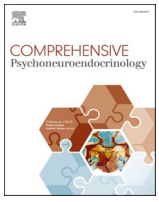
Comprehensive Psychoneuroendocrinology 19 (2024) 100251

Contents lists available at ScienceDirect

Comprehensive Psychoneuroendocrinology

journal homepage: www.sciencedirect.com/journal/comprehensive-psychoneuroendocrinology



Turning stress into success: A festschrift in honor of Janice Kiecolt-Glaser

Lisa M. Christian *

Department of Psychiatry & Behavioral Health and the Institute for Behavioral Medicine Research and The Institute for Behavioral Medicine Research, The Ohio State University Wexner Medical Center, Columbus, OH, USA

I'm pleased and honored to have this opportunity to write a festschrift in recognition of Janice Kiecolt-Glaser. I have had the unique opportunity to work Jan as both a trainee and a colleague. As a graduate student at the Ohio State University, I completed my PhD with Jan. I then went on to a faculty position at the Institute for Behavioral Medicine Research where I was most fortunate to join her as a colleague. Jan's work, as well as the doors she has opened for me, have inspired and shaped my career in ways that can't be overstated.

Jan is an exemplary scholar and mentor. Her work in psychoneuroimmunology (PNI) began at a time when the intersection of psychology, neuroscience, and immunology was still uncharted territory. Her curiosity and creativity led her to explore how stress, emotions, and social interactions impact our immune system. With a keen eye for interdisciplinary collaboration, she embarked on groundbreaking studies that bridged these seemingly disparate fields. As one of the founders of the field of PNI, she creatively used an inspiring variety of both research models and focus on different populations to truly create new knowledge and forge a new field – rare and enviable accomplishments.

Her research illuminated the profound effects of chronic stress on immune function. From caregivers of spouses living with dementia [1–20], to medical students during exams [21–24], to cancer survivors [25–57], married couples [58–82], and other populations, Jan's work verified that stress alters immune responses, leaving individuals more vulnerable to infections and diseases. Her work has underscored the importance of the mind-body connection, emphasizing that mental well-being directly influences physical health. As such, it has had far reaching impact, not only on avenues of research, but also on clinical approaches to care and the now mainstream acceptance that stress measurably and substantially impacts health.

Critically, Jan's work has explicated not only the effects of stress, but also factors contributing to resilience. In particular, her work has emphasized the critical role of marital interactions and relationship quality. Support from one's spouse has important beneficial effects on stress hormones and inflammation [61,78,80]. In contrast, marital discord has significant negative effects that she has documented through elegantly designed studies which included conflict interactions between couples in the lab [61–73,75,81]. Her findings have had impact not only within, but also well beyond academic circles. With relevance to clinicians, researchers, as well as the general public, her work resonates broadly by emphasizing power of relationships to hurt as well as to protect and heal.

* Institute for Behavioral Medicine Research, The Ohio State University Wexner Medical Center, Room 112, 460 Medical Center Drive, Columbus, OH, 43210, USA.
E-mail address: Lisa.Christian@osumc.edu.

https://doi.org/10.1016/j.cpnec.2024.100251
Received 23 April 2024; Received in revised form 12 July 2024; Accepted 17 July 2024
Available online 23 July 2024

Image 1. Colleagues at the Institute for Behavioral Medicine Research in September 2019 (left to right): Leah Pyter, PhD, Lisa Christian, PhD, Tamar Gur, MD, PhD, Janice Kiecolt-Glaser, PhD, William Malarkey, MD, John Sheridan, PhD, and Olga "Niki" Kokiko-Cochran, PhD.

Beyond her research, Jan's influence extended to mentorship. As a guiding force for countless students and early-career scientists, she nurtured curiosity, critical thinking, and resilience. Reflecting her awareness of the importance of social support and preventing isolation, she aimed to time recruitment of new trainees in a way to ensure that they would have collaborative partners around at the same time. This created a dynamic and supportive working environment.

Jan's mentoring style is disciplined but fair, with high expectations, not only of her trainees, but also for herself as a mentor. She provided incredibly speedy and thorough feedback. In addition to written notes in the margins, she used her own unique method of mini-cassette tape recordings which provided a conversational nature to feedback, as well as greater context and tone. Rather than only receiving written notes in the margin with instructional fixes, Jan's tapes provided unvarnished critiques as well as sincere encouragement. Indeed, one of the most important benefits of this approach to provide edits is the clarity in feedback as well as the lack of ambiguity about your mentor's thoughts on your overall writing quality and style. It is truly a unique and valued approach.

In addition, she instilled essential writing habits through consistent recommendations to read (and re-read) "Professors as Writers: A Self-Help Guide to Productive Writing" by Robert Boice [83]. In this superlative guide, Dr. Boice details his research on writing habits among professors, and identifies the characteristics the differentiate the highly productive from the not-so-productive. Now a classic, from 1990, this book has never lost its relevance. I revisit these principles myself when "getting off track" and have gone on to standardly recommend this to all mentees. A key take-away point is to write daily, and in short bouts. Don't wait until you have 3–4 h uninterrupted; not only may that never occur, but writing in long bouts contributes to burnout rather than continued productivity. Understanding this approach was transformative to my own writing style, productivity, and ability to enjoy the writing process – at least some of the time!

Of course, any ode to Jan would not be complete without fully appreciating her partner in the lab and in life, Ronald Glaser. Together, with colleagues whom they considered close friends, they established the Institute of Behavioral Medicine Research (IBMR). The IBMR was founded in 1996, with the goal of stimulating interdisciplinary research and creating a pipeline of new and established investigators in the field. The IBMR moved into its own building in 2009, a milestone close to Ron's heart. Indeed, stimulating collaboration as well as building a pipeline of trainees and junior faculty to grow and build the field of PNI was near and dear to both Ron and Jan.

As celebrated in this special volume, many of Jan's mentees have gone on to shape the field in their own unique ways, carrying forward her legacy. My research is no exception, having been strongly guided by taking models Jan had used, and applying them to a population that she had not explored – perinatal women.

In some initial work in my lab, I utilized a stress reactivity paradigm, the Trier Social Stress Test (TSST) to examine inflammatory and cardiovascular responses to acute stress among African American and European American women during pregnancy and non-pregnancy [84,85]. This study was inspired by work prior with my master's thesis mentor, Dr. Catherine Stoney on cardiovascular reactivity [86] as well as Jan's work on neuroendocrine and immune reactivity to acute stressors [66,71,72,87,88]. My work in this area demonstrated that inflammatory responses to acute stress were attenuated during pregnancy, but a main effect of race was observed whereby African American women showed greater inflammatory responses than European American women during pregnancy as well as non-pregnancy, and also showed differential adaptation in heart rate variability [84,85].

Jan & Ron's work examining reactivation of latent Epstein Barr virus (EBV) was seminal in the field, showing that psychological stress can affect cell-mediated immunity. Their studies demonstrated EBV reactivation among medical students in response to the short-term stress of examinations as well as in the context of chronic stress among spouses providing caregiver for a partner with dementia [24,38,89–93]. My work examining observational longitudinal changes in inflammation as well as EBV across pregnancy and postpartum as a function of race and racial discrimination was directly informed by these studies [94,95]. Taking this paradigms and applying it in a new context and new population proved to be a fruitful direction.

My work using influenza virus vaccine models to examine inflammatory and antibody responses during pregnancy also drew directly from Jan's prior work [96–99]. A foundational study from Jan, Ron, and colleagues published in JAMA Psychiatry showed that in a sample of older adults (mean age 71.21 $\pm$ 8.68 years), mild depressive symptoms predicted more robust and prolonged inflammatory responses to seasonal influenza virus vaccine [99]. Their studies also showed effects of stress on antibody and responses to influenza virus vaccination and hepatitis-B vaccination in older and younger adults, respectively [96]. While later work from Jan's lab went on to also utilize typhoid vaccine as a novel immune challenge, demonstrating effects of chemotherapy, obesity, and physical fitness on innate immune responses (IL-6, IL-1 receptor agonist, and white blood cell) among breast cancer survivors [46,50]. In parallel, my studies in pregnant and non-pregnant women demonstrated the trajectory of the inflammatory response to influenza virus vaccination pregnant and non-pregnant women [100,101], showed similar effects of depression on inflammatory responses to influenza vaccination during pregnancy [102], demonstrated that subjective symptoms following receipt of vaccination were associated with the magnitude of inflammatory responses [103], and demonstrated effects of prior maternal vaccination on antibody transfer to the neonate [104]. There is still much to be explored in this area of stress and vaccination.

Jan's contributions in the area of aging have been incredibly influential to myself and the larger scientific community. For example her work on telomere length, a key indicator of biological aging [105], has

demonstrated that dietary factors, particularly omega-3 fatty acid intake, and psychological stress including childhood adversity and caregiving stress affect the rate of aging [15,106–108]. In investigating similar questions, my colleagues and I have found effects of childhood adversity and social support on telomere length in perinatal women, a population for which aging has unique potential health implications [109]. In addition, Jan's extensive data in the area of the gut microbiome and leaky gut has demonstrated how marital distress and depression negatively affect gut microbiome composition as well as the presence of leaky gut, or dysbiosis of the gut that results in translocation of bacterial endotoxin, contributing to systemic inflammation [73,74,110–114]. This work inspired me to examine related research questions. My data in women and toddlers showed associations between the gut microbiome in early life with both maternal obesity and measures of temperament in toddlers [115–117], and we are currently exploring how leaky gut changes across the course of late pregnancy through postpartum.

The examination of stress reactivity paradigms, inflammation and Epstein-Barr Virus (EBV) latency, influenza virus vaccine models, biological aging, the gut microbiome, and more have provided an outstanding basis for a productive independent research career. And, through new grants of my own, and "inheriting" ongoing studies upon Jan's retirement, I endeavor to continue to broaden my scope to the examination of other populations and biomarkers including studies of stress and resilience among sexual and gender diverse populations [118], adults living with cancer and their partners [119,120], and caregivers for spouses with Alzheimer's and related dementias [20]. Jan has always been on the cutting-edge of research, as demonstrated by the diversity and wide-ranging impact of her studies. As shown by my the connections between Jan's work and my own, I have benefited from the opportunity to address related questions, and I am only one of the numerous trainees she has launched.

In sum, Jan truly turned stress into success. Not only for herself, but for her mentees and colleagues. Jan's legacy certainly isn't confined to academic journals. It lives in the people she influenced, mentored, and sponsored along the way - the students who discovered their passion, and the colleagues who admired her talent, work ethic, and collaborative spirit. Her ability to translate complex science into practical advice make her a sought-after speaker. The enduring relevance and applicability of her work is evident. Her impact on the field, her mentees, and her colleagues will only continue to grow as their efforts continue and they train future generations of scholars. I am fortunate to count myself among them.

CRediT authorship contribution statement

Lisa M. Christian: Writing – review & editing, Writing – original draft, Conceptualization.

Declaration of competing interest

The author has no conflicts of interest to disclose.

Acknowledgements

Preparation of this manuscript was supported by the National Institute on Aging of the National Institutes of Health (R01 AG069138 LMC, JKG).

References

[1] J. Bodnar, J.K. Kiecolt-Glaser, Caregiver depression after bereavement: chronic stress isn't over when it's over, Psychol. Aging 9 (1994) 372–380.
[2] J.T. Cacioppo, K.M. Poehlmann, J.K. Kiecolt-Glaser, et al., Cellular immune responses to acute stress in female caregivers of dementia patients and matched controls, Health Psychol. 17 (1998) 182–189.
[3] A.K. Damjanovic, Y. Yang, R. Glaser, et al., Accelerated telomere erosion is associated with a declining immune function of caregivers of Alzheimer's disease patients, J. Immunol. 179 (6) (2007) 4249–4254.
[4] J. Dura, E. Haywood-Niler, J.K. Kiecolt-Glaser, Alzheimer's and Parkinson's diseases dementia caregivers: effects of chronic stress, Gerontol. 30 (1990) 332–338.
[5] J.K. Kiecolt-Glaser, Immunologic changes in Alzheimer caregivers, in: N.R. Hall, S.J. Blumenthal (Eds.), Mind-body Interactions and Disease, Health Dateline Press., Washington, D. C., 1995, pp. 125–134.
[6] J.K. Kiecolt-Glaser, J. Dura, C.E. Speicher, O.J. Trask, R. Glaser, Spousal caregivers of dementia victims: longitudinal changes in immunity and health, Psychosom. Med. 53 (1991) 345–362.
[7] J.K. Kiecolt-Glaser, C.S. Dyer, E.C. Shuttleworth, Upsetting social interactions and distress among Alzheimer's Disease family caregivers: a replication and extension, Am. J. Community Psychol. 116 (1988) 825–837.
[8] J.K. Kiecolt-Glaser, R. Glaser, Caregivers, mental health, and immune function, in: E. Light, B. Lebowitz (Eds.), Advances in Alzheimer's Disease Caregiving and Family Stress, Springer Publishing Company, New York, 1994, pp. 64–74.
[9] J.K. Kiecolt-Glaser, R. Glaser, E.C. Shuttleworth, C.S. Dyer, P. Ogrocki, C. E. Speicher, Chronic stress and immunity in family caregivers for Alzheimer's Disease victims, Psychosom. Med. 49 (1987) 523–535.
[10] J.K. Kiecolt-Glaser, S.J. Wilson, Caregiver vulnerability and brain structural markers: compounding risk, Am. J. Geriatr. Psychiatr. 25 (6) (2017) 592–594.
[11] E.M. Redinbaugh, R.C. MacCallum, J.K. Kiecolt-Glaser, Recurrent syndromal depression in caregivers, Psychol. Aging 10 (1995) 358–368.
[12] B.N. Uchino, J.K. Kiecolt-Glaser, J.T. Cacioppo, Age and social support: effects on cardiovascular functioning in caregivers of relatives with Alzheimer's Disease, J. Pers. Soc. Psychol. 63 (1992) 839–846.
[13] S.J. Wilson, A.C. Padin, D.J. Birmingham, W.B. Malarkey, J.K. Kiecolt-Glaser, When distress becomes somatic: dementia family caregivers' distress and genetic vulnerability to pain and sleep problems, Gerontol. 59 (5) (2019) E451–E460.
[14] J.K. Kiecolt-Glaser, R. Glaser, Caregiving, mental health, and immune function, in: E. Light, B. Lebowitz (Eds.), Alzheimer's Disease Treatment and Family Stress: Directions for Research, National Institute of Mental Health (Government Printing Office), Washington, D.C, 1989, pp. 245–266.
[15] J.K. Kiecolt-Glaser, J.P. Gouin, N.P. Weng, W.B. Malarkey, D.Q. Beversdorf, R. Glaser, Childhood adversity heightens the impact of later-life caregiving stress on telomere length and inflammation, Psychosom. Med. 73 (2011) 16–22.
[16] H. Wu, J. Wang, J.T. Cacioppo, R. Glaser, J.K. Kiecolt-Glaser, W.B. Malarkey, Chronic stress associated with spousal caregiving of patients with Alzheimer's dementia is associated with down-regulation of B-lymphocyte GH mRNA, J. Gerontol. Series A, Biolog. Sci. Med. Sci. 54 (1999) M212–M215.
[17] J.M. Bennett, C.P. Fagundes, J.K. Kiecolt-Glaser, The chronic stress of caregiving accelerates the natural aging of the immune system, in: A.C. Phillips, J.M. Lord, J. A. Bosch (Eds.), Immunosenescence: Psychological and Behavioral Determinants, Spinger, New York, 2013.
[18] S. Robinson-Whelen, Y. Tada, R.C. MacCallum, L. McGuire, J.K. Kiecolt-Glaser, Long-term caregiving: what happens when it ends? J. Abnorm. Psychol. 110 (2001) 573–584.
[19] S.J. Wilson, A.C. Padin, B.E. Bailey, et al., Spousal bereavement after dementia caregiving: a turning point for immune health, Psychoneuroendocrinology 118 (2020).
[20] L.M. Christian, S.J. Wilson, A.A. Madison, et al., Understanding the health effects of caregiving stress: new directions in molecular aging, Ageing Res. Rev. 92 (2023) 102096.
[21] J.K. Kiecolt-Glaser, R. Glaser, E.C. Strain, et al., Modulation of cellular immunity in medical students, J. Behav. Med. 9 (1986) 311–320.
[22] J.K. Kiecolt-Glaser, M.A. Belury, R. Andridge, W.B. Malarkey, R. Glaser, Omega-3 supplementation lowers inflammation and anxiety in medical students: a randomized controlled trial, Brain Behav. Immun. 25 (2011) 1725–1734.
[23] J.K. Kiecolt-Glaser, W. Garner, C. Speicher, G.M. Penn, J. Holliday, R. Glaser, Psychosocial modifiers of immunocompetence in medical students, Psychosom. Med. 46 (1984) 7–14.
[24] R. Glaser, G.R. Pearson, R.H. Bonneau, B.A. Esterling, C. Atkinson, J.K. Kiecolt-Glaser, Stress and the memory T-cell response to Epstein-Barr virus in healthy medical students, Health Psychol. 12 (1993) 435–442.
[25] C.M. Alfano, I. Imayama, M.L. Neuhouser, et al., Fatigue, inflammation, and omega-3 and -6 fatty acid intake among breast cancer survivors, J. Clin. Oncol. 30 (12) (2012) 1280–1287.
[26] C.M. Alfano, J. Peng, R.R. Andridge, et al., Inflammatory cytokines and comorbidity development in breast cancer survivors versus noncancer controls: evidence for accelerated aging? J. Clin. Oncol. 35 (2) (2017) 149.
[27] B.L. Andersen, J.K. Kiecolt-Glaser, R. Glaser, A biobehavioral model of cancer stress and disease course, Am. Psychol. 49 (1994) 389–404.
[28] M.A. Belury, R.M. Cole, R. Andridge, et al., Erythrocyte long-chain omega-3 fatty acids are positively associated with lean mass and grip strength in women with recent diagnoses of breast cancer, J. Nutr. 151 (8) (2021) 2125–2133.
[29] J.M. Bennett, R. Glaser, R.R. Andridge, J. Peng, W.B. Malarkey, J.K. Kiecolt-Glaser, Long lasting effects of smoking: breast cancer survivors' inflammatory responses to acute stress differ by smoking history, Psychoneuroendocrinology 38 (2) (2013) 179–187.
[30] H.M. Derry, L.M. Jaremka, J.M. Bennett, et al., Yoga and self-reported cognitive problems in breast cancer survivors: a randomized controlled trial, Psycho Oncol. 24 (8) (2015) 958–966.
[31] C.P. Fagundes, J.M. Bennett, C.M. Alfano, et al., Social support and socioeconomic status interact to predict Epstein-Barr virus latency in women

awaiting diagnosis or newly diagnosed with breast cancer, Health Psychol. 31 (1) (2012) 11–19.
[32] C.P. Fagundes, R. Glaser, C.M. Alfano, et al., Fatigue and herpesvirus latency in women newly diagnosed with breast cancer, Brain Behav. Immun. 26 (2012) 394–400.
[33] C.P. Fagundes, R. Glaser, W.B. Malarkey, J.K. Kiecolt-Glaser, Childhood adversity and herpesvirus latency in breast cancer survivors, Health Psychol. 32 (3) (2013) 337–344.
[34] C.P. Fagundes, L.M. Jaremka, W.B. Malarkey, J.K. Kiecolt-Glaser, Attachment style and respiratory sinus arrhythmia predict post-treatment quality of life in breast cancer survivors, Psycho Oncol. 23 (7) (2014) 820–826.
[35] C.P. Fagundes, M.E. Lindgren, J.K. Kiecolt-Glaser, Psychoneuroimmunology and cancer: incidence, progression, and quality of life, in: B.I. Carr, J. Steel (Eds.), Psychological Aspects of Cancer, Springer US, Boston, MA, 2013, pp. 1–11.
[36] C.P. Fagundes, M.E. Lindgren, C.L. Shapiro, J.K. Kiecolt-Glaser, Child maltreatment and breast cancer survivors: social support makes a difference for quality of life, fatigue and cancer stress, Eur. J. Cancer 48 (2012) 728–736.
[37] C.P. Fagundes, D.M. Murray, B.S. Hwang, et al., Sympathetic and parasympathetic activity in cancer-related fatigue: more evidence for a physiological substrate in cancer survivors, Psychoneuroendocrinology 36 (8) (2011) 1137–1147.
[38] R. Glaser, D.A. Padgett, M.L. Litsky, et al., Stress-associate changes in the steady-state expression of latent Epstein-Barr virus: implications for chronic fatigue syndrome and cancer, Brain Behav. Immun. 19 (2005) 91–103.
[39] K.L. Heffner, T.J. Loving, T.F. Robles, J.K. Kiecolt-Glaser, Examining psychosocial factors related to cancer incidence and progression: in search of the silver lining, Brain Behav. Immun. 17 (Suppl 1) (2003) S109–S111.
[40] S. Hughes, L.M. Jaremka, C.M. Alfano, et al., Social support predicts inflammation, pain, and depressive symptoms: longitudinal relationships among breast cancer survivors, Psychoneuroendocrinology 42 (2014) 38–44.
[41] L.M. Jaremka, J. Peng, R. Bornstein, et al., Cognitive problems among breast cancer survivors: loneliness enhances risk, Psycho Oncol. 23 (12) (2014) 1356–1364.
[42] J. KIECOLT-GLASER, R. GLASER, Psychoneuroimmunology and cancer: fact or fiction? Eur. J. Cancer 35 (11) (1999) 1603–1607.
[43] J.K. Kiecolt-Glaser, J.M. Bennett, R.R. Andridge, et al., Yoga's impact on inflammation, mood, and fatigue in breast cancer survivors: a randomized controlled trial, J. Clin. Oncol. (2014).
[44] J.K. Kiecolt-Glaser, M. Chee, Personality, stress and cancer: a re-examination, Psychol. Inq. 2 (1991) 249–251.
[45] J.K. Kiecolt-Glaser, R. Glaser, Psychoneuroimmunology and cancer: fact or fiction? Eur. J. Cancer 11 (1999) 1603–1607.
[46] J.K. Kiecolt-Glaser, M. Renna, J. Peng, et al., Breast cancer survivors' typhoid vaccine responses: chemotherapy, obesity, and fitness make a difference, Brain Behav. Immun. 103 (2022) 1–9.
[47] J.K. Kiecolt-Glaser, T.F. Robles, K.L. Heffner, T.J. Loving, R. Glaser, Psycho-oncology and cancer: psychoneuroimmunology and cancer, Ann. Oncol. 13 (Suppl 4) (2002) 165–169.
[48] M.E. Lindgren, C.P. Fagundes, C.M. Alfano, et al., Beta-blockers may reduce intrusive thoughts in newly diagnosed cancer patients, Psycho Oncol. 22 (8) (2013) 1889–1894.
[49] A.A. Madison, J. Peng, M.R. Shrout, et al., Distress trajectories in black and white breast cancer survivors: from diagnosis to survivorship, Psychoneuroendocrinology 131 (2021).
[50] A.A. Madison, B. Way, K.G. Ratner, et al., Typhoid vaccine does not impact feelings of social connection or social behavior in a randomized crossover trial among middle-aged female breast cancer survivors, Brain Behav. Immun. 107 (2023) 124–131.
[51] A.A. Madison, A. Woody, B. Bailey, et al., Cognitive problems of breast cancer survivors on proton pump inhibitors, J. Cancer Survivorship 14 (2) (2020) 226–234.
[52] A.C. Padin, S.J. Wilson, B.E. Bailey, et al., Physical activity after breast cancer surgery: does depression make exercise feel more effortful than it actually is? Int. J. Behav. Med. 26 (3) (2019) 237–246.
[53] M.E. Renna, M.R. Shrout, A.A. Madison, et al., Within-person changes in cancer-related distress predict breast cancer survivors' inflammation across treatment, Psychoneuroendocrinology 121 (2020).
[54] M.E. Renna, M.R. Shrout, A.A. Madison, et al., Fluctuations in depression and anxiety predict dysregulated leptin among obese breast cancer survivors, J. Cancer Survivorship 15 (6) (2021) 847–854.
[55] M.E. Renna, M.R. Shrout, A.A. Madison, et al., Worry and rumination in breast cancer patients: perseveration worsens self-rated health, J. Behav. Med. 44 (2) (2021) 253–259.
[56] M.R. Shrout, M.E. Renna, A.A. Madison, et al., Breast cancer survivors' satisfying marriages predict better psychological and physical health: a longitudinal comparison of satisfied, dissatisfied, and unmarried women, Psycho Oncol. 30 (2021) 699–707.
[57] M.R. Shrout, M.E. Renna, A.A. Madison, et al., Relationship satisfaction predicts lower stress and inflammation in breast cancer survivors: a longitudinal study of within-person and between-person effects, Psychoneuroendocrinology 118 (2020).
[58] J.P. Gouin, C.S. Carter, H. Pournajafi-Nazarloo, et al., Marital behavior, oxytocin, vasopressin, and wound healing, Psychoneuroendocrinology 35 (2010) 1082–1090.
[59] J.P. Gouin, R. Glaser, T.J. Loving, et al., Attachment avoidance predicts inflammatory responses to marital conflict, Brain Behav. Immun. 23 (7) (2009) 898–904.
[60] J.E. Graham, R. Glaser, T.J. Loving, W.B. Malarkey, J.R. Stowell, J.K. Kiecolt-Glaser, Cognitive word use during marital conflict and increases in proinflammatory cytokines, Health Psychol. 28 (5) (2009) 621–630.
[61] K.L. Heffner, J.K. Kiecolt-Glaser, T.J. Loving, R. Glaser, W.B. Malarkey, Spousal support satisfaction as a modifier of physiological responses to marital conflict in younger and older couples, J. Behav. Med. 27 (3) (2004) 233–254.
[62] K.L. Heffner, T.J. Loving, J.K. Kiecolt-Glaser, L.K. Himawan, R. Glaser, W. B. Malarkey, Older spouses' cortisol responses to marital conflict: associations with demand/withdraw communication patterns, J. Behav. Med. 29 (4) (2006) 317–325.
[63] L.M. Jaremka, M.A. Belury, R.R. Andridge, et al., Novel links between troubled marriages and appetite regulation: marital distress, ghrelin, and diet quality, Clin. Psychol. Sci. 3 (2015) 1–13.
[64] L.M. Jaremka, R. Glaser, W.B. Malarkey, J.K. Kiecolt-Glaser, Marital distress prospectively predicts poorer cellular immune function, Psychoneuroendocrinology 38 (11) (2013) 2713–2719.
[65] J.K. Kiecolt-Glaser, L.D. Fisher, P. Ogrocki, J.C. Stout, C.E. Speicher, R. Glaser, Marital quality, marital disruption, and immune function, Psychosom. Med. 49 (1) (1987) 13–34.
[66] J.K. Kiecolt-Glaser, R. Glaser, J.T. Cacioppo, et al., Marital conflict in older adults: endocrinological and immunological correlates, Psychosom. Med. 59 (4) (1997) 339–349.
[67] J.K. Kiecolt-Glaser, R. Glaser, J.T. Cacioppo, W.B. Malarkey, Marital stress: immunologic, neuroendocrine, and autonomic correlates, Ann. N. Y. Acad. Sci. 840 (1998) 649–655.
[68] J.K. Kiecolt-Glaser, L. Jaremka, R. Andridge, et al., Marital discord, past depression, and metabolic responses to high-fat meals: interpersonal pathways to obesity, Psychoneuroendocrinology 52 (2015) 239–250.
[69] J.K. Kiecolt-Glaser, S. Kennedy, S. Malkoff, L. Fisher, C.E. Speicher, R. Glaser, Marital discord and immunity in males, Psychosom. Med. 50 (1988) 213–229.
[70] J.K. Kiecolt-Glaser, T.J. Loving, J.R. Stowell, et al., Hostile marital interactions, proinflammatory cytokine production, and wound healing, Arch. Gen. Psychiatr. 62 (2005) 1377–1384.
[71] J.K. Kiecolt-Glaser, W.B. Malarkey, M. Chee, et al., Negative behavior during marital conflict is associated with immunological down-regulation, Psychosom. Med. 55 (1993) 395–409.
[72] J.K. Kiecolt-Glaser, T. Newton, J.T. Cacioppo, R.C. MacCallum, R. Glaser, W. B. Malarkey, Marital conflict and endocrine function: are men really more physiologically affected than women? J. Consult. Clin. Psychol. 64 (1996) 324–332.
[73] J.K. Kiecolt-Glaser, S.J. Wilson, M. Bailey, et al., Marital distress, depression, and a leaky gut: translocation of bacterial endotoxin as a pathway to inflammation, Psychoneuroendocrinolgy 98 (2018) 52–60.
[74] J.K. Kiecolt-Glaser, S.J. Wilson, M.L. Bailey, et al., Marital distress, depression, and a leaky gut: translocation of bacterial endotoxin as a pathway to inflammation, Psychoneuroendocrinology 98 (2018) 52–60.
[75] T.J. Loving, K.L. Heffner, J.K. Kiecolt-Glaser, R. Glaser, W.B. Malarkey, Stress hormone changes and marital conflict: spouses' relative power makes a difference, J. Marriage Fam. 66 (3) (2004) 595–612.
[76] T.L. Newton, J.K. Kiecolt-Glaser, Hostility and erosion of marital quality during early marriage, J. Behav. Med. 18 (1995) 601–619.
[77] T.L. Newton, J.K. Kiecolt-Glaser, R. Glaser, W.B. Malarkey, Conflict and withdrawal during marital interaction: the roles of hostility and defensiveness, Pers. Soc. Psychol. Bull. 21 (1995) 512–524.
[78] T.F. Robles, V.A. Shaffer, W.B. Malarkey, J.K. Kiecolt-Glaser, Positive behaviors during marital conflict: influences on stress hormones, J. Soc. Pers. Relat. 23 (2) (2006) 305–325.
[79] S.J. Wilson, R. Andridge, J. Peng, B.E. Bailey, W.B. Malarkey, J.K. Kiecolt-Glaser, Thoughts after marital conflict and punch biopsy wounds: age-graded pathways to healing, Psychoneuroendocrinology 85 (2017) 6–13.
[80] S.J. Wilson, B.E. Bailey, W.B. Malarkey, J.K. Kiecolt-Glaser, Linking marital support to aging-related biomarkers: both age and marital quality matter, J. Gerontol. B Psychol. Sci. Soc. Sci. 76 (2) (2021) 273–282.
[81] S.J. Wilson, L.M. Jaremka, C.P. Fagundes, et al., Shortened sleep fuels inflammatory responses to marital conflict: emotion regulation matters, Psychoneuroendocrinology 79 (2017) 74–83.
[82] S.J. Wilson, J. Peng, R. Andridge, et al., For better and worse? The roles of closeness, marital behavior, and age in spouses' cardiometabolic similarity, Psychoneuroendocrinology 120 (2020).
[83] R. Boice, Professors as Writers: A Self-Help Guide to Productive Writing, New Forums Press, Stillwater, OK, 1990.
[84] L.M. Christian, J. Koenig, D.P. Williams, G. Kapuku, J.F. Thayer, Impaired vasodilation in pregnant African Americans: preliminary evidence of potential antecedents and consequences, Psychophysiology 58 (1) (2021) e13699.
[85] L.M. Christian, R. Glaser, K. Porter, J.D. Iams, Stress-induced inflammatory responses in women: effects of race and pregnancy, Psychosom. Med. 75 (7) (2013) 658–669.
[86] L.M. Christian, C.M. Stoney, Social support versus social evaluation: unique effects on vascular and myocardial response patterns, Psychosom. Med. 68 (6) (2006) 914–921.
[87] M.H. Burleson, W.B. Malarkey, J.T. Cacioppo, et al., Postmenopausal hormone replacement: effects on autonomic, neuroendocrine, and immune reactivity to brief psychological stressors, Psychosom. Med. 60 (1) (1998) 17–25.

[88] J.T. Cacioppo, M.H. Burleson, K.M. Poehlmann, et al., Autonomic and neuroendocrine responses to mild psychological stressors: effects of chronic stress on older women, Ann. Behav. Med. 22 (2) (2000) 140–148.
[89] J.T. Cacioppo, J.K. Kiecolt-Glaser, W.B. Malarkey, et al., Autonomic and glucocorticoid associations with the steady-state expression of latent Epstein-Barr virus, Horm. Behav. 42 (1) (2002) 32–41.
[90] R. Glaser, E.C. Strain, K. Tarr, J.E. Holliday, R.L. Donnerberg, J.K. Kiecolt-Glaser, Changes in Epstein-Barr virus antibody titers associated with aging, Exp. Biol. Med. 179 (1985) 352–355.
[91] R. Glaser, D.K. Pearl, J.K. Kiecolt-Glaser, W.B. Malarkey, Plasma cortisol levels and reactivation of latent Epstein-Barr virus in response to examination stress, Psychoneuroendocrinology 19 (1994) 765–772.
[92] R. Glaser, G.R. Pearson, J.F. Jones, et al., Stress-related activation of Epstein-Barr virus, Brain Behav. Immun. 5 (1991) 219–232.
[93] J.K. Kiecolt-Glaser, C.E. Speicher, J.E. Holliday, R. Glaser, Stress and the transformation of lymphocytes by Epstein-Barr virus, J. Behav. Med. 7 (1984) 1–12.
[94] L.M. Christian, A.D. Iams, K. Porter, R. Glaser, Epstein-Barr virus reactivation during pregnancy and postpartum: effects of race and racial discrimination, Brain Behav. Immun. 26 (8) (2012) 1280–1287.
[95] L.M. Christian, K. Porter, Longitudinal changes in serum proinflammatory markers across pregnancy and postpartum: effects of maternal body mass index, Cytokine 70 (2) (2014) 134–140.
[96] R. Glaser, J.K. Kiecolt-Glaser, W.B. Malarkey, J.F. Sheridan, The influence of psychological stress on the immune response to vaccines, Ann. N. Y. Acad. Sci. 840 (1998) 656–663.
[97] R. Glaser, J.F. Sheridan, W.B. Malarkey, R.C. MacCallum, J.K. Kiecolt-Glaser, Chronic stress modulates the immune response to a pneumococcal pneumonia vaccine, Psychosom. Med. 62 (2000) 804–807.
[98] J.K. Kiecolt-Glaser, R. Glaser, S. Gravenstein, W.B. Malarkey, J. Sheridan, Chronic stress alters the immune response to influenza virus vaccine in older adults, Proc. Natl. Acad. Sci. U. S. A. 93 (1996) 3043–3047.
[99] R. Glaser, T. Robles, J. Sheridan, W.B. Malarkey, J.K. Kiecolt-Glaser, Mild depressive symptoms are associated with amplified and prolonged inflammatory responses following influenza vaccination in older adults, Arch. Gen. Psychiatr. 60 (2003) 1009–1014.
[100] L.M. Christian, K. Porter, E. Karlsson, S. Schultz-Cherry, J.D. Iams, Serum proinflammatory cytokine responses to influenza virus vaccine among women during pregnancy versus non-pregnancy, Am. J. Reprod. Immunol. 70 (1) (2013) 45–53.
[101] L.M. Christian, J.D. Iams, K. Porter, R. Glaser, Inflammatory responses to trivalent influenza virus vaccine among pregnant women, Vaccine 29 (48) (2011) 8982–8987.
[102] L.M. Christian, A. Franco, J.D. Iams, J. Sheridan, R. Glaser, Depressive symptoms predict exaggerated inflammatory responses to an in vivo immune challenge among pregnant women, Brain Behav. Immun. 24 (1) (2010) 49–53.
[103] L.M. Christian, K. Porter, E. Karlsson, S. Schultz-Cherry, Proinflammatory cytokine responses correspond with subjective side effects after influenza virus vaccination, Vaccine 33 (29) (2015) 3360–3366.
[104] L.M. Christian, C. Beverly, A.M. Mitchell, et al., Effects of prior influenza virus vaccination on maternal antibody responses: implications for achieving protection in the newborns, Vaccine 35 (39) (2017) 5283–5290.
[105] E.H. Blackburn, E.S. Epel, J. Lin, Human telomere biology: a contributory and interactive factor in aging, disease risks, and protection, Science 350 (6265) (2015) 1193–1198.
[106] J.K. Kiecolt-Glaser, E.S. Epel, M.A. Belury, et al., Omega-3 fatty acids, oxidative stress, and leukocyte telomere length: a randomized controlled trial, Brain Behav. Immun. 28 (2013) 16–24.
[107] J.K. Kiecolt-Glaser, R. Glaser, Psychological stress, telomeres, and telomerase, Brain Behav. Immun. 24 (4) (2010) 529–530.
[108] J.K. Kiecolt-Glaser, L.M. Jaremka, H.M. Derry, R. Glaser, Telomere length: a marker of disease susceptibility? Brain Behav. Immun. 34 (2013) 29–30.
[109] A.M. Mitchell, J.M. Kowalsky, E.S. Epel, J. Lin, L.M. Christian, Childhood adversity, social support, and telomere length among perinatal women, Psychoneuroendocrinology 87 (2018) 43–52.
[110] J.K. Kiecolt-Glaser, S.J. Wilson, A. Madison, Marriage and gut (microbiome) feelings: tracing novel dyadic pathways to accelerated aging, Psychosom. Med. 81 (8) (2019) 704–710.
[111] J.K. Kiecolt-Glaser, S.J. Wilson, M.R. Shrout, et al., The gut reaction to couples' relationship troubles: a route to gut dysbiosis through changes in depressive symptoms, Psychoneuroendocrinology 125 (2021).
[112] A. Madison, J.K. Kiecolt-Glaser, Stress, depression, diet, and the gut microbiota: human-bacteria interactions at the core of psychoneuroimmunology and nutrition, Curr. Opinion Behav. Sci. 28 (2019) 105–110.
[113] A.A. Madison, J.K. Kiecolt-Glaser, Stress, depression, diet, and the gut microbiota: human-bacteria interactions at the core of psychoneuroimmunology and nutrition, Curr. Opinion Behav. Sci. 28 (2019) 105–110.
[114] A.A. Madison, J.K. Kiecolt-Glaser, The gut microbiota and nervous system: age-defined and age-defying, Semin. Cell Dev. Biol. 116 (2021) 98–107.
[115] L.M. Christian, J.D. Galley, E.M. Hade, S. Schoppe-Sullivan, C.K. Dush, M. T. Bailey, Gut microbiome composition is associated with temperament during early childhood, Brain Behav. Immun. 45 (2015) 118–127.
[116] J.D. Galley, M. Bailey, C. Kamp Dush, S. Schoppe-Sullivan, L.M. Christian, Maternal obesity is associated with alterations in the gut microbiome in toddlers, PLoS One 9 (11) (2014) e113026.
[117] D.R. Delgadillo, S.D. Pressman, L.M. Christian, J.D. Galley, M.T. Bailey, Associations between gut microbes and social behavior in healthy 2-year-old children, Psychosom. Med. 84 (7) (2022) 749–756.
[118] L.M. Christian, S.W. Cole, T. McDade, et al., A biopsychosocial framework for understanding sexual and gender minority health: a call for action, Neurosci. Biobehav. Rev. 129 (2021) 107–116.
[119] L.M. Christian, J.K. Kiecolt-Glaser, S.W. Cole, et al., Psychoneuroimmunology in multiple myeloma and autologous hematopoietic stem cell transplant: opportunities for research among patients and caregivers, Brain Behav. Immun. 119 (2024) 507–519.
[120] A.E. Rosko, M.I. Elsaid, J. Woyach, et al., Determining the relationship of p16 (INK4a) and additional molecular markers of aging with clinical frailty in hematologic malignancy, J Cancer Surviv (2024).