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Post-Traumatic Bio-Behavioral Rehabilitation of Adult Female Victims

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Abstract

Objective: To determine if low resting basal AM cortisol and flat diurnal cortisol slope that has been reported in female abuse victims, which is dysregulated in the same way in female violent perpetrators, could be corrected and if healthier diurnal cortisol patterns are associated with less aggression in adult female victims. **Design and Methods**: A non-experimental, naturalistic study evaluated if bio-behavioral rehabilitation could occur for females living in a Delaware homeless mission and participating in their programs. Basal salivary cortisol (AM, PM & slope), aggression, neurological conditions, general health, alcohol use, having been a victim of abuse, religion, spirituality and forgiveness were evaluated over one month between 2018 and 2019. **Results**: T tests revealed significant improvement in mean cortisol (AM, PM & slope), aggression, emotional/ behavioral dyscontrol, and health over one month while participating in the mission's programs. Paired t-tests however were only significant for aggression and health. Healthier cortisol was significantly correlated with greater time since last alcohol, greater time since last abuse, less aggression, better health and greater religion, spirituality and forgiveness. **Conclusion**: Community programs could be cost effective methods of post-traumatic bio-behavioral rehabilitation. Forgiveness may play a critical role for abuse victims. A larger sample and more settings are needed, although these findings are promising.

Introduction

Female abuse victims disproportionately make up homeless populations. They can cycle in and out of prisons to homelessness due to multiple related problems[1] including having been a victim of adverse childhood experiences (ACEs) such as childhood sexual abuse (CSA),[2,3] alcohol misuse,[4,5] and traumatic brain injuries (TBI),[6,7] which may all be risk factors for committing violent crimes.[8–12] Importantly, we are not implying that victims of abuse are to be blamed, but rather that we recognize their unresolved trauma may result in risk factors for behaviors that need early detection and evidence-based prevention interventions.

ACEs could result in poor bio-behavioral health outcomes throughout the lifespan.[13–16] It is therefore critical to intervene to prevent or mitigate these outcomes. However, little effort seems to be focused on addressing life-long consequences of stress after traumatized children become adults. Further study is needed to support evidence-based interventions to enhance resilience and brain plasticity in adult female victims as most research has been with children.

The stress hormone cortisol can be dysregulated later in life among victims of abuse.[17] Cortisol is a primary product of the hypothalamic-pituitary-adrenal (HPA) axis, a key component of the stress response. Normally, a resting basal cortisol diurnal pattern shows a peak in the morning and then a gradual decrease throughout the day, creating a steep diurnal cortisol slope between morning (AM) and evening (PM). Stress such as from CSA can precipitate long-lasting HPA axis dysfunction of the psychobiological stress system resulting in cortisol dysregulation.[18]

HPA axis dysregulation, including low AM cortisol and flatter slope, have been reported in both female victims[19,20] and perpetrators of violence.[9,10,17] Women with greater intimate partner violence victimization had a flatter cortisol slope compared to women with less of victimization.[21] Criminals with greater abuse histories than controls have low diurnal cortisol.[22] Low AM cortisol was related to trauma symptoms in women[23] and aggression in adolescents.[24,25] Importantly, low AM cortisol and flatter slope were only related to recently committing a violent crime, but not past lifetime violent crime history of those currently incarcerated for a nonviolent crime,[10] suggesting that cortisol dysregulation may normalize as violent behavior decreases. Which occurred first, and what contributed to these changes is unknown. It is not known if or how dysregulated HPA function could be rehabilitated in adult females, or if rehabilitated HPA regulation could decrease violence or aggression.

There have been numerous cortisol studies, yet very few evaluate interventions to improve diurnal cortisol regulation or bio-behavioral outcomes of adult victims. Interventions to improve biological health of children who experienced ACEs show promise.[26] However, studies have not determined if cortisol dysregulation in adult females can be corrected, how to correct it, or if behavior improves if cortisol improves. It is critical to study this to establish evidence-based interventions to decrease the exorbitant human and financial cost.[27–29]

Homelessness is a serious problem globally in even the wealthiest nations.[30] Homelessness in the U.S. increased by 0.7% from 2016 to 2017[31] and by 3% from 2018 to 2019, the third straight year of increases.[32] Between 38-42% of the homeless in the region where this study was conducted were female.[33,34]

Social support could impact physiological responses to acute stress,[35] but it is not known if it can improve cortisol diurnal patterns associated with past stress. There is evidence however, to support the hypothesis that social support could play a role in normalizing a dysregulated cortisol diurnal rhythm.[36] Social support and other resources from homeless shelters, often run by faith-based communities,[37] could promote resilience in victims of ACEs and prevent long-term post-traumatic sequelae.[2,38–41] It is critical to study community supportive resources to determine if they can help promote resilience to HPA axis dysregulation in females.

The purpose of this study was to test the hypothesis that homeless women would have higher AM basal cortisol, steeper cortisol diurnal slope, and less bio-behavioral outcomes such as alcohol use, aggression and violence over a one-month time frame living in a supportive shelter and participating in their programs. We examined females for resting basal AM and PM salivary cortisol, past abuse, health, alcohol use, aggression, violence and length of time living in the

homeless mission and attending their programs. Because this is a faith-based setting, faith-based measures were also assessed. An additional aim was to test the hypothesis that the main variables would be correlated with cortisol.

Methods

This non-experimental, naturalistic, longitudinal pilot study evaluated women (N =21) living in a faith-based homeless mission in the Mid-Atlantic region of the United States over one month. Women may obtain housing at this mission for a night or apply to be in the longer-term residential program. Homeless women may live at this mission for up to two years if they follow the rules and participate in the mission's programs to help them become independent. All women living in the mission were given the opportunity to be in the study. The response rate was 80%. Women were only included in the study if they were in the longer-term residential program where they could be followed over time, over age 18 years, not on medications such as steroids that can influence cortisol levels, and not pregnant or having other medical conditions that could influence cortisol levels.

The mission statement of the setting is to serve the homeless, addicted and impoverished through Christ-centered programs to meet their spiritual, social and physical needs. Their primary goal is to restore people to a right relationship with God, their families and society. Each resident woman receives individual counseling and group education and training to be equipped to become a productive member of society. The women participate in daily programs and share responsibilities such as cooking and cleaning. The programs offer Bible-based rehabilitation for a fresh start.[42] The Women's Discipleship Lifechange Program consists of 2- 4 hours of Biblically-based individual counseling per week, daily morning and evening chapel services, recreation, education enhancement until achieving high school competency, and 6-8 hours of classes per week. Class topics include the Christian lifestyle based on the Bible, spiritual disciplines (prayer, Bible study, worship, giving), addiction rehabilitation, resisting temptation i.e. substance use, finances and budgeting, nutrition, work ethic, relationship boundaries, anger management, abuse, career planning and numerous other Bible-related topics. Classes and counseling are coordinated together.

The University of Delaware Institutional Review Board (IRB) approved the study and all procedures were carried out in accordance with the protocol. All participants were able to read and signed informed consent forms after they passed a brief quiz assuring that they understood the consent form. All interviews were private, participants' information is confidential and was not reported to the mission staff to assure that participants felt safe providing accurate information. Confidentiality could only be broken if a participant posed a threat to themselves or others, which did not occur.

Measures

Alcohol use was measured with the Alcohol Use Disorders Identification Test (AUDIT), a valid, reliable measure consistent with other alcohol use scales (Cronbach's alpha.67-.88).[43–45] Timeline Followback (TLFB) was also used to evaluate alcohol use retrospectively.[46–49] Self-reports have been reliable.[50] Retest reliability was r=.73-1. for outpatients with severe mental illness.[51]

Violence propensity was evaluated with the Buss-Perry Aggression Questionnaire, (BPAQ) a valid reliable measure of violence propensity.[11,52] This is a 29-item Likert scale. Internal consistency for subscales and total score range from .72 to .89; retest reliability over 9 weeks ranged from.72 to .80.[52] Higher scores indicate greater violence propensity.

Adverse experiences in childhood (ACE) and adulthood were investigated with Muenzenmaier's scale,[53,54] slightly modified to assess frequency and severity of sexual and physical abuse before and after age 18. Validity and reliability was reported in tests of women of similar age, ethnic background, and education including mentally ill women and female prisoners.[9,10,53,54] Self-reports were verified by evidence of injuries with physical examinations. Higher scores indicate greater frequency and severity of abuse.

Salivary Cortisol was evaluated similar to previous studies for comparison,[9,10,17] immediately upon awakening (AM) before they ate, drank, smoked or exercised, and again before dinner (PM). Participants were asked not to eat, drink anything other than water, smoke or exercise between their noon meal and the PM saliva collection. AM and PM were re-assessed on a second day within one week of initial measures[55] and again after one month over two days within one week. An average was computed for the two AM cortisol measures at the initial collection and again after one month. The average was also calculated for the two PM measurements at both time periods. Cortisol slope was determined by subtracting PM average from AM average at each time period. Variables that could impact cortisol are controlled as participants all lived in the same environment, ate the same meals at the same time, were exposed to the same light, had the same sleep-wake routines, and the same homeless socio-economic status. Saliva samples were collected with passive drool then transported on ice to freezer storage until they were assayed in a University of Delaware lab with commercially available immunoassay kits without modification to the manufacturer's recommended protocols. All assays have been validated as outlined in the product inserts (see www.salimetrics.com).

Religion/ Spirituality (R/S) was measured with the Duke University Religion Index (DUREL)[56] because the setting is faith-based. The DUREL has been used for many years in mental health studies.[57,58] Test-retest reliability ($r = 0.91$), internal consistency (Cronbach's $\alpha = 0.78–0.91$), convergent validity with other R/S measures ($r's = 0.71–0.86$), and factor structure have been confirmed in numerous studies.[59] Higher scores indicate greater R/S.

Forgiveness was measured with the Heartland Forgiveness Scale (HFS), an 18-item, self-report questionnaire to assess dispositional forgiveness (general tendency to forgive).[60] The HFS has three subscales: tendency to forgive self, other people, and situations beyond anyone's control (natural disaster). Internal consistency Cronbach alpha was HFS self, .72 - .76; other, .78 - .81; and situations, .77 - .82; test-retest three-week stability was self, r=.72; other, r=.73; situations, r=.77; and 9-month stability was self, r=.69; other, r=.69; situations, r=.68.[60] Higher scores indicate greater forgiveness.

Health was measured with the Optum™ SF-12v2® Health Survey, a short version of the SF-36v2® of the Medical Outcomes Study[61,62] with 12 questions for self-report of functional health and well-being.[63] It is a practical, reliable, valid measure of physical and mental health that takes 2-3 minutes to complete and is widely used to measure population health[64] and health-related quality of life in the Medicaid population with physical and behavioral conditions in similar cohorts.[65] Participants also underwent a brief medical history and physical examination to

validate self-reports and detect evidence of abuse and conditions that could impact results. Higher SF-12v2® scores indicate better health.

Neurological conditions such as traumatic brain injury (TBI) were assessed with the reliable, validated,[66,67] physical examinations by a nurse specialist and Quality of Life in Neurological Disorders (Neuro QOL)[68–71] short forms, which measure physical, mental, and social effects of neurological conditions from the Patient-Reported Outcomes Measurement Information System (PROMIS). Neuro-QOL Emotional and Behavioral Dyscontrol with internal consistency, (Cronbach α) 0.93 can be completed in 2 minutes.[68] Higher scores indicate greater emotional and behavioral dyscontrol.

Statistical Analyses

Data were analyzed with IBM SPSS Statistics 26. Frequencies, distributions and descriptive statistics and means were computed for each variable to compare measures at the initial interview to measures at a one-month follow up. Differences in variables between the initial measures and one-month follow up were analyzed with student t tests and paired t tests. Pearson correlations were also analyzed to detect relationships between the main variables and cortisol.

Results

Participants were females aged 22 to 59 years. Six identified as Caucasian, 12 African American, 1 Hispanic/ Latino and 2 reporting mixed racial ethnic background. This is consistent with the ratio of racial/ ethnic backgrounds of women at this setting. Fourteen reported that they had been abused as children and 14 reported having been a victim of abuse after age 18. Thirteen were being treated for a mental health condition (e.g. bipolar disorder, anxiety, depression). Fourteen had a neurological history, primarily TBI. Six sustained at least one TBI before becoming homeless; 3 had a history of more than one TBI. Four admitted that they had been arrested and incarcerated in the past. Four reported having committed a violent act for which they were never caught or convicted.

T tests revealed significant improvement in mean cortisol (AM p=.010, PM p=.000, slope p=.033); aggression (p=.000); Emotional and Behavioral Dyscontrol (p=.000) and health (p=.000) over one month while participating in the mission's programs. Paired t-tests however were only significant for lower aggression (p=.015) and better health (p=.002). Steeper cortisol slope correlated with greater time since last alcohol (r=.925, p=.000) and time since last abuse (r=.904, p=.000). Higher AM cortisol correlated with greater time since last alcohol (r=.931, p=.000) and time since last abuse (r=.911, p=.000). Lower PM cortisol correlated with less aggression (r=.648, p=.043); better health (r=-.678, r=.003); greater religious attendance (r=-.650, p=.002); private religious activity (r=-697, p=.001); intrinsic religiosity (r=-.741, p=.000); and forgiveness of self (r-.-755, p=.000), forgiveness of others (r=-.751, p=000), and forgiveness of situations (r=-.762, p=.000).

Discussion

Aggression decreased and health improved over one month while living at the mission and participating in their programs. A healthier diurnal cortisol pattern significantly correlated with better health, greater time since last alcohol, greater time last abuse, less aggression, and greater religion/ spirituality and forgiveness. Forgiveness may play an important role in victims'

rehabilitation.[2] These findings suggest that living in a supportive homeless mission and participating in their faith-based programs may attenuate the bio-behavioral concomitants of chronic stress.

The majority reported no intention of acting upon aggression measured in surveys. More time since the last victimization by abuse correlated with a healthier cortisol pattern, which is encouraging for the future of abuse victims.

Longer time since last alcohol use also correlated with a healthier cortisol pattern. Evidence suggests that alcohol directly stimulates the HPA axis and effects glucocorticoid receptors that contribute to the development of alcohol use disorders, their severity, chronicity, progression and relapse risk.[72]

Limitations

Causation cannot be determined by this non-experimental design. Future research should study more participants prospectively over a longer period of time. Because homeless shelters can vary depending upon geographical region, faith-based beliefs, leadership, management, and funding sources, further study is needed in more settings.

Conclusions

Based on these correlations, those who were abused most recently, used alcohol most recently, had greater aggression, poorer health and lower religion and forgiveness had the most unhealthy cortisol pattern, which is likely related to past abuse and violent behavior.[9,10,17] Further study is needed with larger more diverse populations and more settings to determine if faith-based missions could impact cortisol by providing protection from abuse, restricting alcohol and promoting religious principles such as forgiveness.

It has been reported that there are no mechanism-informed interventions for ACEs victims in order to prevent or reverse adverse health outcomes.[73] Homeless shelters however, could help correct bio-behavioral correlates of previous chronic stress in adult females through social and other support.[38–41] More research is needed to determine the best evidence-based interventions for adult female victims. More research needs to focus on abuse in underserved, low socioeconomic, aging populations, and to determine the degree to which bio-behavioral changes associated with stress are reversible. Forgiveness may play a critical role.

It is not clear if the results are simply due to these women being housed in a supportive and protective shelter or if the faith-based programs unique to this shelter contributed to these results, yet faith-based measures correlated with healthier cortisol. Further study is needed with more settings. These findings support the need to study a larger more diverse sample to statistically adjust for related variables to answer these questions.

References

1. Salem, B. E., Nyamathi, A., Idemundia, F., Slaughter, R., & Ames, M. (2013, January-March). At a crossroads: Reentry challenges and healthcare needs among homeless female ex-offenders. *Journal of Forensic Nursing*, *9*(1), 14–22. PubMed https://doi.org/10.1097/JFN.0b013e31827a1e9d

2. Brewer-Smyth, K., Kafonek, K., & Koenig, H. G. (2020, January/February). A pilot study on sleep quality, forgiveness, religion, spirituality, and general health of women living in a homeless mission. *Holistic Nursing Practice*, *34*(1), 49–56. PubMed https://doi.org/10.1097/HNP.0000000000000362

3. Roy, L., Crocker, A. G., Nicholls, T. L., Latimer, E. A., & Ayllon, A. R. (2014, June 1). Criminal behavior and victimization among homeless individuals with severe mental illness: A systematic review. *Psychiatric Services (Washington, D.C.)*, *65*(6), 739–750. PubMed https://doi.org/10.1176/appi.ps.201200515

4. Torchalla, I., Strehlau, V., Li, K., & Krausz, M. (2011, November 1). Substance use and predictors of substance dependence in homeless women. *Drug and Alcohol Dependence*, *118*(2-3), 173–179. PubMed https://doi.org/10.1016/j.drugalcdep.2011.03.016

5. Upshur, C., Weinreb, L., Bharel, M., Reed, G., & Frisard, C. (2015, April). A randomized control trial of a chronic care intervention for homeless women with alcohol use problems. *Journal of Substance Abuse Treatment*, *51*, 19–29. PubMed https://doi.org/10.1016/j.jsat.2014.11.001

6. Mackelprang, J. L., Harpin, S. B., Grubenhoff, J. A., & Rivara, F. P. (2014, October). Adverse outcomes among homeless adolescents and young adults who report a history of traumatic brain injury. *American Journal of Public Health*, *104*(10), 1986–1992. PubMed https://doi.org/10.2105/AJPH.2014.302087

7. Topolovec-Vranic, J., Ennis, N., Colantonio, A., Cusimano, M. D., Hwang, S. W., Kontos, P., . . . Stergiopoulos, V. (2012, December 8). Traumatic brain injury among people who are homeless: A systematic review. *BMC Public Health*, *12*, 1059. PubMed https://doi.org/10.1186/1471-2458-12-1059

8. Barrett, E. L., Mills, K. L., & Teesson, M. (2011, July). Hurt people who hurt people: Violence amongst individuals with comorbid substance use disorder and post traumatic stress disorder. *Addictive Behaviors*, *36*(7), 721–728. PubMed https://doi.org/10.1016/j.addbeh.2011.02.005

9. Brewer-Smyth, K., & Burgess, A. W. (2008, May-June). Childhood sexual abuse by a family member, salivary cortisol, and homicidal behavior of female prison inmates. *Nursing Research*, *57*(3), 166–174. Retrieved from http://search.proquest.com/docview/70758394?accountid=10457 PubMed https://doi.org/10.1097/01.NNR.0000319501.97864.d5

10. Brewer-Smyth, K., Burgess, A. W., & Shults, J. (2004, January 1). Physical and sexual abuse, salivary cortisol, and neurologic correlates of violent criminal behavior in female prison inmates. *Biological Psychiatry*, *55*(1), 21–31. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/14706421 PubMed https://doi.org/10.1016/S0006-3223(03)00705-4

11. Brewer-Smyth, K., Cornelius, M. E., & Pickelsimer, E. E. (2015, January-March). Childhood adversity, mental health, and violent crime. *Journal of Forensic Nursing*, *11*(1), 4–14. PubMed https://doi.org/10.1097/JFN.0000000000000062

12. Brewer-Smyth, K., & Pohlig, R. T. (2017, October/December). Risk factors for women being under the influence of alcohol compared with other illicit substances at the time of

committing violent crimes. *Journal of Forensic Nursing*, *13*(4), 186–195. PubMed https://doi.org/10.1097/JFN.0000000000000177

13. Bellis, M. A., Hughes, K., Leckenby, N., Jones, L., Baban, A., Kachaeva, M., . . . Terzic, N. (2014, September 1). Adverse childhood experiences and associations with health-harming behaviours in young adults: Surveys in eight eastern European countries. *Bulletin of the World Health Organization*, *92*(9), 641–655. PubMed https://doi.org/10.2471/BLT.13.129247
14. Felitti, V. J. (2009, May-June). Adverse childhood experiences and adult health. *Academic Pediatrics*, *9*(3), 131–132. Retrieved from http://search.proquest.com/docview/67254860?accountid=10457 PubMed https://doi.org/10.1016/j.acap.2009.03.001
15. Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., . . . Marks, J. S. (1998, May). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) Study. *American Journal of Preventive Medicine*, *14*(4), 245–258. Retrieved from http://search.proquest.com/docview/79953781?accountid=10457 PubMed https://doi.org/10.1016/S0749-3797(98)00017-8
16. Merrick, M. T., Ports, K. A., Ford, D. C., Afifi, T. O., Gershoff, E. T., & Grogan-Kaylor, A. (2017, July). Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse & Neglect*, *69*, 10–19. PubMed https://doi.org/10.1016/j.chiabu.2017.03.016
17. Brewer-Smyth, K., & Burgess, A. W. (2019). Neurobiology of female homicide perpetrators. *Journal of Interpersonal Violence*, *0*(0), 886260519860078. PubMed
18. Bernard, K., Frost, A., Bennett, C. B., & Lindhiem, O. (2017, April). Maltreatment and diurnal cortisol regulation: A meta-analysis. *Psychoneuroendocrinology*, *78*, 57–67. PubMed https://doi.org/10.1016/j.psyneuen.2017.01.005
19. Cordero, M. I., Moser, D. A., Manini, A., Suardi, F., Sancho-Rossignol, A., Torrisi, R., . . . Schechter, D. S. (2017, April). Effects of interpersonal violence-related post-traumatic stress disorder (PTSD) on mother and child diurnal cortisol rhythm and cortisol reactivity to a laboratory stressor involving separation. *Hormones and Behavior*, *90*, 15–24. PubMed https://doi.org/10.1016/j.yhbeh.2017.02.007
20. Trickett, P. K., Noll, J. G., Susman, E. J., Shenk, C. E., & Putnam, F. W. (2010, Winter). Attenuation of cortisol across development for victims of sexual abuse. *Development and Psychopathology*, *22*(1), 165–175. PubMed https://doi.org/10.1017/S0954579409990332
21. Kim, H. K., Tiberio, S. S., Capaldi, D. M., Shortt, J. W., Squires, E. C., & Snodgrass, J. J. (2015, January). Intimate partner violence and diurnal cortisol patterns in couples. *Psychoneuroendocrinology*, *51*, 35–46. PubMed https://doi.org/10.1016/j.psyneuen.2014.09.013
22. Cima, M., Smeets, T., & Jelicic, M. (2008, April). Self-reported trauma, cortisol levels, and aggression in psychopathic and non-psychopathic prison inmates. *Biological Psychology*, *78*(1), 75–86. PubMed https://doi.org/10.1016/j.biopsycho.2007.12.011

23. Basu, A., Levendosky, A. A., & Lonstein, J. S. (2013, Summer). Trauma sequelae and cortisol levels in women exposed to intimate partner violence. *Psychodynamic Psychiatry*, *41*(2), 247–275. PubMed https://doi.org/10.1521/pdps.2013.41.2.247

24. Platje, E., Jansen, L. M. C., Raine, A., Branje, S. J. T., Doreleijers, T. A. H., de Vries-Bouw, M., . . . Vermeiren, R. R. J. M. (2013, April). Longitudinal associations in adolescence between cortisol and persistent aggressive or rule-breaking behavior. *Biological Psychology*, *93*(1), 132–137. PubMed https://doi.org/10.1016/j.biopsycho.2013.01.002

25. Platje, E., Vermeiren, R. R. J. M., Raine, A., Doreleijers, T. A. H., Keijsers, L. G. M. T., Branje, S. J. T., . . . Jansen, L. M. C. (2013, November). A longitudinal biosocial study of cortisol and peer influence on the development of adolescent antisocial behavior. *Psychoneuroendocrinology*, *38*(11), 2770–2779. PubMed https://doi.org/10.1016/j.psyneuen.2013.07.006

26. Purewal Boparai, S. K., Au, V., Koita, K., Oh, D. L., Briner, S., Burke Harris, N., & Bucci, M. (2018, July). Ameliorating the biological impacts of childhood adversity: A review of intervention programs. *Child Abuse & Neglect*, *81*, 82–105. PubMed https://doi.org/10.1016/j.chiabu.2018.04.014

27. Fergusson, D. M., McLeod, G. F. H., & Horwood, L. J. (2013, September). Childhood sexual abuse and adult developmental outcomes: Findings from a 30-year longitudinal study in New Zealand. *Child Abuse & Neglect*, *37*(9), 664–674. PubMed https://doi.org/10.1016/j.chiabu.2013.03.013

28. Jawaid, A., Roszkowski, M., & Mansuy, I. M. (2018). Chapter Twelve - Transgenerational Epigenetics of Traumatic Stress. In B. P. F. Rutten (Ed.), Progress in Molecular Biology and Translational Science (Vol. 158, pp. 273-298): Academic Press.

29. Strüber, N., Strüber, D., & Roth, G. (2014, January). Impact of early adversity on glucocorticoid regulation and later mental disorders. *Neuroscience and Biobehavioral Reviews*, *38*, 17–37. PubMed https://doi.org/10.1016/j.neubiorev.2013.10.015

30. Global Homelessness Statistics. (2018). Retrieved from https://homelessworldcup.org/homelessness-statistics/

31. Facts on Homelessness. (2018). Retrieved from https://projecthome.org/about/facts-homelessness

32. State of Homelessness. 2020 Edition. (2020). Retrieved from https://endhomelessness.org/homelessness-in-america/homelessness-statistics/state-of-homelessness-2020/

33. HPCD. (2015). A Snapshot of Homelessness in Delaware: Point InTime 2015. Retrieved from http://hpcdelaware.org/documents/HPCD_1505_PITReport-WEB.pdf#page=6&zoom=auto,-99,775

34. HPCD. (2016). A Snapshot of Homelessness in Delaware: Point InTime 2016. Retrieved from http://www.hpcdelaware.org/documents/PIT_Report_2016.pdf

35. McQuaid, R. J., McInnis, O. A., Paric, A., Al-Yawer, F., Matheson, K., & Anisman, H. (2016, January 30). Relations between plasma oxytocin and cortisol: The stress buffering

role of social support. *Neurobiology of Stress*, *3*, 52–60. PubMed https://doi.org/10.1016/j.ynstr.2016.01.001

36. Gaffey, A. E., Bergeman, C. S., Clark, L. A., & Wirth, M. M. (2016, September). Aging and the HPA axis: Stress and resilience in older adults. *Neuroscience and Biobehavioral Reviews*, *68*, 928–945. PubMed https://doi.org/10.1016/j.neubiorev.2016.05.036
37. National Alliance to End Homelessness (2017) Faith-Based Organizations: Fundamental Partners in Ending Homelessness. Retrieved from endhomelessness.org/wp-content/uploads/2017/06/05-04-2017_Faith-Based.pdf
38. Akhtar, S., & Barlow, J. (2018, January). Forgiveness therapy for the promotion of mental well-being: A systematic review and meta-analysis. *Trauma, Violence & Abuse*, *19*(1), 107–122. PubMed https://doi.org/10.1177/1524838016637079
39. Banyard, V., Hamby, S., & Grych, J. (2017, March). Health effects of adverse childhood events: Identifying promising protective factors at the intersection of mental and physical well-being. *Child Abuse & Neglect*, *65*, 88–98. PubMed https://doi.org/10.1016/j.chiabu.2017.01.011
40. Brewer-Smyth, K., & Koenig, H. G. (2014, April). Could spirituality and religion promote stress resilience in survivors of childhood trauma? *Issues in Mental Health Nursing*, *35*(4), 251–256. PubMed https://doi.org/10.3109/01612840.2013.873101
41. Toussaint, L., Shields, G. S., Dorn, G., & Slavich, G. M. (2016, June). Effects of lifetime stress exposure on mental and physical health in young adulthood: How stress degrades and forgiveness protects health. *Journal of Health Psychology*, *21*(6), 1004–1014. PubMed https://doi.org/10.1177/1359105314544132
42. Sunday Breakfast Mission. (2021) Retreived from https://sundaybreakfastmission.org/
43. Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). The Alcohol Use Disorders Identification Test (AUDIT) Guidelines for Use in Primary Health Care Manual. Retrieved from http://apps.who.int/iris/bitstream/10665/67205/1/WHO_MSD_MSB_01.6a.pdf
44. NIAAA. (2016). Screening Tests. Retrieved from http://pubs.niaaa.nih.gov/publications/arh28-2/78-79.htm
45. Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993, June). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption—II. *Addiction (Abingdon, England)*, *88*(6), 791–804. PubMed https://doi.org/10.1111/j.1360-0443.1993.tb02093.x
46. NIAAA. (2016). Alcohol timeline Followback. Retrieved from http://pubs.niaaa.nih.gov/publications/AssessingAlcohol/InstrumentPDFs/13_TLFB.pdf
47. Robinson, S. M., Sobell, L. C., Sobell, M. B., Arcidiacono, S., & Tzall, D. (2014, January). Alcohol and drug treatment outcome studies: New methodological review (2005-2010) and comparison with past reviews. *Addictive Behaviors*, *39*(1), 39–47. PubMed https://doi.org/10.1016/j.addbeh.2013.09.029

48. Sobell, L. C., Brown, J., Leo, G. I., & Sobell, M. B. (1996, September). The reliability of the Alcohol Timeline Followback when administered by telephone and by computer. *Drug and Alcohol Dependence*, *42*(1), 49–54. PubMed https://doi.org/10.1016/0376-8716(96)01263-X

49. Sobell, L. C., Sobell, M. B., Leo, G. I., & Cancilla, A. (1988, April). Reliability of a timeline method: Assessing normal drinkers' reports of recent drinking and a comparative evaluation across several populations. *British Journal of Addiction*, *83*(4), 393–402. PubMed https://doi.org/10.1111/j.1360-0443.1988.tb00485.x

50. Sobell, L. C., Sobell, M. B., Riley, D. M., Schuller, R., Pavan, D. S., Cancilla, A., . . . Leo, G. I. (1988, May). The reliability of alcohol abusers' self-reports of drinking and life events that occurred in the distant past. *Journal of Studies on Alcohol*, *49*(3), 225–232. PubMed https://doi.org/10.15288/jsa.1988.49.225

51. Carey, K. B., Carey, M. P., Maisto, S. A., & Henson, J. M. (2004, November). Temporal stability of the timeline followback interview for alcohol and drug use with psychiatric outpatients. *Journal of Studies on Alcohol*, *65*(6), 774–781. PubMed https://doi.org/10.15288/jsa.2004.65.774

52. Buss, A. H., & Perry, M. (1992, September). The aggression questionnaire. *Journal of Personality and Social Psychology*, *63*(3), 452–459. Retrieved from http://search.proquest.com/docview/73223875?accountid=10457 PubMed https://doi.org/10.1037/0022-3514.63.3.452

53. Meyer, I. H., Muenzenmaier, K., Cancienne, J., & Struening, E. (1996, March). Reliability and validity of a measure of sexual and physical abuse histories among women with serious mental illness. *Child Abuse & Neglect*, *20*(3), 213–219. PubMed https://doi.org/10.1016/S0145-2134(95)00137-9

54. Muenzenmaier, K., Meyer, I., Struening, E., & Ferber, J. (1993, July). Childhood abuse and neglect among women outpatients with chronic mental illness. *Hospital & Community Psychiatry*, *44*(7), 666–670. PubMed https://doi.org/10.1176/ps.44.7.666

55. Stalder, T., Kirschbaum, C., Kudielka, B. M., Adam, E. K., Pruessner, J. C., Wüst, S., . . . Clow, A. (2016, January). Assessment of the cortisol awakening response: Expert consensus guidelines. *Psychoneuroendocrinology*, *63*, 414–432. PubMed https://doi.org/10.1016/j.psyneuen.2015.10.010

56. Koenig, H., Parkerson, G. R., Jr., & Meador, K. G. (1997, June). Religion index for psychiatric research. *The American Journal of Psychiatry*, *154*(6), 885b–886. PubMed https://doi.org/10.1176/ajp.154.6.885b

57. Koenig, H. G., George, L. K., & Peterson, B. L. (1998, April). Religiosity and remission of depression in medically ill older patients. *The American Journal of Psychiatry*, *155*(4), 536–542. PubMed https://doi.org/10.1176/ajp.155.4.536

58. Parker, M., Lee Roff, L., Klemmack, D. L., Koenig, H. G., Baker, P., & Allman, R. M. (2003, September). Religiosity and mental health in southern, community-dwelling older adults. *Aging & Mental Health*, *7*(5), 390–397. PubMed https://doi.org/10.1080/1360786031000150667

59. Koenig, H. G., & Büssing, A. (2010). The Duke University Religion Index (DUREL): A five-item measure for use in epidemiological studies. *Religions*, *1*(1), 78. Retrieved from http://www.mdpi.com/2077-1444/1/1/78 https://doi.org/10.3390/rel1010078

60. Thompson, L. Y., Snyder, C. R., Hoffman, L., Michael, S. T., Rasmussen, H. N., Billings, L. S., . . . Roberts, D. E. (2005, April). Dispositional forgiveness of self, others, and situations. *Journal of Personality*, *73*(2), 313–360. PubMed https://doi.org/10.1111/j.1467-6494.2005.00311.x

61. Gandek, B., Sinclair, S. J., Kosinski, M., & Ware, J. E., Jr. (2004, Summer). Psychometric evaluation of the SF-36 health survey in Medicare managed care. *Health Care Financing Review*, *25*(4), 5–25. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4194895/ PubMed

62. Ware, J. E., Snow, K. K., Kosinski, M., & Gandek, B. M. (1993). SF-36 Health Survey Manual and Interpretation Guide. Boston, Massachusetts The Health Institute, New England Medical Center

63. Optum. (2018). SF-12v2 Health Survey. Retrieved from https://campaign.optum.com/content/optum/en/optum-outcomes/what-we-do/health-surveys/sf-12v2-health-survey.html

64. Ware, J., Jr., Kosinski, M., & Keller, S. D. (1996, March). A 12-Item Short-Form Health Survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care*, *34*(3), 220–233. PubMed https://doi.org/10.1097/00005650-199603000-00003

65. Huo, T., Guo, Y., Shenkman, E., & Muller, K. (2018, February 13). Assessing the reliability of the short form 12 (SF-12) health survey in adults with mental health conditions: A report from the wellness incentive and navigation (WIN) study. *Health and Quality of Life Outcomes*, *16*(1), 34. PubMed https://doi.org/10.1186/s12955-018-0858-2

66. Bogner, J., & Corrigan, J. D. (2009, July-August). Reliability and predictive validity of the Ohio State University TBI identification method with prisoners. *The Journal of Head Trauma Rehabilitation*, *24*(4), 279–291. PubMed https://doi.org/10.1097/HTR.0b013e3181a66356

67. Ohio State University TBI Identification Method (OSU TBI-ID). (2017). Diagnosing and Treating Brain Injury. Retrieved from http://www.brainline.org/content/2013/08/new-tbi-screening-tool.html

68. Cella, D., Lai, J. S., Nowinski, C. J., Victorson, D., Peterman, A., Miller, D., . . . Moy, C. (2012, June 5). Neuro-QOL: Brief measures of health-related quality of life for clinical research in neurology. *Neurology*, *78*(23), 1860–1867. PubMed https://doi.org/10.1212/WNL.0b013e318258f744

69. HealthMeasures. (2018). Neuro QOL. Retrieved from http://www.healthmeasures.net/explore-measurement-systems/neuro-qol

70. Neuro, Q. O. L. (2018). Health Measures. Retrieved from http://www.healthmeasures.net/explore-measurement-systems/neuro-qol

71. NINDS. (2015). User Manual for the Quality of Life in Neurological Disorders (Neuro-QoL) Measures, Version 2.0, Retrieved from

http://www.healthmeasures.net/images/neuro_qol/Neuro-QOL_User_Manual_v2_24Mar2015.pdf

72. Blaine, S. K., & Sinha, R. (2017, August 1). Alcohol, stress, and glucocorticoids: From risk to dependence and relapse in alcohol use disorders. *Neuropharmacology*, *122*, 136–147. PubMed https://doi.org/10.1016/j.neuropharm.2017.01.037

73. Heim, C., Entringer, S., & Buss, C. (2019). Translating basic research knowledge on the biological embedding of early-life stress into novel approaches for the developmental programming of lifelong health. *Psychoneuroendocrinology*. PubMed