



Crying during adolescence: The role of gender, menarche, and empathy

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It is a well-established fact that adult women cry more frequently than adult men. However, in babies and young children no gender differences in crying frequency are found. Frey (1985) has postulated that boys and girls start to diverge in crying with the onset of menses in girls. The aim of the present study was to examine gender differences in crying during adolescence and the role of menarche and empathy. Participants were 216 boys and 265 girls, age 11 to 16, who completed questionnaires on crying frequency, crying proneness, empathy, and (for girls only) menarche. It appeared that girls cried more frequently and were more prone to cry than boys in all age groups. Gender differences increased with age mainly because of a decrease in crying among boys. Onset of menstruation did not have an effect on the crying measures. Empathy, on the other hand, was strongly associated with crying. Older girls were more empathic than younger girls, whereas for boys the relationship between empathy and age was weaker. It can be concluded that gender differences in crying develop before age 11 and that menarche does not play a significant role in crying in girls.

Introduction

Crying may best be described as a typical human emotional expression, with as its main characteristic the production of tears. In spite of the vast attention to emotions and emotional expression, surprisingly little research has been devoted to this uniquely human emotional expression. Therefore, little is known about the specific functions of crying and in many respects the level of mere speculation has not been surpassed. In

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the literature (e.g. Vingerhoets, Cornelius, Becht, & Van Heck, 2000), the following two main functions of crying have been postulated: (1) crying helps to reduce tension and facilitates physiological recovery after having been in distress (e.g. Bindra, 1972; Frey, 1985), and (2) crying is a powerful stimulus to communicate pain and distress to others and to evoke comfort and emotional support (e.g. Cornelius, 1997; Kottler, 1996) or to manipulate the social environment (e.g. Frijda, 1997; Kottler, 1996). Unfortunately, the sparse research until now has been hampered by the lack of theoretical guidance.

Maybe the best-established finding concerns the gender difference in crying. All studies focusing on this issue (for reviews see Bekker & Vingerhoets, 1999, 2001; Vingerhoets & Scheirs, 2000) yield an unequivocal result: women cry more frequently than men do. These findings transcend different cultures; a study among 35 countries spanning the American, European, Asian and African continents, found that women are more likely to cry in each of these countries (Becht, Poortinga, & Vingerhoets, 2001). However, until now little is known about the background of this difference and its developmental aspects. In the literature, globally four types of explanations can be distinguished: (1) gender differences in crying result from social learning processes; boys are not permitted to cry, whereas for girls it is more acceptable to shed tears; (2) men and women differ in exposure to emotional situations and perceive situations differently; (3) somewhat related to the previous view, one may hypothesize that men and women differ in personality and coping styles, which may explain the gender differences in crying, and, finally, (4) biological factors, in particular sex hormones, are hypothesized to play a role.

While the last hypothesis has hardly been studied yet, partial evidence exists for the other three hypotheses (see Bekker & Vingerhoets, 1999, 2001; Vingerhoets & Scheirs, 2000) suggesting differences in socialization and exposure to emotional events as well as differences in coping for adult men and women. However, these hypotheses do not explain *when* during their development boys and girls diverge, which is important since it has been found that differences in crying are not observed from birth onwards (cf. Bekker & Vingerhoets, 1999; Vingerhoets & Scheirs, 2000). Remarkably, hardly any data are available on crying frequency in infants, children and adolescents. Only Hastrup, Kraemer, Bornstein, and Trezza (2001) present data on crying in these age groups. Although their data suggest that minor gender differences already exist as early as at age 2 years, gender differences do not become marked until around the age of 13. However, the samples in this study were quite small ($7 < N < 12$ per age-gender group), which prevent more definitive conclusions. Frey (1985), unfamiliar with these data at that time, offered a plausible explanation for gender differences to become pronounced during puberty. He speculated that gender differences begin to develop around the age of 13, because that is the time when secondary sex characteristics develop, caused by the many hormonal changes associated with puberty. Frey suggested that onset of menses is associated with a marked increase in crying due to significant increases in the levels of prolactin.

The present study is a first more systematic attempt to provide data relating to the question whether biological factors can partly explain the divergence in crying among men and women. Our main objective was to obtain insight into the development of these gender differences. We therefore collected data on crying of boys and girls in the age range 11 to 16. In addition, we examined the possible role of menarche, since this is a clear and prominent point in the female development, likely to be associated with several hormonal changes that may influence mood and behaviour (cf. Buchanan, Eccles, & Becker, 1992).

Finally, we explored the role of empathy. As has been made clear by Vingerhoets, Van Tilburg, Boelhouwer, and Van Heck (2001), many antecedent and moderating factors may play a role as determinants of crying, including personality, exposure to emotional events, display rules, and biological factors. In the present study we focused on one specific personality factor, namely empathy. The rationale for this choice is that empathy is the only personality factor that has been shown to be relevant for crying in adults (Williams, 1982) and maybe even in very young babies (Sagi & Hoffman, 1976). We therefore feel that empathy is more important than most other personality features, of which the importance for crying is weak at best (see e.g. Frey, Hoffman-Ahren, Johnson, Lykken, & Tuason, 1983, and Patel, 2001, for depression and Peter, Vingerhoets, & Van Heck, 2001 for the Big Five personality factors). Empathy may be especially important for crying, because it may be expected to be strongly associated with exposure to emotional events and their emotional impact (cf. Vingerhoets *et al.*, 2001).

Method

Participants

Pupils between the age of 11 and 16 at four primary and secondary schools in the Netherlands were approached to participate. The participants were 481 adolescents (216 boys and 265 girls) who took part on a voluntary basis after obtaining written permission from their parents (there were no refusals). The sample sizes for boys per age group (11 to 16 years old, respectively) were 14, 51, 50, 52, 38, 11, and for girls respectively 26, 55, 73, 64, 36, 11. The respondents completed the questionnaires at school as part of their regular curriculum.

Measures

Previous research has suggested that it is important to differentiate between crying proneness, which should be considered as a stable personality trait, and crying frequency, in which the environmental factors and exposure to dramatic situations play an important role (Vingerhoets & Scheirs, 2000; Vingerhoets *et al.*, 2001).

Crying proneness was measured by applying a slightly modified version of part A of the Adult Crying Inventory (ACI; Vingerhoets & Becht, 1996). This questionnaire has been developed within the context of an international study on adult crying. The version applied here consisted of 54 items about situations and feelings which might evoke crying. Cronbach's alpha for the ACI-A is .95. The Pearson correlations of the ACI with self-reported crying proneness (10-point scale) and crying frequency were .64 and .44, respectively (Vingerhoets & Becht, 1996). Two items were excluded from the original list, because they did not relate to this age group ('I cry when making love', and 'I cry when I attend or witness memorial meetings'), one item was added to the questionnaire: 'I cry when something serious happens to my pet'. Questions had to be answered on a 5-point Likert scale ranging from 'never crying in this situation' to 'always crying in this situation'. Scores were summed across items. The higher the sum, the more the respondent was prone to cry. Cronbach alpha for the adjusted ACI-A was .94. Correlations between the ACI-A and self-reported crying frequency (10-point scale)

and self-reported number of crying episodes during the last 4 weeks were .67 ($p \leq .01$) and .55 ($p \leq .01$), respectively.

Crying frequency was measured by number of self-reported crying episodes during the last 4 weeks. Previous research has shown that this time period yielded the most reliable and valid estimates (Kraemer & Hastrup, 1986; Williams & Morris, 1996).

Empathy was assessed using an adjusted Dutch version of the Mehrabian and Epstein (1972) Questionnaire Measure of Emotional Empathy. The following two questions were excluded on the basis of a pilot-study among 11 to 16-year-old Dutch students: 'Most foreigners I have met seemed cool and unemotional', and 'I am able to remain calm even though those around me worry'. Cronbach alpha for the adjusted Dutch version was .76.

Finally, information was gathered on age, gender and age of first menstruation.

Results

Univariate analyses

T tests were performed to examine whether there were gender differences in crying proneness, crying frequency and empathy. As can be seen from Table 1, girls scored significantly higher on all these variables than boys. Furthermore, Table 1 shows that there were no significant differences between menstruating ($N = 164$) and non-menstruating girls ($N = 101$). Because no 11-year-olds were currently menstruating, whereas all 15- and 16-year-old girls were post-menarche, the same analyses were performed for the 12–14 year age group only, which, again, yielded no significant differences between menstruating and non-menstruating girls. As menstruation did not appear to play a role in crying, we restricted further analyses to age and gender differences and the role of empathy in crying, not taking into account pubertal status.

Table 1. Means and *t* tests on crying proneness, crying frequency, and empathy

Boys ($N = 216$)	Girls ($N = 265$)	<i>t</i> value	Menstruating girls ($N = 164$)	Non-menstruating girls ($N = 101$)	<i>t</i> value	
Crying proneness	1.59	2.14	14.72***	2.17	2.09	1.43
Crying frequency	1.40	3.86	-8.47***	3.83	3.93	-1.19
Empathy	2.17	11.92	-13.14***	12.60	10.83	10.82

*** $p \leq .001$.

Gender and age differences in crying proneness and frequency

The preliminary analyses revealed a significant difference in crying frequency and proneness between girls and boys. As can be seen from Fig. 1, girls' scores were higher compared to boys for all age groups. It further appeared that crying frequency and crying proneness change with age. Especially for boys the tendency to cry seems to decrease with increasing age. Bivariate correlations between age and crying indices showed low but significant correlations for boys, but not for girls (boys: $r = -.27$, $p \leq .01$ and $r = -.22$, $p \leq .01$ and girls $r = -.04$, ns and $r = .05$, n.s., for crying frequency and crying proneness, respectively).

Sequential regression analysis was employed to determine if addition of age (step 2) and age by gender interaction (step 3) improved prediction of crying beyond that afforded by gender differences (step 1). Gender was entered as a dummy variable with the numeric value 0 assigned to girls and 1 to boys. Results of evaluation of assumptions led to the exclusion of several outliers for each analysis (1 for crying proneness, 12 for crying frequency). Table 2 displays the standardized regression coefficients, the Adjusted R^2 , R^2 change and the ANOVA test of the model at each step. After addition of the interaction term in step 3, both age and gender failed to enter the regression equation for crying proneness and crying frequency. For crying frequency the age by gender interaction explained 16% of the variance; for crying proneness, the amount of explained variance was 33%. Thus, these results show that gender differences in crying become larger with increasing age.

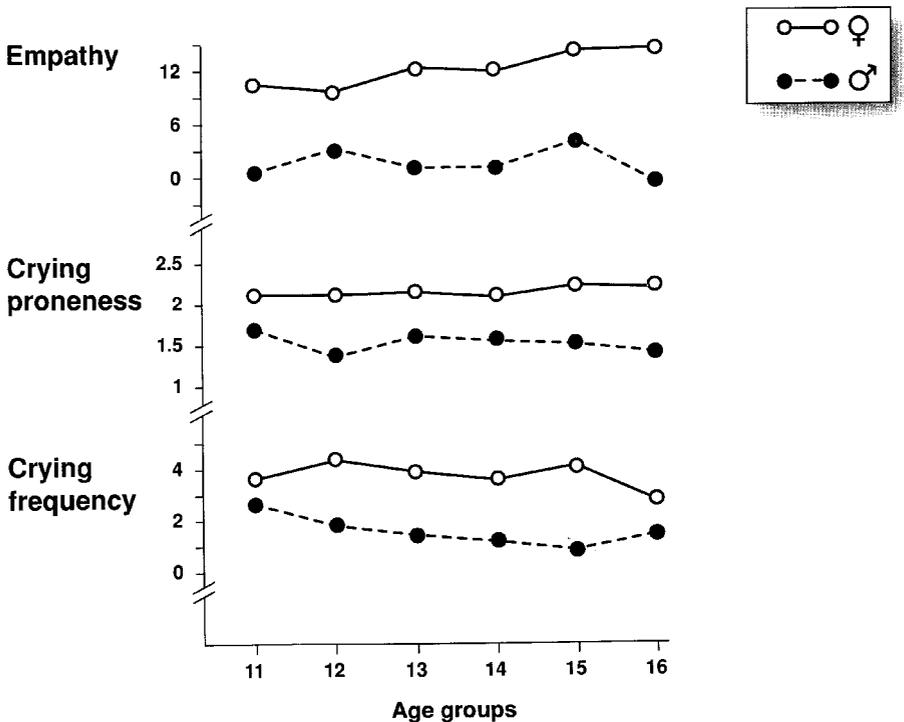


Figure 1. Mean scores on crying proneness, crying frequency and empathy

Empathy and crying

As shown in Table 1 and Fig. 1, girls show higher empathy scores than boys among all age groups. Age and empathy did not correlate in boys ($r = .00$, n.s.), whereas for girls a low but significant positive correlation was found ($r = .17$, $p \leq .01$). Sequential regression analysis was employed to determine if addition of age (step 2) and the age by gender interaction (step 3) improved prediction of empathy beyond that afforded by gender differences (step 1) (see Table 3 for results of the regression analysis). Results of evaluation of assumptions led to the exclusion of one outlier. Both gender and age

Table 2. Sequential regression of gender and age on crying indices

	R^2 change	Adjusted R^2	ANOVA
Crying proneness			
Variables entered at			
Step 1	.318***	.32	$F(1,440) = 205.04***$
Gender ($\beta = -.56***$)			
Step 2	.002	.32	$F(2,439) = 103.01***$
Gender ($\beta = -.56***$)			
Age ($\beta = -.04$)			
Step 3	.012**	.33	$F(3,438) = 72.35***$
Gender ($\beta = .54$)			
Age ($\beta = .06$)			
Gender \times Age ($\beta = -1.12**$)			
Crying frequency			
Variables entered at			
Step 1	.145***	.14	$F(1,461) = 78.20***$
Gender ($\beta = -.38***$)			
Step 2	.011*	.15	$F(2,460) = 42.57***$
Gender ($\beta = -.38***$)			
Age ($\beta = -.11**$)			
Step 3	.007*	.16	$F(3,459) = 29.88***$
Gender ($\beta = .48$)			
Age ($\beta = -.03$)			
Gender \times Age ($\beta = -.86*$)			

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

Table 3. Sequential regression of gender and age on empathy scores

	R^2 change	Adjusted R^2	ANOVA
Empathy			
Variables entered at			
Step 1	.298***	.30	$F(1,445) = 189.31***$
Gender ($\beta = -.55***$)			
Step 2	.007*	.30	$F(2,444) = 97.69***$
Gender ($\beta = -.55***$)			
Age ($\beta = .09*$)			
Step 3	.004	.30	$F(3,443) = 66.06***$
Gender ($\beta = .05$)			
Age ($\beta = .14*$)			
Gender \times Age ($\beta = -.61$)			

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

significantly predicted empathy scores, but the age by gender interaction did not enter the regression equation in step 3.

Empathy correlates strongly with crying proneness ($r = .60$, $p \leq .001$) and crying frequency ($r = .34$, $p \leq .01$). Therefore, it could be argued that the crying-gender

Table 4. Sequential regression of gender and empathy on crying indices

	R ² change	Adjusted R ²	ANOVA
Crying proneness			
Variables entered at			
Step 1	.377***	.38	F(1,416) = 251.29***
Empathy ($\beta = .61$ ***)			
Step 2	.075***	.45	F(2,415) = 170.90***
Empathy ($\beta = .44$ ***)			
Gender ($\beta = -.33$ ***)			
Crying frequency			
Variables entered at			
Step 1	.161***	.16	F(1,429) = 82.56***
Empathy ($\beta = .40$ ***)			
Step 2	.042***	.20	F(2,428) = 54.69***
Empathy ($\beta = .28$ ***)			
Gender ($\beta = -.24$ ***)			

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

relationship is mediated by differences in empathic ability of boys and girls. To determine whether gender (step 2) predicts crying scores beyond that accounted for by empathy scores (step 1), again a sequential regression analysis was employed (see Table 4). After exclusion of the outliers (1 for crying proneness, 12 for crying frequency), both empathy and gender entered the regression equation for crying proneness and crying frequency in step 2, indicating that gender has a direct effect on crying independent of the effect of empathy.

Discussion

The present study examined age differences in self-reported crying behaviour in adolescents and the possible role of hormones linked to the initiation of menarche. The results show a strong association between both crying proneness and actual crying frequency, on the one hand, and gender on the other hand. In general, like adult women, adolescent girls are more prone to cry and actually cry more often than adolescent boys, irrespective of age. Contrary to our expectations, based on the assumed relevance of menarche, gender differences were already apparent at age 11, when none of the girls in our sample menstruated. In addition, the failure to find significant differences between same age menstruating and non-menstruating girls rules out a major role of menarche. Considering that babies and young children show no gender differences in crying (Bekker & Vingerhoets, 1999; Vingerhoets & Scheirs, 2000), the present data suggest that somewhere in childhood (the data of Håstrup *et al.* (2001) suggest possibly already at the age of 2 years), girls become more prone to cry than boys. This finding thus seems to challenge the role of female hormonal factors associated with the onset of menarche as a major cause of the divergence in crying frequency between boys and girls, as hypothesized by Frey (1985). However, the lack of an association between menarche and crying does not imply that other hormonal changes are not linked to changes in crying either. For example, secretion of oestradiol

(a human oestrogen) is significantly increased in girls as young as 9 and 10 years of age (for a review see Buchanan *et al.*, 1992). These changes are important, since oestrogens facilitate the development of female secondary sex traits. It needs to be established what role hormonal changes in early puberty play in the onset of gender differences in crying behaviour.

Even though gender differences in crying already exist in early puberty, these differences become larger with increasing age. The data indicate that, for girls, the tendency to cry seems rather stable, whereas, for boys, it decreases with age. Two plausible explanations for this observation concern the role of social learning (see Brody, 2000; Jansz, 2000) and an influence of male rather than female hormonal factors. Exploratory data of Truijers and Vingerhoets (1999) and Bronstein, Briones, Brooks, and Cowan (1996) suggest an important role of social factors in the onset of gender difference in crying. Truijers found that adolescent boys scored higher than girls on only one item of her shame inventory: I feel shame when I cry. Bronstein and colleagues report that adolescent boys are more likely to cry if their families are more accepting of expressing emotions, meaning that traditional sanctions against male crying are not strongly conveyed. In addition, boys may cry less with increasing age because of changes in male sex hormones during puberty. Boys generally enter puberty a couple of years later than girls. For example, before about age 11 no major increases in testosterone are detected in most boys, while in girls the production of oestrogens is significantly increased by about age 9 to 10 (see Buchanan *et al.*, 1992). Because of age limitations in the current sample, effects of early hormonal changes on crying might have been detected in boys but not in girls. A possible role for male sex hormones in crying is further supported by Panksepp's (1998) observations in animals that there is an age-related decline in distress vocalization in male guinea pigs and chickens after separation from the mother, which is dependent on the maturation of the pituitary-gonadal axis. In addition, administering testosterone resulted in a decrease in distress vocalizations in young animals. On the other hand, removal of the sexual gland delayed the decline in crying behaviour. However, results of human studies suggest that the effects of hormones on human behaviour are complex and probably weak at best. A recent extensive summary of the state-of-the-art with respect to the role of hormones as co-determinants of affect and behaviour in adolescence by Buchanan *et al.* (1992) shows that this is a very complex field with a lack of data. These authors further argue that many nonhormonal factors, such as demographic and environmental factors, moderate the effects of hormone activity on mood and behaviour. This means that delicate interactions between socialization processes and sex hormones are influencing behaviour, including crying. It may not be easy to disentangle the contribution of socialization and hormonal factors as determinants of the different development of male and female crying behaviour. Only concurrent assessment of biological factors and social influences can answer this question.

In addition to the influence of socialization processes and biological factors on gender differences in crying, personality may play an important role. The present study shows that empathy also might partly explain gender differences in crying. Our data demonstrate that girls scored higher on empathy than boys over all age groups. Gender differences in empathy have consistently been found in previous studies (see Eisenberg & Lennon, 1983; Karniol, Gabay, Ochion, & Harari, 1998). It can be speculated that women are more empathic than men because of differential socialization of emotion in boys and girls, or from an evolutionary point of view, empathy might have had survival value in women by strengthening the mother-child attachment. Alternatively, these

results could reflect a stereotype confirming bias in self-reports. No matter what the interpretation, the tendency of girls to empathize with others makes them more vulnerable to emotional experiences and feelings that induce crying.

Empathy also increases with age, especially for girls. Although the interaction effect of age by gender was not significant, there seems to be a trend for increasing gender differences in empathy with age. This would mean that the decrease in crying proneness and frequency in boys could not be attributed to a corresponding diminishing of empathy. Furthermore, after controlling for empathy, the effect of gender on crying measures was somewhat reduced, but still highly significant. These results indicate that, although the tendency to empathize with others might partly explain gender differences, other factors may be more important. Research directed at the role of other relevant personality factors besides empathy in crying is needed (e.g. neuroticism, depression). Finally, one should be aware of the possibility that the ability to empathize may also be related to biological factors. For example, Moir and Jessel (1995) report some evidence that empathy is negatively associated with androgen levels in women.

The present study has some important limitations. A major drawback is the reliance on cross-sectional data. Longitudinal studies are recommended in order to track the development of crying behaviour in the adolescent and childhood years. Moreover, although there is some evidence supporting the validity of self-reported crying frequency and proneness in adults, it is not clear whether self-reports are a valid and reliable measure of crying in adolescents. Furthermore, we have not included an objective measure of physical maturation, such as secondary sex characteristics, nor did we measure levels of sex hormones in this sample. Therefore, the direct link between crying and levels of prolactin or other sex hormones could not be assessed. Finally, the present study did not pay attention to the role of specific other personal, social and biological variables that might be relevant for gender differences in crying, such as depression, neuroticism, shame and social learning.

To summarize, the present data strongly suggest that gender differences in crying have already developed before the menarche in girls. However, the data also indicate that during adolescence these differences become more pronounced. This seems to be due in particular to the gradual decrease in crying in boys. Empathy, on the other hand, increases with age, especially in girls, and is associated with a greater tendency to cry. However, crying frequency and proneness were quite stable over age group in girls, suggesting that elevated empathy scores cannot account for the increased difference in crying between genders. It might be that social pressure to inhibit tears becomes larger for both boys and girls during adolescence, resulting in an accompanying decrease in male crying. However, in girls the increased ability to empathize with others might prevent a decrease in crying because of the heightened exposure and reaction to emotional stimuli. For example, as Bekker and Vingerhoets (2001) point out, gender differences in exposure to emotional situations may not only be related to daily professional activities (caring, nursing), but also to the choice of leisure activities (such as the kind of films one watches and the books one reads), and to how female friends deal with each other. Finally, biological factors like male hormones might be playing a role. The gender difference in crying thus seems to result from a complex interplay of biological, psychological, and social factors. Future studies should consider these issues in order to advance our understanding of the developmental aspects of crying.

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