and retrospective self-report studies are reasonable first steps in the field, both of these methods also have clear limitations.

Retrospective self-report studies require participants to search over long periods to identify characteristics of crying episodes, which may be infrequent events. As a result, individuals may be more likely to recall the most salient or intense crying episode rather than a typical crying episode. Further, retrospective self-report data are also vulnerable to implicit theories about (the functions of) crying. To the extent that participants subscribe to the strong lay view that crying is beneficial, implicit theories are likely to magnify reports of the benefits of crying (see Cornelius, 1986).

Laboratory designs also introduce error into the assessment of crying. There is typically only a single point assessment of crying, and the effects of crying on mood are typically evaluated only over a brief period of time. Since crying is never successfully elicited in 100% of participants and random assignment to crying is not possible, it is difficult in a laboratory design to disentangle the effects of crying from the characteristics of cry-prone individuals. In addition, because the laboratory environment is typically asocial and socially unsupportive, the crying does not impact the situation (which is depicted in the film), which may also bias studies against finding psychological benefits (Rottenberg, Bylsma & Vingerhoets, 2008).

If we are to understand the intrapersonal and interpersonal factors that mediate and moderate the effects of crying, the field must overcome methodological challenges. One is to rely less on single-point measurements and find ways to gather an ecologically valid sample of crying episodes. Repeated sampling is often achieved with computerized experience sampling (ESM). However, given the rarity of crying, there is a practical concern with ESM. To capture multiple episodes would require long and dense ESM recording protocols, creating a high participant burden and possibly inducing reactivity (i.e., dense assessment of crying may alter the behavior under study). Alternatively, the daily diary method (Bolger, Davis, & Rafaeli, 2003) can be implemented over longer periods of time with a lower participant burden than ESM. The daily diary method allows the investigator to obtain multiple crying reports for each participating individual, enhancing reliability and allowing for the estimate of within-individual effects, as well as the examination of effects of crying over time. Further, since reports are typically given at the end of each day, use of this method provides detailed assessment of crying without causing major interruption to the natural flow of daily life. Since reports are provided the same day that crying episodes occur, retrospective biases and memory errors are reduced relative to retrospective surveys (e.g., Parkinson, Briner, Reynolds, & Totterdell, 1995; Poikolainen & Karkkainen, 1983).

In the only daily diary study of the effects of crying to date, Frey and colleagues (1983) examined emotional crying reports over a 30-day period from 286 females and 45 males and found that criers reported experiencing mood improvement (i.e., reductions in sadness or anger) after 40% of the recorded episodes. However, on a trait measure that asked criers how they generally felt after a crying episode, a much larger percentage (85% of females and 73% of males) reported feeling better after crying. The wide discrepancy between daily and trait measures again highlights the importance of methodological choices and the value of methods that collect data on mood on the same day as a particular crying episode (i.e., to minimize the influence of memory errors and implicit theories of crying).

Given the varied nature of crying and its effects, Rottenberg, Bylsma and Vingerhoets (2008) developed a heuristic framework to study the psychological effects of crying. Among the domains considered by this framework are: the nature of crying triggers, how and when effects are measured, conditions in the social environment, personality traits (and other individual difference characteristics), and the affective state or disposition of the crier. Most of these domains have been related to the psychological effects of crying including: reasons/triggers for crying (Bylsma et al., 2008), individual differences in personality traits (Rottenberg, Bylsma, Wolvin et al., 2008), in affective states (Rottenberg, Cevaal, & Vingerhoets, 2008) and the presence or absence of others (Bylsma et al., 2008).

### 1.1. The present study

The aims of the present study thus were twofold. A first goal was to learn more about the connections between individual affective characteristics (i.e., mood and mood stability) and crying. Second, the goal was to evaluate our model (Rottenberg, Bylsma & Vingerhoets, 2008) in a stronger design, with more attention to person characteristics. To that end, we applied a daily diary methodology to examine crying episodes in young women over a period of approximately two months. Since the purpose of the original study was to examine the relationship between crying and the menstrual cycle, only females were included and data were collected for two menstrual cycles (minimum of 40 days) for each individual (van Tilburg, Becht, & Vingerhoets, 2003). The extended length of the daily diary protocol allowed for the inclusion of a large number of crying episodes, which enabled us to examine crying for the first time as a within-subjects phenomenon using sophisticated multilevel regression analyses. We could, for example, contrast crying and non-crying days for each participant and evaluate both mood as a predictor of crying and crying as a predictor of subsequent mood change. Finally, we extended Frey and colleagues' (1983) findings by including detailed analyses of the context of crying and their relationship to mood.

Although this study was novel in several respects, previous findings with retrospective survey designs helped guide hypotheses. Since we have found that persons with neuroticism (De Fruyt, 1997; Peter et al., 2001) and depression report crying more frequently and report experiencing less post-crying mood improvement relative to non-psychiatric individuals (Rottenberg, Cevaal & Vingerhoets, 2008; Vingerhoets, Rottenberg, Cevaal, & Nelson, 2007), we hypothesized that (1) high dispositional negative mood and low dispositional positive mood would be associated with greater crying frequency, and (2) poorer dispositional mood would predict less experience of mood improvement after crying. Based on our previous work examining predictors of post-crying mood improvement (Bylsma et al., 2008), we further expected that mood improvement after crying would be positively associated with: (3) crying in the presence of one other individual (relative to crying alone or with many other

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