

From Attachment to Social Signalling: A Biopsychosocial Review of Human Crying

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Abstract

Crying is a complex human emotional behavior serving adaptive, regulatory, and communicative functions across the lifespan. This review conceptualizes crying as a biopsychosocial phenomenon integrating evolutionary, developmental, neurobiological, personality, social, and clinical perspectives. It distinguishes reflex, infant, and adult emotional crying and outlines neural mechanisms involving limbic–hypothalamic–brainstem pathways. Experimental findings on observer responses demonstrate that visible tears shape perceptions of vulnerability, warmth, and competence. The review examines gender differences, media influences on emotional norms, and the role of personality traits and emotion regulation processes in crying behavior. Social evaluations in professional contexts are considered alongside conditions under which crying may be perceived as weakness. Finally, maladaptive crying is discussed in relation to psychopathology and neurological dysfunction.

Keywords: Crying, Social perception, Gender Differences, Neurobiology, Personality Psychology, Psychopathology and Media Influence

1. Introduction

Crying is a multifaceted human behaviour encompassing reflexive lacrimation, developmentally programmed distress signalling in infancy, and complex emotional expression in adulthood. Although tear secretion serves a fundamental ocular function, emotional crying represents a distinctive psychobiological phenomenon characterized by the integration of affective processing, autonomic regulation, and social communication. Contemporary research suggests that crying varies systematically by developmental stage, eliciting context, and functional significance

Reflex tearing constitutes the most basic form of lacrimation and is elicited by physical irritants such as chemical vapors, particulate matter, or corneal stimulation. This response is mediated primarily by trigeminal afferents projecting to brainstem lacrimal nuclei and does not require higher-order limbic activation. Reflex tears function to maintain corneal integrity and ocular homeostasis and are therefore distinct from emotionally mediated crying (Vingerhoets, 2013). Importantly, reflex lacrimation lacks the social signalling properties characteristic of emotional tears.

In contrast, infant crying represents an evolutionarily conserved distress signal embedded within attachment systems. Human neonates are born in an altricial state, necessitating prolonged caregiver

investment. Within this developmental context, crying functions as a proximity-maintaining mechanism that activates caregiving responses. According to attachment theory advanced by John Bowlby (1969), infant crying constitutes a biologically programmed behavioral system designed to ensure protection and nurturance. Empirical analyses indicate that infant cries are acoustically graded signals; variations in pitch, duration, and intensity convey differential urgency and physiological need (Soltis, 2004). Pain-related cries, for example, are typically higher in frequency and more aversive to listeners, eliciting rapid caregiver intervention. Thus, infant crying operates as a structured communicative system shaped by natural selection to maximize survival probability.

Adult emotional crying represents a qualitatively distinct phenomenon characterized by visible tear production in response to affective states. Situations that reliably elicit adult crying include bereavement, interpersonal rejection, attachment threat, empathic distress, moral elevation, and overwhelming positive experiences. Neuroimaging evidence demonstrates that socially painful experiences, such as exclusion or rejection, activate neural substrates implicated in physical pain processing, particularly the anterior cingulate cortex (Eisenberger, Lieberman, & Williams, 2003). This neural overlap provides a mechanistic account of why interpersonal loss frequently precipitates crying episodes.

From an evolutionary perspective, adult emotional tears have been conceptualized as an extension of infant attachment signaling adapted to complex social environments. Ad Vingerhoets (2013) proposed that visible tears function as honest signals of vulnerability, enhancing communicative clarity in cooperative social groups. The presence of tears alters facial appearance in ways that increase perceived sadness and need for support while decreasing perceived aggression (Balsters, Kraemer, Swerts, & Vingerhoets, 2013). Such findings suggest that emotional tears amplify social information and promote prosocial responses. In this framework, crying serves both intrapersonal and interpersonal functions, facilitating emotional processing while simultaneously recruiting social support.

Crying is not exclusively associated with sadness. Empathic crying occurs when individuals witness the suffering of others or experience emotionally evocative narratives. Individual differences research indicates that trait empathy is positively associated with crying frequency (Rottenberg, Bylsma, & Vingerhoets, 2008). Additionally, crying may be elicited by anger or frustration, particularly in contexts characterized by perceived powerlessness. Positive emotional crying, including tears of joy, often arises in response to highly arousing events such as reunions, childbirth, or significant achievements. These instances may reflect regulatory mechanisms that modulate extreme affective arousal irrespective of valence.

The regulatory outcomes of crying appear to be context dependent. Although self-reports frequently describe crying as cathartic, empirical findings indicate that mood improvement is contingent upon social response. Individuals are more likely to experience post-cry relief when episodes occur in supportive interpersonal contexts (Rottenberg et al., 2008). In contrast, crying in unsupportive environments may exacerbate distress. These findings underscore the social embeddedness of crying and support its characterization as a biopsychosocial process rather than a purely intrapsychic event.

Taken together, crying comprises distinct yet interrelated forms, including reflex lacrimation, infant distress signaling, and adult emotional expression, each elicited by specific situational triggers and mediated by identifiable neural and physiological systems. Although substantial progress has been made

in delineating the evolutionary, developmental, and neurobiological foundations of crying, the literature remains fragmented across disciplinary boundaries. A comprehensive synthesis is therefore needed to integrate attachment theory, affective neuroscience, autonomic physiology, and social signaling frameworks into a unified account. The present review aims to consolidate current empirical findings, critically evaluate competing theoretical perspectives, and identify gaps that warrant further investigation. By situating crying within an interdisciplinary biopsychosocial framework, this review seeks to clarify its adaptive significance and functional role in human emotional and social life.

2. Neural Circuitry of Crying

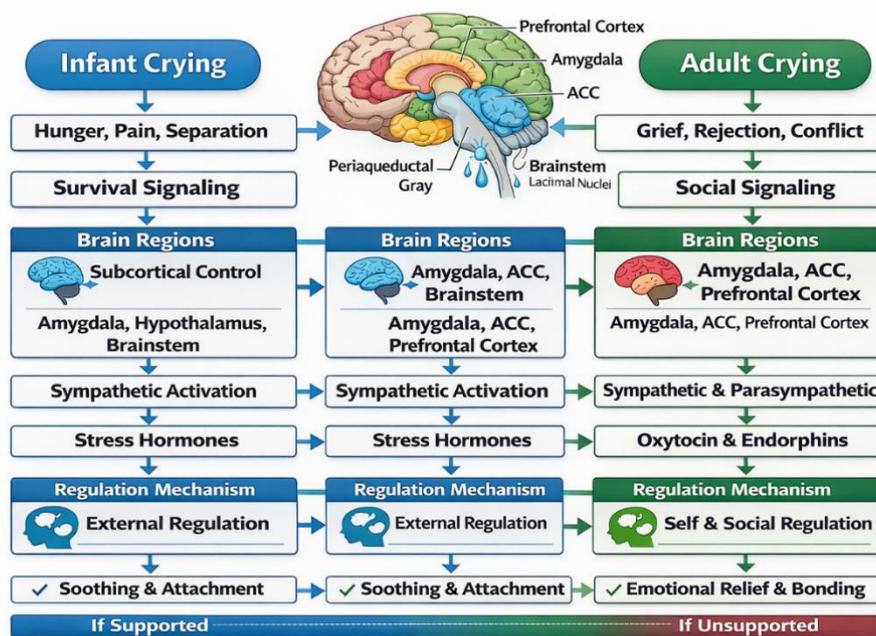


Image 1: Focused on Neural circuitry & Infant Vs Adult Crying

Crying can be conceptualized as comprising basal, reflex, infant distress, adult emotional, and non-affective lacrimation in nonhuman species, each associated with partially dissociable neural and physiological mechanisms. Basal tearing maintains corneal integrity through tonic parasympathetic activity originating in the superior salivatory nucleus and projecting via the facial nerve to the lacrimal glands, thereby sustaining ocular lubrication independent of affective processing. Reflex tearing is elicited by nociceptive or irritant stimulation of trigeminal afferents, which engage brainstem lacrimal nuclei through short-loop circuits that do not require limbic appraisal (Vingerhoets, 2013). These forms of lacrimation are primarily homeostatic and protective.

Infant crying, by contrast, reflects an evolutionarily conserved distress system rooted predominantly in subcortical circuitry. Activation of the amygdala, hypothalamus, periaqueductal gray, and brainstem vocalization centers coordinates autonomic arousal with patterned respiratory–laryngeal output, producing acoustically graded distress signals in response to hunger, pain, or separation. Variations in pitch, duration, and harmonic structure reliably encode urgency and physiological need (Bowlby, 1969; Soltis, 2004). This

system operates within attachment-related motivational networks and is biased toward rapid caregiver recruitment rather than reflective appraisal.

Adult emotional crying involves broader limbic–cortical integration embedded within large-scale salience and affective networks. The amygdala contributes to affective salience detection; the anterior cingulate cortex and anterior insula are consistently implicated in socially painful experiences, overlapping with regions engaged during physical pain processing (Eisenberger, Lieberman, & Williams, 2003). Hypothalamic and brainstem nuclei coordinate sympathetic arousal and parasympathetic lacrimal activation, while cortical regions—including medial prefrontal areas—are thought to modulate contextual appraisal and regulatory control. The resulting behavioral output integrates tear secretion, sobbing respiration, and facial musculature changes, producing a multimodal signal of vulnerability that is both physiologically regulated and socially legible (Rottenberg, Bylsma, & Vingerhoets, 2008).

In contrast, so-called “crocodilian tears” reflect lacrimal and Harderian gland secretion associated with ocular lubrication and osmotic regulation, often mechanically stimulated during feeding. In the absence of neocortical–limbic integration characteristic of mammalian affective processing, such lacrimation is best understood as a peripheral exocrine response rather than an expression of affective neural computation. This comparative distinction underscores that emotional crying in humans is not reducible to glandular secretion but instead represents the coordinated output of distributed affective, autonomic, and social signaling systems.

Social Experiments on Crying

Experimental research on crying has employed controlled paradigms to isolate the causal impact of visible tears on social perception and behavioral intention. Using digital manipulation techniques in which tears are systematically added to otherwise identical facial expressions, studies demonstrate that the presence of tears independently shifts observer judgments. Balsters, Kraemer, Swerts, and Vingerhoets (2013) showed that tearful faces are rated as sadder, more helpless, and more in need of support than tearless counterparts, while simultaneously being perceived as less aggressive. This “tear effect” suggests that tears function as perceptual amplifiers of vulnerability, attenuating threat appraisal and recalibrating social evaluation.

Convergent findings extend beyond sadness-specific contexts. Hendriks and Vingerhoets (2006) reported that observers exhibit heightened empathic concern and stronger comfort intentions toward crying individuals even when baseline emotional expressions are experimentally controlled. Likewise, Van de Ven, Meijs, and Vingerhoets (2017) demonstrated that tears accompanying sadness, relief, or joy increase perceived emotional intensity and authenticity, thereby enhancing attributed warmth and support-worthiness across affective valence conditions. These effects appear robust across laboratory paradigms, indicating that tears operate as a high-salience social cue that modulates both affective resonance and prosocial motivation.

Importantly, experimental vignette studies reveal boundary conditions. In professional or status-relevant contexts, crying increases perceived interpersonal warmth yet may diminish perceived competence, suggesting that tear-elicited vulnerability interacts with normative expectations and role schemas. Thus, visible tears do not exert uniformly positive social consequences; rather, their interpersonal impact is contextually constrained and shaped by culturally embedded display rules. Taken together, experimental

evidence supports the view that tears function as potent social signals that enhance vulnerability perception, amplify empathic engagement, and promote prosocial intent, while simultaneously rendering the expresser susceptible to competence-based evaluative trade-offs.

Gender Differences in Crying: Prevalence, Frequency, and Strategic Use

Gender differences in crying are robust across cultures and developmental stages. Large cross-national surveys consistently indicate that adult women report crying substantially more frequently than men, with annual estimates ranging from approximately 30–64 episodes for women compared to 6–17 for men. These differences typically emerge during adolescence, a developmental period characterized by pubertal hormonal shifts and intensifying gender role socialization, suggesting interaction between endocrine changes and culturally transmitted display rules (Vingerhoets, 2013; Vingerhoets & Scheirs, 2000). Although prolactin has been proposed to facilitate tear production and testosterone to inhibit overt crying, biological mechanisms alone are insufficient to account for the magnitude and cross-cultural variability of the gender gap. Notably, gender differences in crying are attenuated in societies with greater gender equality, consistent with social role theory and the proposition that emotional expression is regulated by culturally embedded norms regarding masculinity and femininity.

Experimental research further indicates that gender moderates observer responses to crying. Female crying is generally perceived as more normatively appropriate and elicits greater sympathy and support, whereas male crying may reduce perceived competence or dominance, particularly in professional or status-relevant contexts. These patterns suggest that emotional displays are evaluated through gendered expectation frameworks that shape the social costs and benefits of visible vulnerability.

Regarding strategic or instrumental crying, self-report research suggests that a minority of individuals acknowledge occasionally using tears to influence others. Survey data summarized by Vingerhoets (2013) indicate that approximately 20–30% of respondents report crying with at least partial instrumental intent, with women reporting slightly higher rates than men. Importantly, most respondents characterize such episodes as amplification of genuine emotional states rather than fabrication. Consistent with signaling theory, experimental findings indicate that when tears are perceived as manipulative or normatively inappropriate, observers respond with diminished trust and reduced empathic engagement, highlighting the reputational risks associated with perceived inauthenticity.

Crying, Personality Traits, and the Misconception of Weakness

From an integrative personality-science perspective, crying is more appropriately conceptualized as an expression of stable trait configurations, regulatory tendencies, and attachment dynamics rather than as an index of dispositional weakness. Within the Five-Factor Model, crying frequency shows positive associations with neuroticism—reflecting heightened affective reactivity—and with agreeableness and empathy-related traits, indexing interpersonal sensitivity and responsiveness (Vingerhoets, 2013; Rottenberg, Bylsma, & Vingerhoets, 2008). These associations suggest amplified emotional attunement rather than diminished competence. Conversely, individuals higher in emotional stability or conscientiousness may exhibit lower crying frequency, plausibly due to greater inhibitory control or regulatory modulation; however, reduced expressivity should not be conflated with superior resilience or psychological strength.

From an emotion regulation standpoint, crying represents one form of expressive responding that contrasts with suppression-based strategies. Experimental and longitudinal evidence indicates that habitual emotional suppression is associated with reduced well-being, impaired social functioning, and elevated physiological stress markers, whereas contextually appropriate expression—particularly in supportive interpersonal environments—can facilitate affective processing and social bonding (Gross & John, 2003; Rottenberg et al., 2008). In this framework, crying may signal regulatory engagement rather than regulatory failure, with adaptiveness contingent on situational affordances and interpersonal feedback.

Attachment and psychodynamic traditions further situate crying within activation of the attachment behavioral system in response to perceived threat, separation, or loss. Secure attachment is typically associated with flexible distress expression and efficient recovery, whereas avoidant attachment is characterized by deactivating strategies that may suppress overt crying despite comparable internal arousal. These patterns underscore that absence of tears does not necessarily imply reduced distress, but may reflect defensive regulatory strategies.

Social-cognitive accounts emphasize appraisal processes, identity concerns, and culturally embedded display rules. Gender norms and role expectations shape whether crying is interpreted as authentic vulnerability or as incompetence. Experimental evidence demonstrates a warmth–competence trade-off: visible tears reliably increase perceived warmth and sincerity, yet may reduce perceived competence in status-relevant or normatively restrictive contexts (Van de Ven, Meijs, & Vingerhoets, 2017). Such findings indicate that the social meaning of crying is contextually constructed rather than intrinsically diagnostic of weakness.

Across trait, regulatory, attachment, and social-cognitive frameworks, converging empirical evidence does not support the proposition that crying constitutes dispositional frailty. Instead, crying appears to reflect affective sensitivity embedded within broader systems of self-regulation, interpersonal signaling, and relational security, with adaptive or maladaptive consequences determined by contextual fit and individual differences in regulatory flexibility.

Crying in professional setup: Implications for Selection Outcomes

Crying during a recruitment interview may influence hiring outcomes through its effects on perceived emotional stability and professional competence. In personnel selection research, interviewer evaluations are strongly shaped by inferred personality traits—particularly emotional stability (low neuroticism) and conscientiousness—both of which demonstrate consistent meta-analytic associations with job performance (typically $r \approx .20-.30$) (Judge, Heller, & Mount, 2002). Because visible crying may be interpreted as heightened emotional reactivity, interviewers may infer lower stress tolerance or diminished self-regulatory capacity, especially in roles requiring leadership, high-stakes decision-making, or client-facing composure. Consistent with impression formation and signaling models, emotional displays serve as diagnostic cues from which observers infer dispositional attributes.

Experimental research on emotional tears further indicates that although crying increases perceived warmth and authenticity, it can simultaneously reduce perceived competence in professional contexts (Van de Ven, Meijs, & Vingerhoets, 2017). In competitive applicant pools, even modest downward shifts in perceived competence may influence relative rankings and selection outcomes. However, these effects are context-dependent rather than uniformly disqualifying. A brief, situationally appropriate emotional

response—particularly when followed by rapid recovery and restored composure—may elicit empathy without substantially undermining evaluations. In contrast, prolonged or poorly regulated crying is more likely to negatively affect perceived role fit.

Gender norms further moderate these dynamics. Role congruity theory suggests that men may be penalized more strongly for violating expectations of emotional restraint, whereas women may experience competence-based evaluative costs when emotional displays conflict with leadership or authority norms (Vingerhoets, 2013). Importantly, structured interviews attenuate subjective bias by standardizing evaluation criteria, thereby reducing the impact of transient emotional displays. Overall, available evidence suggests that crying may decrease selection likelihood in roles emphasizing emotional control, yet its impact depends on contextual appropriateness, recovery behavior, and interviewer interpretation rather than reflecting inherent incapacity or diminished job-relevant ability.

Media Influence and Contemporary Shifts in Gendered Norms of Crying

Cultural norms surrounding crying have historically been strongly gendered, with emotional expressivity socially sanctioned for women and discouraged for men. However, contemporary media environments—particularly film, television, advertising, and social media—may contribute to gradual shifts in attitudes toward crying, especially male emotional expression. From a social learning perspective (Bandura), repeated exposure to high-status male public figures, athletes, and fictional protagonists displaying tears without severe social sanction may recalibrate normative beliefs regarding acceptable emotional behavior. Through observational learning and norm internalization processes, media representations can function as cultural models that reshape expectations of masculinity.

Cross-national survey data indicate that although women continue to report higher crying frequency (approximately 30–64 episodes per year versus 6–17 for men), the gender gap narrows in societies characterized by greater gender equality and more flexible role norms (Vingerhoets, 2013). This cross-cultural variability suggests that crying behavior is socially regulated rather than solely biologically determined. Media representations both reflect and potentially reinforce these evolving norms. Experimental research indicates that men who cry are increasingly perceived as warmer and more authentic, though competence penalties may persist in status-relevant or professional contexts (Van de Ven, Meijs, & Vingerhoets, 2017). Generational survey findings further suggest that younger cohorts report greater acceptance of male crying than older cohorts, consistent with broader shifts in masculinity norms and increased exposure to emotionally expressive male role models in digital media environments.

Social media platforms may accelerate these processes by normalizing public emotional disclosure and reducing the social distance between observers and expressers. Increased visibility of emotional openness across genders may weaken associations between crying and weakness in relational or media contexts. Nevertheless, context remains critical: while expressive vulnerability can enhance perceived authenticity and warmth, traditional status-based expectations continue to shape evaluations in leadership, political, and other authority roles.

Overall, available evidence indicates that norms governing crying are culturally constructed and historically contingent. Media exposure appears to play a role in reshaping gendered expectations by increasing the visibility and perceived legitimacy of male emotional expression. However, this normative

shift remains incomplete and context-dependent, with competence-related penalties persisting in institutional settings where emotional restraint remains symbolically linked to authority.

When Crying Becomes Pathological: Clinical and Neurobiological Risk

Crying acquires clinical significance when it is excessive, involuntary, contextually incongruent, or associated with functional impairment. In psychopathology, dysregulated crying is most commonly observed in major depressive disorder (MDD), where it reflects heightened negative affect, rumination, and impaired emotion regulation. Neurobiologically, depression is characterized by altered limbic–prefrontal circuitry, including amygdala hyperactivity and reduced top-down regulatory modulation from medial prefrontal and anterior cingulate regions (Rottenberg, Bylsma, & Vingerhoets, 2008). In this context, persistent or uncontrollable crying may index greater depressive severity, particularly when accompanied by established risk markers such as hopelessness, anhedonia, and cognitive constriction.

Pathological crying also occurs in pseudobulbar affect (PBA), a neurological syndrome characterized by involuntary episodes of crying or laughing that are disproportionate or incongruent with subjective mood. PBA is associated with disruption of corticobulbar and fronto-subcortical circuits that regulate emotional motor expression, often following stroke, multiple sclerosis, traumatic brain injury, or neurodegenerative disease (Parvizi et al., 2009). Proposed mechanisms implicate impaired descending inhibitory control over brainstem emotional expression systems, resulting in disinhibited affective displays. Unlike mood-congruent crying in depression, PBA reflects a disorder of expression rather than of experienced emotion.

Crying may also become maladaptive in conditions marked by pronounced emotional dysregulation, such as borderline personality disorder or severe anxiety disorders, where heightened affective reactivity combined with limited regulatory capacity can produce recurrent, impairing outbursts. In such cases, the clinical concern lies not in tear production per se, but in compromised executive control and interpersonal instability.

Thus, crying is not intrinsically pathological or “dangerous.” It assumes clinical relevance when embedded within neuropsychiatric syndromes characterized by regulatory disruption, disinhibition, or risk-related symptom clusters. Distinguishing normative emotional expression from disorder-specific dysregulation is therefore essential for accurate assessment and intervention.

Discussion & Conclusion

Crying is a biologically organized and socially embedded behavior that serves adaptive functions across development. From infancy through adulthood, tears operate within integrated neurobiological, attachment, and social signaling systems that communicate vulnerability, recruit support, and, under supportive conditions, facilitate emotional processing. Converging evidence from personality science indicates that crying is associated with affective sensitivity, empathy, and regulatory engagement rather than dispositional weakness or diminished resilience.

At the same time, the social meaning of crying is contextually constructed. In environments that prioritize emotional restraint such as high-stakes professional settings or cultures characterized by restrictive gender norms visible tears may incur competence-based evaluative costs. These judgments reflect culturally mediated expectations regarding authority, status, and emotional control rather than objective indicators of capability.

Crying assumes clinical significance only when it becomes excessive, involuntary, contextually incongruent, or functionally impairing, as observed in specific mood and neurological disorders. In such cases, the concern lies not in tear expression itself but in underlying dysregulation or neuropathology.

Taken together, the available evidence supports a biopsychosocial model in which crying constitutes an evolutionarily grounded signalling system embedded within personality structure, regulatory processes, and cultural norms. When proportionate and contextually appropriate, crying reflects adaptive emotional functioning. It becomes maladaptive only when embedded within persistent regulatory failure or disorder-specific pathology. Future research should further delineate the boundary conditions under which tears enhance social connection versus incur status costs, thereby clarifying how vulnerability signals are negotiated within modern institutional and cultural contexts.

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