Article

Sex Differences in the Relationship Between Child Maltreatment, Recent Bereavement, and Average Heart Rate

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Abstract

The study explores the sex differences in cardiovascular outcomes among bereaved individuals. In addition, the study differentiates the impact of child maltreatment and recent loss on the physical health of adult men and women. This study conducted a secondary analysis of data drawn from the Biomarker Subproject of the National Survey of Midlife Development in the United States ($n = 1{,}255$). Analysis included a series of regression models estimated in Stata version 15.1. A main effect for both sex and loss was observed. Both male and female respondents with loss had higher average heart rates as compared to male respondents without loss. Interestingly, being a female without loss was also associated with a higher average heart rate as compared to males without loss. The findings suggest that sex differences in cardiovascular functioning do occur and that these differences may be exacerbated by experiences of trauma and loss, and this relationship has implications for assessment and intervention.

Keywords

bereavement, child maltreatment, cardiovascular health, sex differences

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Introduction

Cardiovascular disease disproportionately impacts women. In fact, heart disease is the leading cause of death in women in the United States (Go et al., 2014; Mehta et al., 2016). As of 2016, 6.6 million women in the United States were coping with heart disease (Mehta et al., 2016). While the sex differences in cardiovascular disease has been well documented (Go et al., 2014; Mehta et al., 2016; Mosca, Barrett-Connor, & Kass Wenger, 2011) and many of the physiological factors that contribute to the elevated risk of women have been identified (e.g., blood pressure, diabetes, smoking, and exercise habits; Howard et al., 1998; Mehta et al., 2016; Stanislavovna Tairova, Odacir Graciolli, Sergueevna Tairova, & De Marchi, 2018), the literature has yet to fully identify the contextual factors that shape the unique experiences of women. Beyond the physiological factors that place women at greater risk, there is some preliminary research suggesting that contextual factors such as trauma (i.e., post-traumatic stress disorder [PTSD]), adversity (Anderson et al., 2018), and loss influence cardiovascular health (Berntson, Patel, & Stewart, 2017) and may contribute to the greater risk of poor cardiovascular outcomes in women (Kornfield, Hantsoo, & Epperson, 2018).

Child Maltreatment and Health

Studies support the linkage between exposure to trauma and poorer health outcomes in general (Bright & Thompson, 2018). Sex influences the ways in which trauma is experienced, processed, and coped with (Bremer-Landau & Caskie, 2019; Breslau, 2009). As a result, trauma differentially impacts the health and mental health of women and men (Kessler, 2003; McFarlane, 2010; Silver, Kumari, Conklin, & Karakurt, 2018). The sex differences that influence the trajectory of trauma recovery and the association with health outcomes are particularly well studied in the context of child maltreatment (see Wegman & Stetler, 2009; Widom, Czaja, Bentley, & Johnson, 2012). More specifically, various forms of maltreatment—physical abuse, sexual abuse, and emotional neglect—have been directly linked with reductions in the quality of life and life expectancy of adult survivors (Corso, Edwards, Fang, & Mercy, 2008). In part, this relationship may be explained by biochemical changes associated with prolonged exposure to stress and adversity (i.e., elevated cortisol levels; Aardal-Eriksson, Eriksson, & Thorell, 2001; Pan, Wang, Wu, Wu Wen, & Liu, 2018; Rector, Tay, Wiese, & Friedman, 2019; Weems & Carrion, 2007). Alternative models suggest that early experiences of maltreatment or trauma may result in behavioral changes (e.g., fitness or nutrition) that lead to poorer health outcomes for adults with histories of child maltreatment (Doom, Mason, Suglia, & Clark, 2017). In both cases, women survivors seem to exhibit more

severe and prolonged health consequences as a result of maltreatment in childhood.

In addition to the literature that supports the association of maltreatment in childhood with general health concerns in adulthood, a second, more modest body of research specifically links experiences of child maltreatment with later cardiovascular disease (Anderson et al., 2018; Carroll et al., 2013; Fuller-Thomson, Brennenstuhl, & Frank, 2010; Gilbert et al., 2015). More specifically, studies have found that women endorsing four or more trauma symptoms were at greater risk of cardiovascular risk as compared to women reporting three or fewer symptoms, suggesting that the severity of reaction also plays a role in cardiovascular outcomes for trauma exposed women (Sumner et al., 2015); and women diagnosed with PTSD were additionally at risk for negative cardiovascular outcomes (e.g., Kubzansky, Koenen, Jones, & Eaton, 2009; Lenane et al., 2019; Lewis, 2015).

Bereavement and Health

These trends cross experiences of stress and adversity and have been demonstrated in the bereavement and loss literature. Also, this body of literature suggests that there are sex differences in the process of coping with loss and that women report greater long-term psychological consequences as a result of loss (Bonanno & Malgaroli, 2019; Heeke, Kampisiou, Niemeyer, & Knaevelsrud, 2017). Similarly, women are more likely to report depression (Stahl, Arnold, Chen, Anderson, & Schulz, 2016; Williams, 2005) and posttraumatic stress (Breslau, 2009; Kersting & Kroker, 2010; in the acute aftermath of loss; all factors known to be associated with declines in health (Jones, Bartrop, Forcier, & Penny, 2010; Kersting & Kroker, 2010; Utz, Caserta, & Lund, 2011), increases in mortality (Jones et al., 2010), and incidences of cardiovascular disease (Buckley, McKinley, Tofler, & Bartrop, 2010).

While the literature supports the link between loss and cardiovascular disease in women (Buckley et al., 2010; Fagundes et al., 2018; Mostofsky et al., 2012), little work has been done to determine what similarities and differences may exist between women who have experienced child maltreatment and those who have experienced loss in adulthood. To that end, intervention approaches have been fairly uniformed despite the diverse and varying experiences of female cardiac patients. Child maltreatment may post a unique threat to health in later life because the event(s) may disrupt critical periods of development, resulting in more pervasive and long-lasting consequences. Alternatively, bereavement in adulthood is less likely to impact development and may in fact be buffered by positive developmental achievements (e.g., healthy attachment and relationship building).

In addition to the lack of nuance in differentiating the impact of child maltreatment from bereavement, it is also difficult to discern if this association

reflects an actual trend in the population or a sampling bias in literature. A large number of studies exploring the link between bereavement and cardiovascular disease relied on samples of women who had lost spouses (mostly women, as women tend to survive their mail partners; Buckley et al., 2010; Rostila, Saarela, Kawachi, & Hjern, 2015; Theorell & Härenstam, 2000; Utz et al., 2011) and caregivers who had lost a child (i.e., early infant death; e.g., Christiansen, Elklit, & Olff, 2013). As a result, it is difficult to detect accurate sex differences in the health outcomes associated with bereavement.

Current Study

The current study aims to address this limitation by exploring cardiovascular outcomes (i.e., average heart rate) in a sample of both men and women who experienced bereavement and child maltreatment. In addition, this study also seeks to differentiate the impact of *historical* child maltreatment from *current* bereavement in adulthood on the health of respondents. Distinguishing the impact of childhood maltreatment and bereavement in adulthood adds an additional nuance that can aid in accurately identifying the mechanisms that place survivors of trauma and loss at greater risk of cardiovascular disease and for understanding the unique risk and protective factors that impact the health of women.

Methods

Sample

This study conducted a secondary analysis of data drawn from the National Survey of Midlife Development in the United States (MIDUS). MIDUS is a multiwave national probability sample of adults in the United States. The second wave of the MIDUS data were collected between 2004 and 2009 and included several subprojects. The biomarker subproject[1] sampled 1,255 of the larger MIDUS sample and included indicators of physiological health and well-being that range from self-report to physician observation to blood and urine samples. The data for the current analysis include all 1,255 participants from the second-wave biomarker subproject of MIDUS. In line with previous approaches to the utilization of MIDUS data, unweighted data were used in the current analysis (Kong, 2018). Demographic information for the sample included in the current analysis is presented in Table 1.

Measures

Child maltreatment. The Childhood Trauma Questionnaire was used to assess self-reported experiences of childhood maltreatment using 28 items coded on a scale of 1 *never true* to 5 *very often true*. There are six subscales in the Childhood

Table 1. Univariate and Demographic Information.

Variable	
Female[a], *n* (%)	713 (56.81)
Age in years, mean (*SD*)	54.52 (11.71)
Partnered[b], *n* (%)	289 (67.37)
Criteria depression, *n* (%)	203 (16.29)
Demographics	
Death of loved one, *n* (%)	664 (52.91)
History of heart disease, *n* (%)	144 (11.53)
History of high blood pressure, *n* (%)	465 (37.44)
History of cholesterol problem, *n* (%)	528 (42.72)
Diagnosed with diabetes, *n* (%)	155 (12.38)
Emotional abuse	
None, *n* (%)	861 (68.88)
Low, *n* (%)	222 (17.76)
Moderate, *n* (%)	72 (5.76)
Severe, *n* (%)	95 (7.60)
Emotional neglect	
None, *n* (%)	698 (55.84)
Low, *n* (%)	334 (23.72)
Moderate, *n* (%)	127 (10.16)
Severe, *n* (%)	91 (7.28)
Physical abuse	
None, *n* (%)	961 (76.82)
Low, *n* (%)	128 (10.23)
Moderate, *n* (%)	86 (6.87)
Severe, *n* (%)	76 (6.08)
Physical neglect	
None, *n* (%)	902 (72.10)
Low, *n* (%)	160 (12.79)
Moderate, *n* (%)	112 (8.95)
Severe, *n* (%)	77 (6.16)
Sexual abuse	
None, *n* (%)	951 (76.32)
Low, *n* (%)	86 (6.90)
Moderate, *n* (%)	100 (8.03)
Severe, *n* (%)	109 (8.75)
Sex × Loss	
Male no death, *n* (%)	266 (21.20)
Male death, *n* (%)	325 (25.90)
Female no death, *n* (%)	276 (21.99)
Female death, *n* (%)	388 (30.92)

Note. Total sample $N = 1{,}255$.
[a]Reference group is male.
[b]Reference group is not partnered.

Trauma Questionnaire: (1) physical abuse ($\alpha = .79$), (2) emotional abuse ($\alpha = .88$), (3) sexual abuse ($\alpha = .94$), (4) physical neglect ($\alpha = .70$), (5) emotional neglect ($\alpha = .89$), and (6) minimization or denial of abuse ($\alpha = .70$). In this study, the minimization/denial subscale was omitted from the analysis as it does not contribute to the assessment of respondent's *exposure* to traumatic experiences.

Loss and sex. Respondents were asked if they had experienced the loss of closed loved one since the first wave of data collection. This self-reported item was then combined with respondents' self-reported sex to generate a four-category nominal interaction variable. This variable divides the sample into males without loss (0), males with loss (1), females without loss (2), and females with loss (3).

Missing Data and Analysis

The total sample of the second wave of the biomarker subproject is 1,255. Of these respondents, 1,091 were retained in the regression model using listwise deletion. Missing data were examined to determine the proportion of data missing and the pattern of missingness. Overall, there was a relatively low proportion of missing data in the final model (approximately 14%). In addition, there were no significant differences in the degree of missingness based on sex, $t(1,253) = 0.29$, $p = .77$; loss status, $t(1,253) = -1.20$, $p = .23$; or experience of child maltreatment, $F(1,253) = 0.94$, $p = .42$. Given these findings, listwise deletion was employed rather than utilizing missing data techniques such as multiple imputation. Ordinary least squares (OLS) regression models with moderation (an interaction of sex and loss) were estimated using STATA version 15.1.[2] The final model included a four-category interaction variable in which respondents were classified as (1) male respondents without loss ($n = 266$), (2) female respondents without loss ($n = 325$), (3) male respondents with loss ($n = 276$), and (4) female respondents with loss ($n = 288$). In addition, experiences and severity of childhood emotional, physical, and sexual abuse, as well as physical and emotional neglect, were included in the model. Respondents' age and history of heart disease were included as controls. OLS regression diagnostics did not indicate any violations of assumptions in the residuals of the models.

Results

Main Effects Model

An OLS regression model examining the relationship between sex and loss on average heart rate was estimated, $F(19,1071) = 6.09$, $p < .001$. The model accounted for approximately 8% of the average variance in heart rate among respondents (adjusted $R^2 = 0.082$). Being a female respondent was associated with an increase in average heart rate ($b = 2.99$, $p < .001$). Similarly, having

experienced a recent loss was also associated with an increase in average heart rate ($b = 1.60$, $p < .05$). Respondents' age and a history of heart disease were both significant negative controls ($b = -5.77$, $p < .001$ and $b = -.18$, $p < .001$ respectively). Interestingly, in addition to emotional and physical neglect, emotional, physical, and sexual abuse were not significant predictors of average heart rate, even when abuse and neglect were reported to be severe. Results of this model are presented in Table 2.

Table 2. Regression With Moderation Sex and Loss.

Variable	Main effect *b* (*SE*)	Moderation *b* (*SE*)
Loss	1.60 (0.79)*	–
Female	2.99 (0.82)***	–
Sex × Loss		
Female no death[a]	–	3.83 (1.16)**
Male death[a]	–	2.51 (1.18)*
Female death[a]	–	4.73 (1.12)***
Emotional abuse		
Low[b]	−0.33 (1.17)	−0.34 (1.17)
Moderate[b]	2.32 (1.96)	2.32 (1.96)
Severe[b]	−0.48 (2.15)	−0.45 (2.15)
Emotional neglect		
Low[b]	−0.26 (1.00)	−0.27 (1.00)
Moderate[b]	0.92 (1.62)	0.92 (1.62)
Severe[b]	3.94 (2.06)	4.00 (2.06)
Physical abuse		
Low[b]	−0.81 (1.33)	−0.81 (1.33)
Moderate[b]	−2.24 (1.78)	−2.24 (1.78)
Severe[b]	3.23 (2.09)	3.18 (2.09)
Physical neglect		
Low[b]	−0.55 (1.24)	−0.57 (1.24)
Moderate[b]	−1.05 (1.55)	−1.07 (1.55)
Severe[b]	−2.20 (1.95)	−2.24 (1.95)
Sexual abuse		
Low[b]	−1.24 (1.54)	−1.19 (1.54)
Moderate[b]	2.85 (1.48)	2.83 (1.48)
Severe[b]	2.02 (1.56)	2.07 (1.55)
Age	−0.18 (0.04)***	−0.18 (0.04)***
History of heart disease	−5.77 (1.37)***	−5.76 (1.37)***

Note. [a]Reference group is male no loss.
[b]Reference group is none.
*$p < .05$. **$p < .01$. ***$p < .001$.

Moderation Model

An OLS regression model examining the relationship between loss and average heart rate was estimated using sex as a moderator, $F(20,1070) = 5.84$, $p < .001$. The model accounted for approximately 8% of the average variance in heart rate among respondents (adjusted $R^2 = 0.082$). As compared to male respondents without loss, being a male with a recent loss was associated with an increase in average heart rate ($b = 2.51$, $p < .05$). Similarly, being female with a recent loss was also associated with an increase in average heart rate ($b = 4.73$, $p < .001$), these findings are consistent with a main effect of loss. A main effect of sex was also observed such that being female without loss was also associated with a higher average heart rate ($b = 3.83$, $p < .001$) as compared to males without loss. Respondents' age and history of heart disease were both significant negative controls ($b = -.18$, $p < .001$ and $b = -5.76$, $p < .001$ respectively). Interestingly, in addition to emotional and physical neglect, emotional, physical, and sexual abuse were not significant predictors of average heart rate, even when abuse and neglect were reported to be severe. Results of this model are presented in Table 2.

Discussion

The model presents a main effect for both sex and loss. More specifically, being a male with loss was associated with a higher average heart rate as compared to male respondents without loss. This trend was similar for females with loss (i.e., effect of loss). Interestingly, being a female without loss was also associated with a higher average heart rate as compared to males without loss, confirming a main effect of sex independent of bereavement status. This finding is consistent with the literature suggesting that even among nonbereaved individuals, females are at greater risk for cardiovascular disease and more specifically that bereaved individuals experience elevated heart rate in the aftermath of loss regardless of sex (O'Connor, Allen, & Kaszniak, 2002).

Perhaps the most interesting finding is the differing relationships between bereavement and childhood maltreatment on average heart rate. While there is some literature supporting the deleterious physical effects of childhood maltreatment on cardiovascular health in adults (Carroll et al., 2013; Fuller-Thomson et al., 2010; Gilbert et al., 2015), the current model did not support this association. Rather, the current findings suggest that sex differences and bereavement status may more accurately explain variance in average heart rate and by extension cardiovascular functioning in adulthood.

In part, experiences of trauma may be linked with the elevated risk of cardiovascular disease for women because women are more likely to exhibit cardiovascular disease (in general) and are similarly more likely to report some forms of maltreatment (i.e., spurious correlation)—such as sexual assault.

Similarly, women are at greater risk for negative psychological consequences as a result of that exposure (Helpman et al., 2017) and therefore more likely to present in clinical settings. While some studies demonstrate an elevated risk for women who experienced maltreatment in childhood even as compared to male peers (Suglia, Clark, Boynton-Jarrett, Kressin, & Koenen, 2014), the current findings challenge this stance and call for greater exploration into the mechanisms that link child maltreatment with cardiovascular disease in women.

A particularly important component that may explain these differing findings is the role of time in the process of coping with bereavement and trauma (Saltzman, 2019). This area has not previously been studied in the context of cardiovascular disease. Perhaps, the effect of bereavement on average heart rate and the nonsignificant association between indicators of child maltreatment on average heart rate in this study can be explained by subjective experiences of *meaningful* time. In keeping with this approach, the combination of the *Time-Informed Framework* and the recognition of a mind/body connection may account for two temporal elements that impact the relationship between psychological distress (e.g., trauma and loss) and health outcomes.

First, the amount of time elapsed between the experience of childhood maltreatment and the measurement of heart rate may have limited the observable physiological reaction (i.e., elevated average heart rate). In contrast, the losses experienced by the sample occurred between wave one and two of MIDUS data collection—implying that the losses occurred somewhere between 7 and 12 years prior to measuring heart rate. The recency of these experiences may explain the significant relationship between bereavement status and average heart rate. On the other hand, the significance of bereavement status on physiological outcomes such as heart rate even 12 years after a loss suggests that the typical approach to understanding grief and bereavement—that is the resolution of grief symptomology within 6 months of the loss—may be misguided and inaccurate.

Alternatively, the *subjective* experience of time is not accounted for in these data. A recent reconceptualization regarding the role of time in loss and trauma suggests that research should account for temporal triggers referred to as *markers in time* (Saltzman, 2019). The experience of *markers in time* (anticipated, repeated, and unavoidable time periods/dates that are highly emotional and distressing) may impact an individual's ability to cope with their loss, resulting in potential psychological distress and related physiological symptomology. While some preliminary research supports the association of anniversary reactions and cardiovascular events (Rostila et al., 2015), additional research accounting for the subjective experience of time and *markers in time* is needed to better determine the effect of time and timing on the cardiovascular functioning in bereaved individuals.

Finally, some research suggests that factors such as the relationship to the deceased, time elapsed since the loss, social support, and psychological factors

such as PTSD, depression, or anxiety may influence the process and experience of bereavement (Buckley et al., 2010). Furthermore, there is research supporting the connection between psychological distress and cardiovascular risk—suggesting that the experience of psychological distress may interact with sex to account for variability in heart rate (e.g., women are also at greater risk for PTSD following bereavement or trauma; Kornfield et al., 2018), a factor not account for by the current model.

Limitations

As in all studies, this study has some limitations that influence the interpretation of the results. There are four important limitations worth noting. First, in regards to the experience of loss, the current models do not account for cumulative or multiple losses, of which I would expect that greater number of losses would have a more deleterious effect on both psychological and physiological health. Second, in this model, all losses are created equal, an approach which differs from the lived experiences of loss. More specifically, the model does not account for the quality of the relationship (e.g., closer or more estranged) nor does it account for the cause of death (e.g., traumatic or sudden, versus prolonged and expected). Third, there are many factors that may influence average heart rate in adulthood including medication usage, physical activity levels, other health conditions, and lifestyle choices. The current model is limited in that it cannot account for all of these potential contributing factors. Finally, as previously noted, the time elapsed since the episode of child maltreatment and the experience of *markers in time* are not account for by these models and potentially explain the findings of this study.

Implications

Despite these limitations, the implications of these findings are worth noting. First, these findings validate that sex differences in cardiovascular functioning do occur and that these differences may be exacerbated by experiences of trauma and loss. More specifically, these findings highlight the differences in the physiological impacts of child maltreatment and recent bereavement, suggesting more nuanced investigation is needed to understand these relationships. This article puts forward a time-informed framework that potentially explains these differences and suggests additional research is needed to test and validate this approach to research on trauma and loss.

However, the results presented in this article do not provide greater insight in to the elevated risk of cardiovascular disease for women—regardless of exposure to trauma and loss. Greater research is needed to further elucidate the psychosocial/behavioral mechanisms that place women at greater risk. These findings suggest that women who have experienced recent loss are cumulatively impacted

as compared to their nonbereaved female counterparts. To that end, this article calls for additional attention to identifying the unique underlying mechanisms that further elevate the risk of cardiovascular disease among this particular subgroup of women.

Second, though more research is needed to fully understand the relationships outlined in this article, these preliminary findings have implications for practice, both in the field of mental health and in medicine. More specifically, mental health practitioners working with bereaved individuals may consider integrating mind–body practices, meditation, or yoga to alleviate some of the potential risk for physiological stress. These practices may be particularly important for female clients given the additional risk for this demographic. In addition, medical professionals may consider additional screening and monitoring for patients who have experienced bereavement in the hopes of identifying risk or cardiovascular disease as early as possible. Most importantly is the expansion of traditional models of bereavement in which individuals are expected to resolve symptoms of grief within 6 months. In recognizing the long-term implications of bereavement, both in regards to mental and physical health, professionals can ensure that screening and intervention remain available to bereaved clients throughout the long-term process of adaptation.

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Notes

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2. Regression models stratified by sex were also estimated. Coefficients for the male and female model were compared to determine if there were significant differences between male and female respondents. Models are available upon request.

References

Aardal-Eriksson, E., Eriksson, T. E., & Thorell, L. H. (2001). Salivary cortisol, post-traumatic stress symptoms, and general health in the acute phase and during 9-month follow-up. *Society for Biological Psychiatry*, *50*, 986–993.

Anderson, E. L., Fraser, A., Caleyachetty, R., Hardy, R., Lawlor, D. A., & Howe, L. D. (2018). Associations of adversity in childhood and risk factors for cardiovascular disease in mid-adulthood. *Child Abuse and Neglect*, *76*, 138–148.

Berntson, J., Patel, J. S., & Stewart, J. C. (2017). Number of recent stressful life events and incident cardiovascular disease: Moderation by lifetime depressive disorder. *Journal of Psychosomatic Research*, *99*, 149–154.

Bonanno, G. A., & Malgaroli, M. (2019). Trajectories of grief: Comparing symptoms from the DSM-5 and ICD-11 diagnoses. *Depression Anxiety*, 1–9.

Bremer-Landau, J. D., & Caskie, G. I. L. (2019). Gender as potential moderator of associations among trauma exposure, posttraumatic stress disorder symptoms, and alcohol use disorder symptoms in young adults. *Journal of Traumatic Stress*, *32*, 586–594.

Breslau, N. (2009). The epidemiology of trauma, PTSD, and other posttrauma disorders. *Trauma, Violence, and Abuse*, *10*(3), 198–210.

Bright, M. A., & Thompson, L. A. (2018). Association of adverse childhood experiences with co-occurring health conditions in early childhood. *Journal of Developmental and Behavioral Pediatrics*, *39*(1), 37–45.

Buckley, T., McKinley, S., Tofler, G., & Bartrop, R. (2010). Cardiovascular risk in early bereavement: A literature review and proposed mechanism. *International Journal of Nursing Studies*, *47*, 229–238.

Carroll, J. E., Gruenewald, T. L., Taylor, S. E., Janicki-Deverts, D., Matthews, K. A., & Seeman, T. E. (2013). Childhood abuse, parental warmth, and adult multisystem biological risk in the Coronary Artery Risk Development in Young Adults study. *Proceedings of the National Academy of Sciences*, *110*(43), 17149–17153.

Christiansen, D. M., Elklit, A., & Olff, M. (2013). Parents bereaved by infant death: PTSD symptoms up to 18 years after the loss. *General Hospital Psychiatry*, *35*, 605–611.

Corso, P. S., Edwards, V. J., Fang, X., & Mercy, J. A. (2008). Health-related quality of life among adults who experienced maltreatment during childhood. *American Journal of Public Health*, *98*(6), 1094–1100.

Doom, J. R., Mason, S. M., Suglia, S. F., & Clark, C. J. (2017). Pathway between childhood/adolescent adversity, adolescent socioeconomic status, and long-term cardiovascular disease risk in young adulthood. *Social Science and Medicine*, *188*, 166–175.

Fagundes, C. P., Murdock, K. W., LeRoy, A., Baameur, R., Thayer, J. F., & Heijnen, C. (2018). Spousal bereavement in association with more pronounced ex vivo cytokine production and lower heart rate variability: Mechanisms underlying cardiovascular risk? *Psychoneuroendocrinology*, *93*, 65–71.

Fuller-Thomson, E., Brennenstuhl, S., & Frank, J. (2010). The association between childhood physical abuse and heart disease in adulthood: Findings from a representative community sample. *Child Abuse and Neglect*, *34*, 689–698.

Gilbert, L. K., Breiding, M. J., Merrick, M. T., Thompson, W. W., Ford, D. C., Dhingra, S. S., & Parks, S. E. (2015). Child adversity and adult chronic disease: An update from ten States and the District of Columbia, 2010. *American Journal of Preventative Medicine*, *48*(3), 345–349.

Go, A. S., Mozaffarian, D., Roger, V. L., Benhamin, E. J., Berry, J. D., Blaha, M. J., . . . Turner, M. B. (2014). Heart disease and stroke statistics—2014 update: A report from the American Heart Association. *Circulation*, *128*, 1–268.

Heeke, C., Kampisiou, C., Niemeyer, H., & Knaevelsrud, C. (2017). A systematic review and meta-analysis of correlates of prolonged grief disorder in adults exposed to violent loss. *European Journal of Psychotraumatology*, *8*(6), 1583524.

Helpman, L., Zhu, X., Suarez-Jimenez, B., Lazarov, A., Monk, C., & Neria, Y. (2017). Sex differences in trauma-related psychopathology. A critical review of neuroimaging literature (2014-2017). *Current Psychiatric Reports*, *19*, 104–117.

Howard, B. V., Cowan, L. D., Go, O., Welty, T. K., Robbins, D. C., & Lee, E. T. (1998). Adverse effects of diabetes on multiple cardiovascular disease risk factors in women: The strong heart study. *Diabetes Care*, *21*(8), 1258–1265.

Jones, M. P., Bartrop, R. W., Forcier, L., & Penny, R. (2010). The long-term impact of bereavement upon spousal health: A 10-year follow-up. *Acta Neuropsychiatrica*, *22*, 212–217.

Kersting, A., & Kroker, K. (2010). Prolonged grief as a distinct disorder, specifically affecting female health. *Archives Women's Mental Health*, *13*, 27–28.

Kessler, R. C. (2003). Epidemiology of women and depression. *Journal of Affective Disorders*, *74*, 5–13.

Kong, J. (2018). Effect of caring for an abusive parent on mental health: The mediating role of self-esteem. *The Gerontologist*, *58*(3), 456–466.

Kornfield, S. L., Hantsoo, L., & Epperson, C. N. (2018). What does sex have to do with it? The role of sex as a biological variable in the development of posttraumatic stress disorder. *Current Psychiatric Reports*, *20*(39), 1–8.

Kubzansky, L. D., Koenen, K. C., Jones, C., & Eaton, W. W. (2009). A prospective study of posttraumatic stress disorder symptoms and coronary heart disease in women. *Health Psychology*, *28*(1), 125–130.

Lenane, Z., Peacock, E., Joyce, C., Frohlich, E. D., Re, R. N., Muntner, P., & Krousel-Wood, M. (2019). Association of post-traumatic stress disorder symptoms following Hurricane Katrina with incident cardiovascular disease events among older adults. *American Journal of Geriatric Psychiatry*, *27*(3), 310–321.

Lewis, T. T. (2015). Trauma and posttraumatic stress disorder: Emerging risk factors for cardiovascular disease in women? *Circulation*, *132*, 227–229.

McFarlane, A. C. (2010). The long-term costs of traumatic stress: Intertwined physical and psychological consequences. *World Psychiatry*, *9*, 2–10.

Mehta, L. S., Beckie, T. M., DeVon, H. A., Grines, C. L., Krumholz, H. M., Johnson, M. N., . . . Watson, K. E. (2016). Acute myocardial infarction in women: A scientific statement from the American Heart Association. *Circulation*, *133*, 916–947.

Mosca, L., Barrett-Connor, E., & Kass Wenger, N. (2011). Sex/gender differences in cardiovascular disease prevention: What a difference a decade makes. *Circulation*, *124*, 1245–2154.

Mostofsky, E., Maclure, M., Sherwood, J. B., Tofler, G. H., Muller, J. E., & Mittleman, M. A. (2012). Risk of acute myocardial infarction after the death of a significant person in one's life: The determinants of myocardial infarction onset study. *Circulation*, *125*, 491–496.

O'Connor, M. F., Allen, J. J. B., & Kaszniak, A. W. (2002). Autonomic and emotion regulation in bereavement and depression. *Journal of Psychosomatic Research*, *52*, 183–185.

Pan, X., Wang, Z., Wu, X., Wu Wen, S., & Liu, A. (2018). Salivary cortisol in post-traumatic stress disorder: A systematic review and meta-analysis. *BMC Psychiatry*, *18*, 324–334.

Rector, J. L., Tay, L., Wiese, C. W., & Friedman, E. M. (2019). Relative sensitivity of cortisol indices to psychosocial and physical health factors. *PLoS One*, *14*(4), e0213513.

Rostila, M., Saarela, J., Kawachi, I., & Hjern, A. (2015). Testing the anniversary reaction: Causal effects of bereavement in a nationwide follow-up study from Sweden. *European Journal of Epidemiology*, *30*, 239–247.

Saltzman, L. Y. (2019). It's about time: Re-conceptualizing the role of time in loss and trauma. *Psychological Trauma: Theory, Research, Practice, and Policy*, *11*(6), 663–670.

Silver, K. E., Kumari, M., Conklin, D., & Karakurt, G. (2018). Trauma and health symptoms in a community sample: Examining the influences of gender and daily stress. *The American Journal of Family Therapy*, *46*(2), 153–167.

Stahl, S. T., Arnold, A. M., Chen, J. Y., Anderson, S., & Schulz, R. (2016). Mortality after bereavement: The role of cardiovascular disease and depression. *Psychosomatic Medicine*, *78*, 697–703.

Stanislavovna Tairova, M., Odacir Graciolli, L., Sergueevna Tairova, O., & De Marchi, T. (2018). Analysis of cardiovascular disease risk factors in women. *Macedonian Journal of Medical Science*, *6*(8), 1370–1365.

Suglia, S. F., Clark, C. J., Boynton-Jarrett, R., Kressin, N. R., & Koenen, K. C. (2014). Child maltreatment and hypertension in young adulthood. *BMC Public Health*, *14*, 1149–1156.

Sumner, J. A., Kubzansky, L. D., Elkind, M. S. V., Roberts, A. L., Agnew-Blais, J., Chen, Q., . . . Koenen, K. C. (2015). Trauma exposure and posttraumatic stress disorder symptoms predict onset of cardiovascular events in women. *Circulation*, *132*(4), 251–259.

Theorell, T., & Härenstam, A. (2000). Influence of gender on cardiovascular disease. In R. M. Eisler & M. Hersen (Eds.), *Handbook of gender, culture, and health* (pp. 161–177). Mahwah, NJ: Lawrence Erlbaum Associates Publishers.

Utz, R. L., Caserta, M., & Lund, D. (2011). Grief, depressive symptoms, and physical health among recently bereaved spouses. *The Gerontologist*, *52*(4), 460–471.

Weems, C. F., & Carrion, V. G. (2007). The association between PTSD symptoms and salivary cortisol in youth: The role of time since the trauma. *Journal of Traumatic Stress*, *20*(5), 903–907.

Wegman, H. L., & Stetler, C. (2009). A meta-analytic review of the effects of childhood abuse on medical outcomes in adulthood. *Psychosomatic Medicine*, *71*(8), 805–812.

Widom, C. S., Czaja, S. J., Bentley, T., & Johnson, M. S. (2012). A prospective investigation of physical health outcomes in abused and neglected children: New findings from a 30-year follow-up. *American Journal of Public Health*, *102*(6), 1135–1144.

Williams, J. R. (2005). Depression as a mediator between spousal bereavement and mortality from cardiovascular disease. Appreciating and managing the adverse health consequences of depression in an elderly surviving spouse. *Southern Medical Association*, *98*(1), 90–97.

Author Biography

Leia Y. Saltzman is trained in both qualitative and quantitative methods, Her research uses mixed methodology to explore the process of adaptation in the context of trauma, community violence, and mass disaster. Her previous research has focused on positive adaptation trajectories such as resilience and posttraumatic growth. Currently, her work explores the role of time in the process of adaptation, with the goal of developing time-informed and sustainable mental health interventions. She is interested in community based research that influences mental health policies and clinical practices with trauma-affected populations in order to promote well-being, build stronger families, and more cohesive communities that can withstand the impact of mass disaster, trauma, and violence.