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## Functions of Emotional Crying<sup>1</sup>

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### Abstract

*Over the last three decades, research on emotional crying has increased significantly. Nevertheless, our understanding of the functions and consequences of this fascinating behaviour remains limited. This paper provides a brief overview of the latest theoretical contributions and empirical findings on the intra- and inter-individual effects of crying. Next, it attempts to disentangle the evolved functions of crying from its effects, which are not necessarily part of these functions. The central premise is that crying represents an evolved mechanism designed to transmit information in a limited set of ancestrally recurrent situations. The paper offers both theoretical analysis and empirical support for the idea that emotional crying functions as an emotional expression or signal that: (a) primarily operates through the visual channel, (b) evolved during recent human evolution to transmit information related to attachment processes, help-seeking, and the expression of friendly intentions, all of which can be structured around the main dimensions of social perception: warmth and competence, (c) often elicits positive reactions from observers, and (d) has positive consequences for the individual that are best understood within the context of its signalling function. In addition to the effects of crying on well-being of the crying individual that are mediated through positive responses from others, this contribution also discusses how crying might directly influence an individual's well-being. Understanding these direct effects requires a consideration of the evolved signalling functions of tears. Based on these proposed functions, the paper attempts a theoretical integration of the inter-individual functions and intra-individual effects of crying.*

**Keywords:** *tears, emotional crying, evolution, communication, mood*

<sup>1</sup> This work is funded by the project The Dimensions of Warmth and Competence, Social Ranking, and Mental Health, uniri-iz-25-292, Financira Europska unija – NextGenerationEU.

## Introduction

Emotional crying (hereafter “crying”) can be defined as welling tears in or shedding tears from the eye (i.e., tearing up) that is not a consequence of any irritation of ocular structures. It typically occurs during intensive emotional reactions, mostly negative, but also positive ones. Crying is a multifaceted response: it is typically accompanied by muscular facial expressions, and sometimes includes vocal crying and sobbing, whereas the latter refers to convulsive inhaling and exhaling (Patel, 1993). Tears *always* preclude other forms of (sincere) crying, and this overlap allows for a certain degree of joint analysis of different aspects of the crying phenomenon. However, it is important to have in mind that some studies showed that aspects of crying other than tearing up (e.g., vocal) can result in different, often less positive reactions from observers (see Zickfeld & Wróbel, 2023). The current contribution will review relevant research and offer theoretical insights that are primarily intended to explain the occurrence of tearing up, as a key component of crying, which clearly has implications for other aspects of crying. Throughout the text, the term tears will be used only when referring specifically to this core aspect of crying (e.g., when it is clear that research dealt with tears only or when I refer to functional properties of tears), while the term crying will be used when specific research findings (likely) involved other aspects of crying, or when referring to functions of crying as a more general response.

Crying can be regarded as a form of emotional expression, but it is different from expressions of so-called primary emotions such as fear or disgust. While those expressions are relatively consistently linked to specific emotions and their functions (Ekman & Friesen, 2003), it is much harder to link crying with any specific emotion. There is an overall agreement among researchers that each emotion consists of cognitive appraisals, physiological component, behavioural tendencies or motivation, subjective feelings, and expressive behaviour. Each of these components differs between specific emotions to various extent. In some cases, some of these components have similar features across different emotions, which may also explain why different emotions co-occur in the same situations, and which makes borders between emotional categories relatively fuzzy (see Lange & Zickfeld, 2023). Crying represents the expressive component of different emotions and, as I argue in the current contribution, it is functionally linked to specific patterns of other basic components of different emotions (e.g., appraisals), which allows it to be coupled with various subjective emotional experiences.

Currently, there is no systematic empirical data providing evidence for any animal species other than humans producing emotional tears (but see Murata et al., 2022). Crying is a relatively frequent human behaviour. Across the globe, males cry, on average, once every two months, while females cry two to five times per month (Bylsma et al., 2011; Vingerhoets, 2013). Nevertheless, there are large individual differences in crying frequency and proneness other than gender. For example, neuroticism, extraversion, and habitual prosocial tendencies play an important role in whether someone will react with tears when exposed to various situations (Barthelmäs & Keller, 2021; Laan et al., 2012; Rottenberg et al., 2008b; Vingerhoets et al., 2018). The strongest triggers of crying are the events that occur rarely, such as social rejection, ending love relationship, and separation from and death of close others. More common situations that trigger crying are physical pain or injury, experiencing any kind of loss, interpersonal conflicts, being harshly criticised, feelings of personal inadequacy, as well as witnessing suffering of other beings (Denckla et al., 2014; Vingerhoets et al., 1997, 2009). Crying co-occurs with a variety of subjective emotional feelings, more often negative, including sadness, grief, self-pity, hopelessness, anger, frustration, but also positive ones, such as joy, elation, and relief, which is only a small part of the large number of different types of feelings reported across different studies (Crile, 1915; Frijda, 1986; Miceli & Castelfranchi, 2003; Murube et al., 1999; Vingerhoets et al., 1997). When it comes to specific emotions, people most often link crying with sadness (Choti et al., 1987; Vingerhoets et al., 1997), and less frequently with fear and anger (Barthelmäs et al., 2022; Grača-

nin et al., 2021; Vingerhoets, 2013). A common factor linking all these situations seems to be the appraisal reflecting the state of helplessness (Gračanin et al., 2018a; Miceli & Castelfranchi, 2003; Murube et al., 1999; Vingerhoets et al., 1997; Zickfeld & Wróbel, 2024). As it will be presented below, one of the main proposed inter-individual functions of tears consists of promotion of helping behaviours by observers. Finally, tears seem to occur not just when requesting help, but also when offering help. Specifically, Murube and colleagues (1999) in their account on the functions of crying considered all episodes of positive crying to be related to offering help, which is a possibility that I will briefly discuss below.

Notably, helplessness is based on the appraisal of low coping potential or low control/agency (Moors et al., 2013), which is not typical of happiness and anger (Smith & Ellsworth, 1985) during which crying sometimes occurs (Gračanin et al., 2021; Vingerhoets et al., 1997). One of the explanations of this seeming paradox is that people cry when they feel overwhelmed with (intensive) emotion (Vingerhoets & Bylsma, 2016). Here, the intensity rather than the type of the emotion (and typical appraisal linked to it) appears to be important. Thus, even in case of anger or happiness, being overwhelmed with emotion results in the appraisal of very low, rather than high agency, eventually resulting in crying. The remaining question is whether there are other key precursors of crying in addition to high emotion intensity. It has been proposed that other factors, such as the characteristics of the receivers of the crying signal, interact with emotion intensity in predicting the likelihood of crying response (see Szynger et al., 2025). These features are either stable or context dependent, for example: the observer is in a better position to help the individual than the individual themselves; the observer can easily fight back if attacked by the potentially crying individual—both of which certainly decrease the level of one’s control, irrespective of the intensity of emotion. In addition, it is important whether the observer knows the individual. All such features fit within the major dimensions of social perception—warmth and competence (Abele et al., 2021; Fiske et al., 2007), which could represent a strong unifying framework for the understanding of the triggers and context of crying episodes. Zickfeld and Wróbel (2024) systematise observers’ responses to emotional tears by structuring them around the two overarching dimensions of social perception—*communion* and *agency* (Abele et al., 2021). I further argue that the more specific aspects of these two dimensions—*warmth* and *competence*—and their interaction are especially relevant for understanding the *triggers* of emotional tears. Warmth refers to features such as friendliness and social closeness, but is not concerned with morality, which is included in the more general factor of communion. By assessing one’s competence, we learn about one’s ability to carry out one’s intentions, which makes it more specific than agency, as the latter also involves assertiveness (Abele et al., 2021; Abele & Wojcizske, 2007; Fiske et al., 2007). The idea is that the individual perception of *relational warmth* (e.g., one perceives certain degree of social closeness or mutual stakes in well-being of the two individuals) interacts with *relational competence* (one perceives that the other individual has greater control over the situation) in prediction of the likelihood of emotional tearing (Gračanin et al., 2023). The current contribution relies on the idea that crying is typically triggered by the appraisals involving high warmth and low competence and their interaction.

Despite a recent increase in both basic and applied research on crying (see Bylsma et al., 2021; Gračanin et al. 2018a; Szynger et al., 2025; Vingerhoets, 2013; Vingerhoets & Bylsma, 2016; Zickfeld & Wróbel, 2024), we still know very little about its functions and evolutionary origins. Why and how did crying evolve? How exactly does it affect crying individuals and what are its social consequences? The aim of the current contribution is to describe and disentangle the evolved functions of crying from the effects of emotional crying that are not necessarily fulfilling these functions. Specifically, the current contribution provides and critically evaluates the arguments for the idea that emotional crying represents an evolved mechanism whose function is to transmit information in a limited set of ancestrally reoccurring situations. Traditionally, the functions of crying are divided into *intra-individual*, referring to the effects of crying on the crying individual, and *inter-individual*, referring to its effects on observers. These functions are presented in Table 1, together with a brief overview of the currently available relevant empirical evidence. Overall, the

current contribution offers theoretical analysis and evaluates empirical support for the idea that emotional crying represents an emotional expression or signal that (a) most likely operates through the visual channel, (b) evolved during recent human evolution as a means of transmitting information, primarily related to attachment processes, seeking help, and showing friendly intentions, (c) most often results in positive reactions from observers, and (d) with its positive consequences for the crying individual best understood in the context of its signalling function. The idea that crying represents an evolved signalling mechanism is relevant for understanding all the effects that crying can have on the individual expressing this behaviour. Before I turn to the proposed evolved function of crying, I will briefly summarise the most important issues and findings from the research on the intra-individual effects of crying.

**Table 1**

*Intra- and inter-individual functions of crying proposed in the literature and current state of the empirical evidence*

Function of crying	Specific empirical evidence for the effects of crying	Strength of the evidence	References (examples)
Intra-individual functions of crying			
Psychological well-being improvements	Mood improvement: <i>Retrospective studies and lay conceptions</i>	Strong	Bindra (1972); Cornelius (1986, 1997, 2001); Hanser et al. (2016); Hendriks et al. (2008); Rottenberg et al. (2008b)
	<i>Studies in therapeutic context</i>	Strong	Nelson (2008)
	<i>Diary studies</i>	Weak	Bylsma et al. (2011)
	<i>Quasi experimental studies</i>	Very weak	Gračanin et al. (2015, 2022); Martin & Labbot (1991); Gross et al. (1994); Rottenberg et al. (2002)
Physiological homeostasis regulation	<i>Quasi-experimental studies:</i> Parasympathetic increases following crying	Moderate	Zickfeld & Grüning (2021)
	Changes in oxytocin and opioid levels	No evidence	Gračanin et al. (2022); Vingerhoets (2013)
Removing toxins from the body	<i>Quasi-experimental studies:</i> Changes in cortisol levels	No evidence	Vingerhoets & Kirschbaum (1997)
Inter-individual functions of crying			
Elicitation of proximity, caregiving, and help	<i>Retrospective and diary studies:</i> Tears promoting helping behaviour	Strong	Barthelmäs et al. (2024); Bylsma et al. (2008); Hendriks et al. (2008)
	<i>Experiments with pictures/vignettes:</i> Tears promoting: Perception of helplessness	Very strong	Balsters et al. (2013); Cornelius & Lubliner (2003); Vingerhoets et al. (2016); Zickfeld et al. (2021)
	Perception of emotions reflecting helplessness-related cognitive appraisal (e.g., sadness)	Very strong	Balsters et al. (2013); Gračanin et al. (2021); Ito & Ong (2023); Provine et al. (2009); Reed et al. (2015)
	Helping intentions	Very strong	Bobowik et al. (2023); Provine et al. (2009); Vingerhoets et al. (2016); Zickfeld et al. (2021)
	Feelings of empathy	Very strong	Gračanin et al. (2021); Zeifman & Brown (2011); Zickfeld et al. (2021)
	Approach intentions	Moderate	Hendriks & Vingerhoets (2006)
	Automatic approach/blocking avoidance	Weak	Gračanin et al. (2018b)
Aggression reduction	<i>Experiments with pictures/vignettes:</i> Intentions for decreasing punishment	Weak	Picó et al. (2020)
Social bonding and collaboration	<i>Experiments with pictures/vignettes:</i> Perception of friendliness, warmth, and non-aggressiveness	Strong	Vingerhoets et al. (2016); Zickfeld et al. (2021)
	Feelings of connectedness	Strong	Vingerhoets et al. (2016); Zickfeld et al. (2021)

*Note.* This table summarises the research findings on the effects of crying. A more complete analysis of the arguments supporting the main functions of crying also needs to be informed by the knowledge about its triggers.

## Intra-Individual Effects of Crying

Earlier studies on crying focused exclusively on the direct effects of crying on the individual who exerts this behaviour, specifically, its effects on psychological well-being, and more specifically, changes in psychophysiological reactions and mood. Due to the great potential for conceptual refinements and critical approach to the existing research, this section will place a greater focus on the subjective aspects of potential intra-individual effects of crying. Nevertheless, I will also briefly introduce the major questions and findings on the effects of crying on psychophysiological processes, which is a topic that received less empirical attention. The idea that shedding emotional tears has beneficial (i.e., cathartic) effects on the crying individual has its roots in early psychodynamic theory, and is based on the assumption that holding back one's emotion has a negative impact on the organism (Freud, 1917; Frey, 1985). It is important to note that such a theoretical position mostly assumes a removal of negative impact of emotional inhibition, rather than the positive impact of emotional expression itself. Nevertheless, this group of studies tried to assess the effects of crying per se on decreases in mental and physical stress responses, and on mood improvement. These studies have shown contradictory results, with differences between findings being related to differences in the methodologies used. Systematic research on lay theories about strategies for decreasing negative emotion, analyses of popular-scientific and fiction literature, as well as media content in general revealed that people consider crying very beneficial in terms of bringing emotional relief (Cornelius, 1986, 1997, 2001; Hanser et al., 2016; Hendriks et al., 2008). In retrospective studies, i.e., when participants report on a previous (most often the last) crying episode, a large majority of them respond that their mood was less negative and more positive after, in comparison to before the crying episode (Bindra, 1972; Rottenberg et al., 2008b). Such findings are corroborated by studies in which therapists report on beneficial effects of their clients' crying (Nelson, 2008). Diary studies are expected to be more reliable when it comes to remembering crying events and less affected by lay theories about crying. In the only systematic diary study on crying, a mere 30% of participants reported mood improvements and 10% reported mood deterioration following crying, while the remaining majority did not report any mood changes (Bylsma et al., 2011). Finally, quasi-experimental research typically showed significant mood deterioration immediately following crying (e.g., Martin & Labbot, 1991; Gross et al., 1994; Rottenberg et al., 2002). One study that assessed mood at several time points has indicated that for the mood improvement to occur it might take a longer period (up to 90 minutes) after a crying episode (Gračanin et al., 2015; but see Gračanin et al., 2022). However, much larger effects observed by using such approach were those related to mood's returning to baseline. Specifically, after the initial large deterioration of mood, which was also observed in other quasi-experimental studies mentioned above, the mood of crying participants quickly returned to the initial level, corresponding to the one before the crying episode.

The existing explanations for the inconsistencies between the results of quasi-experimental and other studies mostly focus on methodological issues, ranging from low ecological validity of laboratory studies to the fact that these are quasi-experiments, rather than experiments. Specifically, crying elicitation in laboratory was limited to film clips and it was coupled with complete absence of (otherwise normative; see below) positive reactions from other people (i.e., experimenters) witnessing participants' crying. At the same time, a quasi-experimental approach does not allow researchers to disentangle the effects of stable individual differences or other forms of inter-individual variation from the effects of the crying process. Even if stable individual differences and emotional states are controlled for (see e.g., Gračanin et al., 2022), this type of design simply cannot de-couple differences in the spontaneous occurrence of crying from differences in *reasons* why crying does or does not occur—that is, from the differences in the triggers of crying. Unfortunately, the same problem is pertinent to diary studies as well. In addition to these basic methodological issues, there are important conceptual differences between different types of studies that could potentially

resolve this apparent paradox. In laboratory studies, mood is typically measured as a composite of different aspects of emotional states, such as sadness, anger, cheerfulness, or tension (e.g., Gračanin et al., 2022). A similar mood parameter was used in the above-mentioned diary study that also failed to find consistent beneficial effects of crying on mood (Bylsma et al. 2011). It might be worth considering the possibility that crying increases certain aspects of negative mood (e.g., sadness), while at the same time it decreases other aspects of mood, such as tension or anger. In retrospective studies, participants might typically refer to some of these aspects of mood due to various reasons (e.g., some negative emotional states are more arousing than others). To my knowledge, no published studies explored the possibility that different aspects of one's negative mood are differently affected by one's crying. Possibly, focusing on more specific aspects of mood or other psychological processes that are important for psychological well-being could help resolve the issue of inconsistent findings regarding the subjective well-being consequences of crying. On the other hand, it is possible that crying relatively rarely results in well-being improvements relative to a period immediately before its occurrence, as shown in the above-mentioned diary study (Bylsma et al., 2011), which was in many instances methodologically superior to many of the other studies mentioned. In that case, consistent results of studies other than quasi-experimental and diary studies, showing the beneficial effects of crying on mood, could be an artefact of what we focus on, how we experience, interpret, and remember mood changes. It is possible that people focus on large mood improvements that occur immediately after large mood deterioration following crying, such as those observed in Gračanin et al. (2015). As suggested by the authors of that study, such sudden mood improvements, that are nevertheless merely a return to baseline, might represent a salient experience that is remembered more easily in comparison to other mood changes following crying.

Whatever the typical or average effects of crying on mood, there is strong evidence of significant variation in these effects. Different characteristics of situations in which one cries influence mood changes following crying. For example, in situations that are less controllable, or in which observers react negatively to one's crying, mood improvement is less likely (Bylsma et al., 2008). Personality also plays an important role in determining whether someone will experience mood improvement following crying. More neurotic and conscientious individuals report less, and more extraverted and agreeable individuals report more mood benefits from crying (De Fruyt, 1997; Barthelmäs & Keller, 2021; Peter et al., 2001).

In cases when crying results in well-being improvements, these effects were proposed to be mediated by several possible mechanisms. The most important mechanism, for which there is also the most empirical support, is an *indirect* one based on observers' responses. Specifically, the strongest evidence regarding the effects of crying on mood pertains to mood changes that are the consequence of other individuals' positive responses to one's tears (Bylsma et al., 2008). In this case, all intra-individual effects of crying are merely byproducts of its inter-individual functions. On the other hand, empirical support for the more *direct* effects of crying on mood is inconsistent, as shown above. More direct mechanisms by which crying might bring benefits to crying individuals are in most cases those for which I propose to be functionally linked to its inter-individual functions. I propose that the intra-individual effects of crying are always based on its inter-individual functions. However, some of these are mere byproducts of the inter-individual functions, while others can have direct functional effects on the crying individual, as I will elaborate below.

Earlier accounts of the psychophysiological processes that might directly facilitate or reflect well-being improvements following crying promoted the idea that tears eliminate stress hormones and toxins from the blood (Frey, 1985). However, theoretical rationale for such claims is highly debatable and empirical evidence is missing (Vingerhoets, 2013; Vingerhoets & Kirschbaum, 1997). The majority of studies on psychophysiological concomitants of crying (as potential mediators between crying and well-being or mood improvements) focused on the (de)activation of sympathetic and parasympathet-

ic nervous systems. Activation of both systems has an important role for psychological well-being in domains of mood and prosocial behaviour (Porges, 2003; Thayer et al., 1996). A dozen of quasi-experiments indicated that the initial sympathetic increase at the onset of tearing turns into sympathetic decrease and parasympathetic increase around the offset of tearing with the latter showing relatively weak effects (e.g., Hendriks et al., 2007; Rottenberg et al., 2003; see Zickfeld & Grüning, 2021 for meta-analysis). Notably, these quasi-experiments suffer from similar conceptual and methodological problems as the above-described laboratory studies on mood changes. They also suffer from additional issues, such as the lack of a clear definition of the onset and offset of crying (Zickfeld & Grüning, 2021). Other potential psychophysiological mechanisms involve changes in levels of oxytocin and endogenous opioids (see Vingerhoets, 2013). Few studies explored the role of these neurochemical substances, and they failed to support the hypotheses about their links with crying (see Gračanin et al., 2022). Largely missing from studies on psychophysiological concomitants or effects of crying are distinctions between various aspects of this multifaceted behaviour. It seems reasonable to ask whether different types of crying (e.g., tearing up vs vocal or sobbing) have different psychophysiological (and potentially resulting mood) consequences.

Finally, there is a possibility that in some individuals crying improves mood via various idiosyncratic factors, such as one's personal attitudes towards crying (Gračanin, 2023; Gračanin et al., 2014). For example, a person might assume that crying is beneficial or that "only good people cry" (see Zickfeld et al., 2022). Similarly, as stated above, the "effects" of crying that one remembers (and thus reports on) possibly depend on the salience of specific aspects of mood dynamics, which is simply part of the process of mood's returning to baseline after a stressful event, as explained above (Gračanin et al., 2015).

If our ancestors did not develop crying responses because these were useful for directly improving their mood, a possibility which any serious functional analysis could easily refute, then what was the reason for this curious behaviour to become part of our nature? The evolutionary perspective offers two straightforward, mutually exclusive hypotheses about the origin of crying and their effects on crying individuals and observers. Crying and its normative consequences (both intra- and inter-individual) exist because they either, on average, increased the chances for survival and reproduction in our ancestors, or they exist as a byproduct of other adaptive mechanisms. As we proposed earlier (Gračanin et al., 2017c, 2018a; Szynger et al., 2025), inter-individual functions of crying can be understood on the basis of its ability to promote gene replication of crying individuals by serving communication functions. In contrast, intra-individual effects of crying in a large part (especially those related to mood changes) seem to be byproducts of its evolved inter-individual effects. However, some of these intra-individual effects are tightly related to inter-individual functions of crying and, as I will elaborate below, they should not be considered byproducts since they might represent part of the more global crying response, whose function is the preparation for and coordination of pro-social interactions.

## **Inter-Individual Functions of Crying**

Theorising about evolved functions of tears started with Darwin (1872) who proposed that crying of infants and small children is functional, while crying in adults serves no purpose. Much later, Tomkins (1963) offered one of the first accounts of the signalling functions of crying by proposing that it signals distress and vulnerability, and promotes caregiving and social bonding behaviour. Two decades later, Frijda (1986) discussed communicative functions of this behaviour in terms of its ability to elicit sympathy and support. Bowlby's attachment theory offered one of the most elaborated and straightforward accounts of the adaptive value of crying (Bowlby, 1969, 1980). He considered crying as an important

component of the innate attachment mechanism. By this account, crying is a main “weapon” of infants, and it fulfils two main functions: (1) regulation of proximity with caregivers and (2) regulation of feeding and receiving other types of care. Finally, over the last three decades, a series of empirical contributions about the inter-individual effect of tears, rather than the more general crying behaviour (for a detailed overview, see Vingerhoets, 2013 and Zickfeld & Wróbel, 2024) has created a solid basis for theorising on their adaptive functions. Tears, as a key aspect of crying, were proposed to represent a signal of submission (Hasson, 2009), neediness and helplessness (Gračanin et al., 2018a; Miceli & Castelfranchi, 2003; Murube et al., 1999; Vingerhoets 2013; Zickfeld & Wróbel, 2024), and prosocial intentions (Gračanin et al., 2018a). Recently, we offered a comprehensive evolutionary account of tears, substantiated by strong evidence for their specific adaptive functions (Szynger et al., 2025). We focused exclusively on tears, rather than the crying response as a whole, and we postulated that tears are a means of informing observers about the value one attaches to specific things. The transmission of information about one’s specific valuation occurs mostly in negative situations when the individual (potentially) suffers damage to their reproductive prospects. It also happens when the observers have greater power to solve the situation in favour of the suffering individual than the individual does, and when there is a sufficient amount of shared interest between the individual and the observer. In positive situations where tearing sometimes occurs, the information about one’s valuation is transmitted in order to create more lasting changes in observers’ cognition, leading to better coordination between the tearful individual and observers over longer periods. This theoretical account is consistent with the notion that crying is typically triggered by the potential crier’s perception of high relational warmth and competence.

### ***Why and How Did Crying Evolve?***

Crying likely evolved from distress calls, an infant behaviour that is omnipresent across bird and mammal species. Their function is to communicate distress and elicit care from caregivers. These calls are limited to sounds in all these species except in humans, who also produce emotional tears. Gračanin et al. (2017c, 2018a) proposed that during recent human evolution these calls initially consisted of vocal crying only. Such communication is useful because it transmits information (e.g., about a baby’s hunger) on relatively large distances, in all directions, and behind obstacles. However, it is disadvantageous since it can attract predators and assaulters (Vingerhoets, 2013; Walter, 2006), and can be extremely annoying, resulting in aggression from others. Such a signal becomes less useful from the very moment small children become able to move towards caregivers. At the same time, combining physical approach with visual signal such as tears has an advantage of directing the distress call to specific individuals, which may also explain the decline in vocal crying with age (Gračanin et al., 2018). In addition, avoiding the spread of information about one’s neediness and distress can be important for one’s social rank even in small children (see Strayer & Trudel, 1984), which ultimately becomes one of the most important factors influencing the individual’s survival and reproduction. A salient signal such as tears thus becomes crucial.

How did emotional tears evolve? Gračanin et al. (2017c, 2018a) proposed that tears evolved as a signal of neediness and distress first in infants, subsequently in older children, and finally in adults. A simple path that led to the emergence of this adaptation might have been based on the fact that animals produce reflex tears when muscles and other tissue around the eyes are mechanically pressed, which is typically observed in yawning or laughing in humans. It was proposed that such behaviours exert pressure on nerve fibres that innervate the lacrimal gland, resulting in excessive tear production (Murube, 2009). However, I could not find any studies comparing the amount of reflex tears produced in humans and other animals. I was also not able to find any scientific accounts of animals other than humans tearing up when yawning. Nevertheless, we do know that chimps, as our closest relatives, have much more robust facial musculature

around the eyes compared to ours. The exceptionally delicate and fragile human facial anatomy, including that of the eyes—especially in infants—could explain the more excessive production of reflex tears in response to mechanical pressure in humans. In our past, the regularity of tearing that was occurring during vocal crying led to the process known as *ritualisation*, which was proposed to be at the basis of the evolution of muscular facial expressions (e.g., anger displays; Eibl-Eibesfeldt, 1989). Through this process tears gradually became a source of information that is not necessarily tied to strong muscular movements around the eyes (Gračanin et al., 2018a).

### ***Signal Value of Tears***

What is the signal value of tears, that is, what information is carried by this signal? To answer that, it is first important to determine what the prototypical triggers of tears are. People most often cry when they incur costs, e.g., when experiencing losses, and less often when they enjoy benefits. In addition to external triggers, another important factor is the state of helplessness (e.g., Vingerhoets, 2013). In other words, the receiver of the signal also gains information about the crier's relative inability to deal with the problem or defend themselves (Sznycer et al., 2025; Gračanin et al., 2018a, Hasson, 2009). For example, people expect individuals to be more likely to tear up during negotiation about resources not only when the outcome of negotiation is more likely to be unfavourable but also when their hierarchical status and ability to return favours are lower rather than higher (Gračanin et al., 2023). When it comes to the role of tears in conflict and aggression, a notable finding is that individuals who show more nonverbal cues of dominance tend to cry less frequently (Gračanin et al., 2019). In short, tears carry information about one's low ability to act (i.e., *competence*) in relation to a certain situation or other individuals. Second, as I elaborate below, people more likely cry in the presence of emotionally closer individuals (e.g. Vingerhoets, 2013). In other words, crying seems to more likely occur in relationships characterised by more *warmth*. The remaining question is how exactly these aspects of social perception trigger the expressive (i.e., crying) component of emotion. Are there some prototypical aspects of physiological and motivational processes functionally related to appraisals of warmth and competence that precede or co-occur with crying?

Finally, for tears to be a signal, on average they must elicit a specific response in observers. Thus, it is also necessary to consider the normative impact of tears on observers' behaviour. Most studies trying to answer this question are experiments that typically consist of the presentation of tearful and non-tearful faces to participants, where tears were either removed from pictures of originally crying faces or artificially added to otherwise non-crying faces. When exposed to tearful faces, observers report feeling more readiness to help the depicted individual than when exposed to non-tearful faces (Bobowik et al., 2023; Provine et al., 2009; Vingerhoets et al., 2016; Zickfeld et al., 2021). Among few others, a recent study based on real life experience rather than on reactions to pictures corroborated and extended those results by showing the effects of tears on actual helping behaviour (Barthelmäs et al., 2024). Tears also decrease aggressive responses in observers, although the supporting evidence is still relatively sparse. In our study in which we exposed participants to vignettes describing mock trials, tearful defendants were punished less harshly than non-tearful ones (Picó et al., 2020). Observers' reactions in dependence of the different characteristics of crying were investigated to a much lesser extent. Tearing up in males was found to elicit observers' more positive reactions compared to the more intense response labelled as crying (Warner & Shields, 2007), or sobbing (Wong et al. 2011). These findings imply that not just more intensive tearing, but also other aspects of crying might be less functional in terms of facilitation of observers' positive responses. However, the research testing such possibility across various contexts is largely missing

## ***Why and How Exactly Tears Affect Observers' Pro-Social Responses***

Based on all the listed findings, it can be inferred that tears signal a need for physical proximity, help, and support. Similarly, tears may act as a plea for reduction of aggression in observers. These messages share a common theme: tearful individuals ask observers for some sort of investment, or more generally, for a “better treatment”. Why would observers be inclined to forego certain resources in order to pass them to the crying individual? A crucial factor is the degree of stake in one’s well-being—be it genetic relatedness or a history of cooperation. Indeed, people are more likely to cry in presence of close individuals than not close individuals (Bylsma et al., 2008; Lombardo et al., 1983; Sharman et al., 2019; Vingerhoets, 2013), and close individuals are more likely to respond with providing help or succour than non-close individuals or strangers (Barthelmäs et al., 2024; Bylsma et al., 2008; Hendriks et al., 2008). However, there is another implicit reason for observers to pass resources to the crying individual: the prospects of future cooperation, at least during the specific situation. Helping somebody who is not going to appreciate it or ceasing aggression towards somebody who will immediately attack is not a viable response. Thus, for the crying signal to fulfil its function, it has to carry information about the tearful individual’s willingness to cooperate, both in the given situation as well as in the long run, so that the investment of the helper will be somehow paid back. Accordingly, tears were proposed to act as a signal of submissiveness (Hasson, 2009) and friendly intentions (Gračanin et al., 2018a). This is in line with recent research consistently showing that tearful individuals are perceived as friendlier, less aggressive, and warmer than non-tearful individuals (Hendriks et al., 2008; van de Veen et al., 2016; Vingerhoets et al., 2016). It is thus not surprising that when tears are present on one’s face, observers also report that they feel more ready to approach (Hendriks & Vingerhoets, 2006), which ultimately results in helping (Vingerhoets et al., 2016), than when tears are not present. As mentioned earlier, some authors proposed that in addition to requesting help, crying also occurs when providing help, which was provided as an explanation for why people cry when experiencing positive emotion (Murube et al., 1999). However, it might be challenging to incorporate various instances of tears of joy, such as crying when witnessing beauty (see Zickfeld et al., 2020), into the function of offering help. A more general category that involves requesting help and offering help, that also has a potential for explain various forms of tears of joy, is the category of prosocial intentions. I speculate that witnessing any highly valued event activates a psychological system designed to facilitate collaboration by sharing the information about one’s valuation of things (see also Sznycer et al., 2025). Clearly, the idea that tears may act as a signal of prosocial intentions or an invitation to cooperate has the potential to explain why tears occur in response to both negative and positive events, which otherwise poses a serious theoretical challenge.

What are the most basic cognitive mechanisms through which visual exposure to tears affects observers’ prosocial responses? For example, do tears affect observers’ behavioural tendencies at the early stages of cognitive processing? Gračanin et al. (2018b) investigated whether tears facilitate approach relative to avoidance tendencies in two different approach–avoidance tasks. Participants were instructed to either move towards tearful faces and away from non-tearful faces, or vice versa, using a joystick or pressing buttons. Tears promoted approach relative to avoidance behaviour, although it was unclear whether tears specifically facilitate approach, block avoidance tendencies in observers, or have both effects.

The presence of tears facilitates recognition or attribution of certain specific emotions. When tears are present on neutral, sad, or on faces expressing other primary emotion, tearful individuals are perceived as more sad than non-tearful individuals (Balsters et al., 2013; Gračanin et al., 2021; Ito et al., 2019; Provine et al., 2009; Reed et al., 2015). The perception of sadness from tears added to faces expressing different emotions can occur automatically, as shown in experiments with reaction-time based Implicit Association Test (Ong & Ito, 2022). Furthermore, tears on faces reliably indicate sadness even

in the presence of contextual information such as body postures, visual scenes, and written scenarios that suggest non-sadness emotions (Ito & Ong, 2023). However, the presence of tears facilitates, or at least does not block the perception of the expressions of fear and anger, compared to other expressions, such as surprise or disgust, the perception of which it strongly decreases. More specifically, we recently explored how tears act in combination with different muscular facial expressions (Gračanin et al., 2021). We tested three different hypotheses stating that the presence of tears increases the perception of: (1) the expressed emotion in general, (2) the expression of one specific emotion—sadness, or (3) helplessness-related cognitive appraisals and behavioural intentions of the crier. The experiment provided the most support for the third hypothesis, implying that tears do not carry information about one specific emotion, but rather inform observers about the costs (potentially) incurred by the crier and their inability to deal with those costs. These messages are typically conveyed by more than one type of emotional expression, and tears seem to facilitate the perception of such expressions. In line with that, in another study we found that observers perceive more intense guilt in tearful individuals than in non-tearful ones (Picó et al., 2020). Apart from affecting the perception of specific emotions, tears have the capacity to make various (but not all) expressions appear more intensive as well as more sincere. Again, this primarily applies to expressions linked to helplessness (Gračanin et al., 2021; Picó et al., 2020). Not surprisingly, tearful individuals are perceived as more helpless (Balsters et al., 2013) and needing more help, care, and succour than non-tearful individuals, which is one of the most straightforward findings in the research on crying (e.g., Cornelius & Lubliner, 2003; Vingerhoets et al., 2016; Zickfeld et al., 2021). When exposed to tearful faces, observers report experiencing more negative emotions themselves (Hendriks & Vingerhoets, 2006), but also more empathy and feelings of connectedness with the depicted individual, than when exposed to non-tearful faces (Provine et al., 2009; Vingerhoets et al., 2016; Zeifman & Brown, 2011; Zickfeld et al., 2021). Most importantly, the effects of tears on social support were found to be mediated by feelings of empathic concern, as well as by perceived helplessness, friendliness, and connectedness with crying individuals (Vingerhoets et al., 2016; Zickfeld et al., 2021).

### ***Pro-Social Effects via Olfactory Channel?***

In a paper from 2011, Gelstein and colleagues reported on the results of three studies showing decreased male sexual interest when exposed to fresh female tears through nasal inhalation. Importantly, they also observed meaningful hormonal changes during male exposure to tears, as well as less theoretically clear changes in the activity of the autonomic nervous system. Our team attempted to replicate the findings pertaining to the sexual interest, but we failed to observe any effects across three studies (Gračanin et al., 2017a; see also Gračanin et al., 2017b and Sobel, 2017). We concluded that sniffing female tears has little effect on male sexual interest and that it appears that tears act primarily as a visual signal. This conclusion is in line with the fact that evidence for the existence of pheromones in humans is weak (Wyatt, 2015). In addition, even if tears contained a chemosignal, there remains a question of its functionality in comparison to tears as a visual signal. While sniffing tears seems to require close proximity (note that in this line of studies participants sniffed tears directly from the test tubes), visual presentation of tears works at larger distance, which represents a more functional signal. Importantly, no other research teams reported on the systematic effects of sniffing female tears on male sexual behaviour. Interestingly, Agron et al. (2023) found that human female tears decrease aggressive behaviour of males, accompanied by theoretically relevant changes in brain activity, which might indirectly support the idea of olfactory effects of tears on sexual behaviour, and more generally, point to the role of olfaction in the evolution of tears as a signal. In the future, research in this field could provide valuable insights into the evolution and functions of tears.

## Intra-Individual Effects and Inter-Individual Functions of Crying: An Integration

As stated above, potential direct intra-individual effects of crying that increase individual well-being are related to the inter-individual functions of tears. It is only through understanding the evolved signalling functions of tears that we can understand the processes through which crying impacts individuals' well-being. In this section, I elaborate on the link between the signalling function of tears—which implies that tears are a signal of helplessness and friendly intentions—and the inter-individual processes that occur during crying and that have the capacity to improve the well-being of the crier.

As I proposed above, crying is typically triggered by the appraisal of low agency (and more specifically, one's low relational competence) and high relational warmth. Its proposed function consists of motivating people who are potentially willing and more capable to provide positive value (or less negative value) by acting in favour of crying individuals than these individuals are capable themselves. Switching from active to passive coping is an adaptive solution in situations when resource expenditure is too high, futile, or dangerous. For example, giving up a task that is too demanding or impossible to solve, or ceasing active confrontation is potentially a better solution than insisting on behaviours that might decrease one's prospects (e.g., Nesse, 2000; Price et al., 1994). I propose that crying behaviour represents the signal component of a broader set of reactions in such situations, whose function is to prepare the organism for passive coping and reception of prosocial responses from nearby individuals (Gračanin et al., 2018a). Relatively loosely bundled emotional mechanisms (see Barrett, 2006) activated in such situations include crying as a signal component, along with other key aspects of emotions—cognitive appraisal, physiological changes, behavioural tendencies, and subjective feelings (see also Lange & Zickfeld, 2023). It was proposed that this specific pattern of reactions that follow the appraisal of low agency/competence together with the appraisal of a sufficient (typically large or suddenly increased; see Zickfeld et al., 2021) amount of relational warmth is coordinated by the *Prosocial Crying System* (PCS; Gračanin, 2023). The system is likely based on brain structures involved in generation of distress calls that we share with other mammals, labelled as the *cry circuit* (Newman, 2007). I further speculate that in humans such system may also overlap with or represent part of other, more general systems, such as the *Social Engagement System* that, among other functions, coordinates the activation of the parasympathetic nervous system and prepares the organism for pro-social interactions (Porges, 2003). PCS is proposed to coordinate tearing and other signalling crying responses, such as vocal crying, with specific patterns of autonomic activation, such as parasympathetic increases and sympathetic withdrawal, together with changes in endocrine system, such as those in oxytocin levels (Zickfeld & Grüning, 2021; Vingerhoets, 2013), which are all related to increases in positive and decreases in negative affect (e.g., Gianaros et al., 2002). In addition to promotion of passive pro-social behaviour, which also includes submissive and helpless responses, the workings of the PCS system thus may promote less negative and more positive subjective emotional states. The existence of such system may further help explain the apparent paradox of people crying when experiencing both positive and negative events. Its output may be useful across both positive and negative situations in which the crying individual communicates friendly intentions, with the function of diminishing losses (e.g., in case of events that provoke sadness, fear, or guilt) and/or fostering collaboration (e.g., during events that provoke joy, gratitude, or kama muta; see Zickfeld et al., 2019).

The initial activation of PCS together with its beneficial effects on well-being (e.g., in terms of increased parasympathetic activation or emotional relief) should occur relatively independently from the reactions of (or in the absence of) observers. However, once its activation is triggered, observers' response to its output might further modulate the effects of PCS on one's well-being, making them less beneficial in case of observers' negative responses, as shown by Bylsma et al. (2008). Specifically, certain social norms and (expected) observers' responses to one's crying (see MacArthur & Shields, 2019) can result in inhibition of

crying or one's negative reactions to one's own tears, such as experiencing feelings of shame or embarrassment (Becht & Vingerhoets, 2002; Bylsma et al., 2008). Modulation of the effects of PCS might occur relatively frequently, especially when it comes to observers' (expected) reactions to more conspicuous aspects of crying, such as vocal. Nevertheless, in the absence of such modulation, the *direct* outputs of PCS are expected to be beneficial in terms of physiology and subjective feelings, even when it comes to those outputs of PCS that sometimes evoke negative responses in observers. This may also explain why crying so often occurs in private (Vingerhoets, 2013) and why it is nevertheless generally considered as psychologically beneficial (Cornelius, 1986, 1997, 2001; Hanser et al., 2016; Hendriks et al., 2008). It is also in line with the above-cited findings about increases in parasympathetic activation following crying in laboratory experiments, in which participants do not experience reactions of other individuals (Zickfeld & Grüning, 2021). Mood changes might indeed represent a byproduct, while other intra-individual effects, such as physiological changes, energy conservation, and ceasing of dangerous activity might represent fulfilled intra-individual function. Clearly, these latter processes activated during switching to passive /prosocial mode could represent mediators between crying and mood improvements (see Gračanin et al., 2014; Vingerhoets, 2013). In short, the existence of PCS may explain why people report feeling better following crying even without observers' beneficial intervention. Admittedly, the presented integration model is in a very initial phase, while at the same time it is rather complex, which makes any attempt of its empirical evaluation a huge challenge. A general approach for testing the model could involve experiments that would manipulate appraisals of certain aspects of warmth and competence, measure spontaneously elicited tears and patterns of psychophysiological (ANS and hormonal) activity as mediators, and specific coping responses including motivation (e.g., for collaboration/submission), as well as subjective feelings and mood dynamics as outcomes.

## Conclusion

I provided a brief overview of the latest knowledge on the intra- and inter-individual effects of emotional crying. If crying improves the well-being of the crying individual, it most often occurs through observers' responses. However, there are some indications that this might also happen directly and internally, through the crying process itself. In the final part of the current contribution, I offered a brief argumentation for why and how this might occur. Undoubtedly, much stronger or at least more documented beneficial effects of crying for one's well-being are those based on an indirect mechanism: eliciting help and support from others. There is now strong empirical support for the claim that tears can be seen as a signal of one's helplessness and willingness to cooperate, whose function is to promote helping responses in observers and to foster cooperation. These messages seem to be mediated by the tears' ability to affect observers' cognition by altering attributions of the states, intentions, and more stable characteristics of crying individuals. In both negative and positive situations, tears are highly informative regarding one's motivations, emotional states, coping abilities, and intentions, all of which can be subsumed within the dimensions of warmth and competence. Tears carry information about one's valuation of things, allowing observers to more efficiently provide, protect, or even benefit from what the crying individual values. The role of other aspects of crying, which can also be regarded as more intensive forms, is less clear and deserves more research.

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