

# Sex Differences in Behavioral and Psychological Expression of Grief During Adolescence: A Meta-Analysis

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## Background

- Grief** is a response to death that includes internalizing behaviors, such as depression, anxiety, and withdraw, and externalizing manifestations, such as impulsivity, aggression, and self-harm (Worden, 2003; Bornstein et al., 2012). Post-traumatic stress disorder (PTSD) symptoms can also be attributed to grief.
- Adolescence** is a time of many developmental changes (Shifflet-Chila et al., 2016). In the brain in particular, the prefrontal cortex and the limbic system develop rapidly (Casey et al., 2008).
  - The prefrontal cortex is involved in cognitive control and executive functioning (Dixon, 2015), and develops later in adolescence (Riva & Giorgi, 2000).
  - The limbic system, including the amygdala, the hippocampus, and the hypothalamus is located deep in the cerebrum and is involved with processing emotional information (Nieuwenhuys, 1996). During the early adolescence, there is an overproduction of axons and synapses activated in the limbic system before synaptic pruning removes the over production of axons (Blakemore, 2008).
  - With an initial overproduction of axons and synapses in the limbic system, as well as an underdeveloped prefrontal cortex, adolescents experience greater emotional reactivity compared to children and adults (Casey et al., 2008).
- Sexual dimorphism** is observed in the brain during adolescence.
  - Male adolescents have larger amounts of gray matter (GM) volume in the amygdala of the limbic system where androgen receptors are found (Neufang et al., 2012).
  - Female adolescents are seen to have a larger hippocampus where estrogen receptors are found (Giedd et al., 2012).
  - Sex differences in brain structures have the potential to affect the way adolescents respond to grief.

### The current study examined the following hypothesis:

- Adolescent females will exhibit more internalizing behaviors associated with grief while adolescent males will exhibit more externalizing behaviors and PTSD symptoms associated with grief.

## Method

### Literature Search

- The online databases PsycInfo, PsycArticles, Academic Search Complete, ERIC, and Medline were searched in September of 2016 using the combination of keywords: "adolescent OR teen OR adolescence OR youth" and "grief OR bereavement" and "gender OR sex".
- 325 articles were found published between January 2001 and September 2016 with 111 repeated across the multiple databases resulting in 214 novel studies. After review of abstracts and full-text, 14 studies were included in the analysis.

### Inclusion Criteria

- Participants of included studies were adolescents aged 18 years or younger with the average minimum age being 8.31 and the average maximum age of 16.79.
- Studies were included if they reported adolescents' behavioral or psychological responses to the death of a loved one, family member, or friend. In addition, the adolescent participating in the study must have known the deceased individual.
- Included studies were required to present quantitative data based on adolescent's internalizing, externalizing, and/or PTSD symptoms after the death.
- Data were coded for several study characteristics: mean age, percent male/female, percent race/ethnicity, location of the study, the relationship the adolescent had to the individual who had died, whether the death was expected/unexpected/suicide/natural disaster, as well as time since the death occurred.



## Results

### Analysis

- Data presented was standardized using a Cohen's  $d$  to examine the difference between male and female adolescents' externalizing and internalizing grief responses ("small"  $d=0.2$ , "medium"  $d=0.5$  and "large"  $d=0.8$ ); see **Figure 1** for effect sizes across studies.
- Effect sizes were weighted based on number of participants to account for the relative influence of sample size (Card, 2016).
- Variability in effect sizes was examined using the  $I^2$  test (Card, 2016).

### Descriptive Information

- The 14 independent studies included in the review consisted of 6,979 participants. The mean age of participants was 12.22 (SD = 2.31), with participants being equally represented in terms of sex assigned at birth: 50% male and 50% female.
- Six studies were conducted in North American (specifically the U.S. and Canada), six in Europe, one in Africa, and one in Asia.
- Seven studies reported on death that was expected, seven studies reported on death that was unexpected. Of these studies, five studies reported on death by suicide, and one study reported by an unexpected natural disaster (earthquake).
- The duration between the time of death and the time of data collection ranged from 1 month to 9.5 years with an average lag of 27.48 months.
- Eleven studies included participants where a parent had died. Five studies included a sibling death, and the remaining studies reported a grandparent, classmate, or the death of someone they really cared about.

### Internalizing Behaviors

- Six of the 14 studies reported on internalized behaviors relating to grief. Across studies, male and female adolescents experienced a difference in internalized expression of grief ranging from -0.67 (i.e., higher among males) to 0.65 (i.e., higher among females). Across studies, the average effect size was small ( $d = .18$ ), revealing that adolescent females were slightly more likely than males to exhibit internalizing behaviors related to their grief.  $I^2 = 82.5\%$ , suggesting considerable variability in this effect size.

### Externalizing Behaviors

- Nine of the 14 studies reported on externalized behaviors relating to grief. The difference between adolescent males and females ranged from -0.54 (i.e., higher among males) to 0.7 (i.e., higher among females). The average effect size was near zero ( $d = 0.03$ ), suggesting that there is no difference between adolescent males and females in externalized behaviors related to grief.  $I^2 = 94.92\%$ , suggesting considerable variability in this effect size.

### Post-Traumatic Stress Disorder (PTSD)

- Of the four studies that collected data on PTSD symptoms, all found that female adolescents were more likely to experience PTSD compared to male adolescents. The average effect size ( $d = .36$ ) was small to moderate, indicating that females are more likely to experience PTSD symptoms after a loss.  $I^2 = 0.01\%$ , suggesting that this finding is consistent across studies.

Figure 1. Stem-and-Leaf Plots.

| Internalizing Behaviors |     |                    | Externalizing Behaviors |       |                    |
|-------------------------|-----|--------------------|-------------------------|-------|--------------------|
| Adolescent males        |     | Adolescent females | Adolescent males        |       | Adolescent females |
|                         | 0.0 |                    |                         | 9 0.0 | 0                  |
|                         | 0.1 |                    |                         | 6 0.1 |                    |
| 1                       | 0.2 | 3                  |                         | 0 0.2 |                    |
|                         | 0.3 | 4                  |                         | 1 0.3 | 8                  |
|                         | 0.4 | 1                  |                         | 0 0.4 |                    |
|                         | 0.5 |                    |                         | 4 0.5 | 2                  |
|                         | 0.6 | 5                  |                         | 0 0.6 |                    |
| 7                       | 0.7 |                    |                         | 0 0.7 |                    |

## Conclusions and Implications

### Internalizing Behaviors

- A small effect size revealed females were slightly more likely than males to exhibit internalizing behaviors relating to grief. Adolescent males and females may differentially, however, experience internalizing behaviors based on the timing of assessment: adolescent males were slightly more likely to display internalizing behaviors when the death occurred more recently (19 months or less), while females were more likely to experience internalized behaviors after a longer time lapse (2 years or more). Due to limited sample size, this observation was not testable statistically and more research is needed to investigate
- Sexual dimorphism in brain development (Giedd et al., 2012) may also contribute to females exhibiting internalized grief symptoms. Specifically for depression, the hippocampus is found to be varying in size compared to their non-depressed counterparts. As female adolescents, on average, have larger hippocampi, the increased brain area may make adolescent females more at vulnerable to internalizing behaviors associated with grief.

### Externalizing Behaviors

- Males and females were equally likely to experience externalizing behaviors associated with grief.
- Externalizing behaviors encompass a wide range of behaviors including self-harm, delinquency, and aggression. As the included studies reported data on a range of externalizing behaviors, this could explain the lack of a mean-level difference found in female and male externalizing behaviors and the considerable variability that was found for the effect size.

### PTSD Symptoms

- Females were much more likely to experience PTSD symptoms associated with grief. This was consistent across all studies presenting data on PTSD.
- The reported non-existent variability across the PTSD studies is significant in supporting female adolescents being more likely to display PTSD symptoms after the death of a loved one.
- The hippocampus and amygdala have not been reported as a contributing factor to developing PTSD symptoms. It is unclear if the sexual dimorphism of the limbic system of adolescents has any effect on the likelihood of exhibiting PTSD symptoms during grief.

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