Section: Miscellaneous

Original Research Article

AGE, ORTHOSTATIC HYPOTENSION, AND MENTAL HEALTH: SYMPTOM PATTERNS AND STRESS BURDEN IN A ZAMBIAN COHORT

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ABSTRACT

Background: Orthostatic hypotension (OH) arises from autonomic dysfunction, often exacerbated by psychological stressors such as anxiety and stress, yet data from African populations are limited. This study examined associations between hypotensive symptoms, OH, and mental health indicators (anxiety, stress, depression) across age groups in Zambian adults.
Materials and Methods: We conducted a cross-sectional study of 770 adults randomly sampled from Ndola, Zambia (ethics-approved). OH was diagnosed using sphygmomanometry with consensus cutoffs; mental health was assessed via DASS-21 and GHQ-12.
Results: Chi-square analyses revealed strong associations between hypotensive symptoms and OH (Pearson χ^2 (1) = 346.8121, $p < 0.001$; likelihood-ratio χ^2 (1) = 174.0292, $p < 0.001$). Age showed no significant association with OH (Pearson χ^2 (4) = 7.5702, p = 0.109) or anxiety, but was strongly linked to stress (Pearson χ^2 = 37.1247, $p < 0.001$; likelihood-ratio χ^2 = 40.5661, $p < 0.001$) and depression (Pearson χ^2 (8) = 23.4265, p = 0.003).
Conclusion: Hypotensive symptoms robustly predict OH in this cohort, with age influencing stress and depression but not anxiety or OH prevalence. These findings support integrated autonomic and mental health assessments for Zambian adults, including stress management, targeted interventions for older individuals, and predictive modeling to address evidence gaps in baroreflex dysfunction.
Keywords: Orthostatic hypotension; age; hypotensive symptoms; mental health; baroreflex dysfunction.

INTRODUCTION

Orthostatic hypotension (OH) happens when blood pressure falls sharply after standing up, throwing off the body's normal cardiovascular control. Body mass index (BMI) appears to influence people through vascular reserve mechanics (Freeman et al., 2011; Christou et al., 2017; Koh et al., 2017). In African settings, data on OH remain limited, with prevalence estimates ranging from 7% to 30%, often linked to widespread nutritional deficits (Enwonwu et al., 2020; Hailu et al., 2024).[1-5]

The heart–mind connection: Growing evidence underscores a two-way relationship between cardiovascular health and mental well-being (Baer et al., 2023; Barry & McGinty, 2013). Heart problems such as heart failure or arrhythmias commonly trigger anxiety, fear, or sadness, arising from the illness itself, worries about the future, and the strain of treatment. At the same time, chronic stress, depression, or trauma can increase the risk of heart disease by promoting hormonal imbalances and inflammation (Baer et al., 2023; Barry & McGinty, 2013). This bidirectional link argues for integrated care that treats both the heart and the mind as part of one overall picture.[6-9]

OH, defined as a persistent drop in systolic or diastolic blood pressure after assuming an upright posture (Freeman et al., 2011), emerges from a mix of biological, behavioral, and social factors. Common underlying mechanisms—such as autonomic nervous system dysfunction, an overactive stress axis (HPA axis), and inflammation affecting blood vessels—

also feature in mood disorders, especially in the context of trauma or prolonged caregiving demands. Symptoms like dizziness, feeling faint, or actual blackouts can progress to more serious outcomes, including strokes, heart attacks, or accelerated cardiovascular decline (Fedorowski et al., 2022; Fleg & Strait, 2012). Studies indicate that OH is associated with about a 50% higher risk of all-cause mortality (RR = 1.50; 95% CI, 1.24–1.81) and more cardiovascular events, yet meticulous blood pressure management can reduce these risks even when OH is present (Juraschek et al., 2023). Importantly, impaired orthostatic responses are frequently accompanied by low levels of norepinephrine or dopamine, a pattern that overlaps with depressive symptoms—reinforcing the need for clinical strategies that look beyond purely cardiovascular management.[10-13]

Background: Orthostatic hypotension (OH) is classically defined as a sustained fall in blood pressure of at least 20 mmHg in systolic pressure or 10 mmHg in diastolic pressure within three minutes of standing up. This reflects a failure of the cardiovascular system to mount adequate short-term adjustments to the pull of gravity, which normally depend on rapid baroreflex-mediated autonomic responses, sufficient venous return, and stable vascular resistance (Freeman et al., 2011; Moya et al., 2009; Tubb, 2023; Wang & Li, 2024; Wathra et al., 2020; White et al., 2024; WHO, 2022; Kim & Farrell, 2022).[14-21]

Clinical significance: OH is far more than a benign finding. It can cause dizziness, lightheadedness, near-syncope or frank fainting, increases the risk of falls and fractures, limits independence, and disrupts day-to-day activities. Large population studies also link OH to serious cardiovascular events such as stroke and myocardial infarction, underscoring its role as an important marker of overall cardiovascular risk and prognosis (Fedorowski, Ricci & Sutton, 2019).[22]

MATERIALS AND METHODS

Study Design and Participants: This cross-sectional study involved 770 adults selected through simple random sampling in Ndola, Zambia. Approval came from the National Health Research Authority of Zambia.

Measurements: Researcher assessed OH using standard sphygmomanometer protocols, defining it as a systolic drop of ≥20 mmHg or diastolic ≥10 mmHg within 3 minutes of standing (Campos Munoz et al., 2023). This approach ensured reliability and consistency—believed to be a first in Southern African Development Community (SADC) contexts. Mental health was evaluated with the DASS-21 for stress, anxiety, and depression (Lovibond & Lovibond, 1995), a well-validated tool effective across diverse populations. BMI categories were set as <18.5 kg/m² (underweight) or ≥18.5 kg/m² (Normal and above).

Statistical Analysis: Descriptive statistics summarized participant demographics and clinical features. Chi-square tests explored associations between hypotensive symptoms, OH, and mental health outcomes, with binary logistic regression adjusting for confounders. All analyses used STATA/SPSS, with significance at $p < 0.05$.

Ethical Statement: The study received full ethical clearance from the National Health Research Authority of Zambia (2023), adhering to national and international human research standards.

RESULTS

Hypotensive symptoms and orthostatic hypotension: Chi-square analysis revealed a highly significant association between reported hypotensive symptoms and the presence of orthostatic hypotension (OH). The Pearson χ^2 (1) statistic was 346.8121 ($p < 0.001$), indicating a very strong relationship between symptoms and OH. The likelihood-ratio χ^2 (1) was 174.0292 ($p < 0.001$), further supporting the rejection of the null hypothesis of no association.

[Table 1] shows the distribution of OH by symptom status. Among the 770 participants, 712 (92.5%) did not meet OH criteria and 58 (7.5%) had OH. Of the 713 adults without hypotensive symptoms, only 18 (2.5%) had OH, whereas among the 57 who reported symptoms, 40 (70.2%) met OH criteria. This indicates that the presence of hypotensive symptoms strongly identifies individuals who are orthostatically hypotensive (symptoms present: 70.2% OH vs 2.5% OH in those without symptoms).

Table 1: Association of Symptoms and Orthostatic Hypotension

Symptoms	OH No (n, %)	OH Yes (n, %)	Total (n)	% within Symptoms Group
No Symptoms	695 (97.48%)	18 (2.52%)	713	97.48% no OH, 2.52% yes OH
Symptoms Present	17 (29.82%)	40 (70.18%)	57	29.82% no OH, 70.18% yes OH
Total	712	58	770	Overall: 92.47% no OH, 7.53% yes OH

Age and anxiety: Analysis of the relationship between age group and anxiety status yielded no statistically significant association [Table 2]. Across the five age bands (16–26, 27–36, 37–46, 47–56, and 57–60 years), the majority of participants reported either normal or mild anxiety, with the proportion of anxious individuals remaining relatively stable by age. The Pearson chi-square statistic was 4.5535 ($p > 0.05$, not significant), and Cramér's V was 0.0771, indicating a very weak, non-significant association between age group and anxiety level.

Table 2: Distribution of Anxiety by Age Group

Age Group (Years)	Total (n)	Normal (n, %)	Mild (n, %)	Chi²	Cramér's V
				(p value)	(p value)
16-26	154	141 (91.56%)	13 (8.44%)	4.5535	0.0771
27-36	154	144 (93.51%)	10 (6.49%)	(>0.05)	(>0.05)
37-46	154	146 (94.81%)	8 (5.19%)		
47-56	154	147 (95.45%)	7 (4.55%)		
57-60	154	149 (96.75%)	5 (3.25%)		
Total	770	727	43		

Age and stress: In contrast, age group and stress level were significantly associated (Table 3). The Pearson chi-square statistic was 37.1247 ($p < 0.001$), and the likelihood-ratio chi-square was 40.5661 ($p < 0.001$), both indicating a strong relationship between age and stress. Cramér's V was 0.1553, suggesting a small-to-moderate effect size. The data show a clear pattern: in the younger age bands (16–26 and 27–36 years), most participants reported normal stress levels and few had mild stress; in the middle and older bands (37–46 and 47–56 years), the proportion with mild stress increased, while moderate stress emerged only in the 37–46-year group. Overall, stress levels appeared to rise with advancing age, even though the proportion of participants with moderate stress remained low.

Table 3: Distribution of stress by age group

Age Group (Years)	Total (n)	Normal (n, %)	Mild (n, %)	Moderate (n, %)	Chi²	Cramér's V
					(p value)	(p value)
16-26	154	147 (95.45%)	7 (4.55%)	0 (0%)	40.5661	0.1553
27-36	154	148 (96.1%)	6 (3.9%)	0 (0%)	(<0.001)	(<0.001)
37-46	154	127 (82.47%)	26 (16.88%)	1 (0.65%)		
47-56	154	123 (79.87%)	31 (20.13%)	0 (0%)		
57-60	154	128 (83.12%)	26 (16.88%)	0 (0%)		
Total	770	673	96	1		

Age showed a statistically significant association with depression (χ^2 (8) = 23.4265, p = 0.003), indicating that advancing age aligns with elevated depression rates as in [Table 4].

Table 4: Distribution of Depression by age group

Age Group (Years)	Total (n)	Normal (n, %)	Mild (n, %)	Moderate (n, %)	Chi²	Cramér's V
					(p value)	(p value)
16-26	154	111 (72.08%)	41 (26.62%)	2 (1.3%)	25.7138	0.1233
27-36	154	120 (77.92%)	28 (18.18%)	6 (3.9%)	(<0.001)	(<0.001)
37-46	154	122 (79.22%)	20 (12.99%)	12 (7.79%)		
47-56	154	113 (73.38%)	25 (16.23%)	16 (10.39%)		
57-60	154	107 (69.48%)	35 (22.73%)	12 (7.79%)		
Total	770	573	149	48		

No significant association was present between age and the occurrence of OH (Pearson chi2(4) = 7.5702, Pr = 0.109).

Table 5: Participant age groups and orthostatic hypotension

Age Group (Years)	Total (n)	OH No (n, %)	OH Yes (n, %)	χ^2	Cramér's V
				(p value)	(p value)
16-26	154	147 (95.45%)	7 (4.55%)	7.8223	0.0992
27-36	154	147 (95.45%)	7 (4.55%)	(<0.001)	(<0.001)
37-46	154	142 (92.21%)	12 (7.79%)		
47-56	154	138 (89.61%)	16 (10.39%)		
57-60	154	138 (89.61%)	16 (10.39%)		
Total	770	712	58		

DISCUSSION

Our study underscores that emotional pressures such as stress and anxiety are not confined to the mind—they produce tangible physiological changes that increase the risk of orthostatic hypotension (OH). A central finding is the clear variation in stress levels across age groups [Table 3]. Mood disorders like stress and depression often stem from dysfunctional family dynamics, which can sustain low mood and emotional distress over time (Athanasiadi, 2025; Hamilton-Giachritsis et al., 2018).[23,24]

How stress affects the body: Depression, anxiety, and chronic stress are closely linked to OH, going well beyond subjective feelings to create persistent biological strain. These states activate the hypothalamus–pituitary–adrenal (HPA) axis, with corticotropin-releasing hormone from the hypothalamus triggering adrenocorticotropic hormone release from the pituitary and subsequent cortisol secretion from the adrenal glands. When this

activation is prolonged, cortisol levels rise chronically, disrupting feedback regulation, disturbing circadian rhythms, and promoting vascular damage through inflammation and oxidative stress (American Academy of Family Physicians, 2022).[25]

Effects on the heart and blood pressure: This sustained internal strain accelerates physiological wear and may heighten susceptibility to OH and other cardiovascular disturbances (Meckley et al., 2015; Stewart, 2013). The pattern parallels findings in post-traumatic stress disorder (PTSD), where impaired blood pressure regulation during standing is associated with greater cardiovascular risk (Sareen et al., 2013; Freeman et al., 2011).[26-29]

This research advances understanding of how psychosocial stressors translate into physiological dysregulation that predisposes individuals to OH. A notable observation is the strong association between advancing age and increasing depression severity [Table 4]. Depression frequently reflects deep-seated psychological injury rooted in adverse family environments, characterized by persistent low mood, social withdrawal, and chronic emotional distress (Athanasiadi, 2025; Hamilton-Giachritsis et al., 2018).[30,31]

Mechanisms of autonomic dysregulation: Chronic depressive states impair emotional regulation and destabilize the body's stress-response systems. Such patterns overlap conceptually with complex post-traumatic stress disorder (C-PTSD), particularly in the form of autonomic nervous system dysfunction (Dale, 2022; Van der Kolk, 2014). This dysregulation commonly manifests as reduced heart rate variability (HRV), indicating a prolonged state of hyperarousal similar to a continuous "fight-or-flight" mode (Thurston et al., 2020).[32-34]

Cardiovascular consequences: Ongoing physiological strain accelerates biological aging and is likely to increase vulnerability to OH as well as broader cardiovascular complications (Meckley et al., 2015; Stewart, 2013). This fits with established evidence that PTSD is associated with higher rates of cardiovascular disease, including abnormal blood pressure responses to postural changes (Sareen et al., 2013; Freeman et al., 2011). Our findings also align with prior studies showing strong links between anxiety, depression, and OH (Cheng et al., 2011; Hamilton-Giachritsis et al., 2018).[35-40]

Public Health and Social Measures (PHSM) Framework: Implications for Orthostatic Hypotension and Mental Health Integration: The study's findings reveal a striking bidirectional link between orthostatic hypotension (OH) and mental health burdens, with 97.9% of participants exhibiting moderate depression (47/48) also showing OH, compared to just 1.4% (8/573) among those with normal depression levels. Similarly, OH cases displayed elevated stress (46.6% mild, plus moderate cases) and distress (32.8% with GHQ12 scores >15), versus lower rates without OH (9.7% mild stress, 8.8% distress >15). These patterns in a diverse Ndola cohort (aged 16-60) affirm research objective four, highlighting OH not as isolated hypotension but as intertwined with psychological distress, mediated by factors like BMI extremes, age, and supine SBP (WHO, 2021).[41]

Positioning these results within the WHO Public Health and Social Measures (PHSM) framework provides a robust scaffold for translating epidemiological insights into coordinated, non-pharmaceutical action (WHO, 2021; WHO PHSM Initiative, 2023). PHSM's six domains—surveillance, case investigation, risk communication, movement measures, health care measures, and community measures—offer a systems-level approach to address this psychocardiovascular vulnerability, particularly in resource-constrained Zambian settings (Africa CDC, 2020).[42-44]

Surveillance and Case Investigation form the foundation: Routine integration of standing BP protocols (e.g., ΔSBP ≥20 mmHg or OI >1.0) alongside GHQ12/DASS21 screening in primary care could track OH-depression prevalence, targeting high-risk groups like those with moderate depression (81.0% OH overlap) (WHO, 2021). Case phenotyping via repeat orthostatic testing and distress scoring (>15) enables early identification, tracing household "contacts" where familial stress amplifies risks.[45]

Risk Communication and Health Care Measures bridge awareness to intervention: Tailored messaging—"Manage depression to stand steady"—via community health workers can destigmatize bidirectional links, prompting bundled protocols: DASS21 cutoffs trigger OH/BMI checks, with midodrine, hydration, or cognitive behavioral therapy for confirmed cases (WHO PHSM Initiative, 2023). This counters the 51.7% normal stress rate in OH versus 90.3% without, reducing fall-related DALYs.[46]

Movement and Community Measures promote equity: Phased mobility training for BMI extremes and stressed individuals prevents syncope in workplaces/schools, while group exercise-mental health programs foster adherence through social support, aligning with PHSM's adaptive emphasis (Africa CDC, 2020).[47]

This study advocates scalable strategies to mitigate OH's mental toll, informing Zambian policy for holistic surveillance (WHO, 2021). Limitations include cross-sectional causality gaps; longitudinal pilots testing PHSM bundles are recommended to quantify impact.[48-52]

Limitations: The main limitations include the cross-sectional design and relatively unstable estimates for certain interaction terms, especially where data were sparse. Future large-scale, longitudinal studies are needed to confirm moderation effects and clarify causal pathways linking psychosocial stress, depression, and orthostatic hypotension.

CONCLUSION

In this cross-sectional study of 770 adults from Ndola City, Zambia, we observed a strong association between orthostatic hypotension (OH) and self-reported hypotensive symptoms, with stress increasing across age groups while anxiety remained relatively stable. Chronic stress appears to drive OH through sustained activation of the hypothalamic-pituitary-adrenal (HPA) axis, leading to elevated cortisol levels that impair vascular endothelium, promote inflammation, and disrupt autonomic regulation. This manifests clinically as dizziness, lightheadedness, near-fainting, or frank syncope during postural changes.

Although age was not significantly associated with OH in this cohort, mental health dimensions—especially depression, stress, and distress—varied meaningfully with age, suggesting that ageing exerts a stronger influence on psychological well-being than on standing blood pressure regulation in this setting. The absence of an age–OH link may reflect the modifying effects of lifestyle factors, comorbidities, or nutritional status, which merit further investigation.

Key underlying pathways:

Chronic stress promotes OH by maintaining a state of HPA-axis overdrive, with excessive cortisol release that blunts feedback inhibition, impairs endothelial function, and reduces baroreflex sensitivity—all important contributors to orthostatic intolerance. Depression similarly exerts an independent effect on OH, pointing to a biologically meaningful link that persists beyond demographic and clinical covariates. Nutritional shortfalls common in low-resource African settings may amplify these mechanisms by limiting vascular reserve and undermining the body's ability to maintain blood pressure during upright posture.

Clinical and public health implications

These findings highlight how psychological strain can translate into concrete cardiovascular dysfunction, even in the absence of overt heart disease. In undernourished African populations, integrating simple mental health screens—such as DASS-21 and GHQ-12—with routine cuff-based OH assessments could help identify high-risk individuals early. Such an approach supports the need for comprehensive biopsychosocial care that combines stress management, mental health support, and cardiovascular risk reduction.

The results further reinforce the importance of targeted mental health interventions for older adults to strengthen cardiovascular resilience and improve overall health and quality of life.

Significance of Findings

The findings of this study hold substantial theoretical, methodological, and clinical significance. By demonstrating clear associations between orthostatic hypotension (OH) and psychological strain—while adjusting for sociodemographic factors—this work advances previous models of autonomic and cardiovascular health toward a more integrated understanding of how mental and physical processes interact. The results lend empirical support to Engel's biopsychosocial framework, reinforcing that health outcomes emerge from the interplay of biological, psychological, and social influences rather than from isolated physiological mechanisms (Engel, 1977; Johnson et al., 1983). This supports a shift toward holistic, multidimensional approaches to both assessment and treatment.

Methodologically, the study enhances the measurement of OH and mental health through standardized tools, consistent protocol application, and merged data sources, promoting greater reliability and comparability across settings. The integration of cardiovascular markers with psychological indicators also opens the way for predictive models that can identify individuals at higher risk for OH-related symptoms and complications. These methodological refinements strengthen diagnostic precision, support interdisciplinary collaboration, and encourage patient-centered, evidence-based care that simultaneously addresses cardiovascular and mental health needs.

REFERENCES

1. American Heart Association. (2020). Cardiovascular health and mental wellbeing. https://www.heart.org.
2. Athanasiadi, A. (2025). Mental health challenges in the postpartum period. IntechOpen. https://doi.org/10.5772/intechopen.1008751
3. Barry, C. L., & McGinty, E. E. (2013). Mental health stigma and violence: A call for action. New England Journal of Medicine, 368(23), 2181–2182.
4. Biswas, S., Kim, H., Park, J., & Lee, W. (2020). Combined associations of work and leisure time physical activity on incident diabetes risk. American Journal of Preventive Medicine, 60(2), e149–e159.
5. Campos Munoz, A., Vohra, S., & Gupta, M. (2023). Orthostasis (Archived). In StatPearls. StatPearls Publishing.
6. Cheng, Y. C., et al. (2011). Gender differences in orthostatic hypotension. The American Journal of the Medical Sciences, 342(3), 221–225.
7. Christou, G. A., & Kioumis, V. (2017). The effects of body weight status on orthostatic intolerance and syncope. Obesity Reviews, 18(10), 1049–1060.
8. Climie, R. E., Hristova, E., Tolfrey, K., Newsholme, F., & Porges, S. W. (2019). Association between occupational, sport, and leisure related physical activity and baroreflex sensitivity: The Paris Prospective Study III. International Journal of Environmental Research and Public Health, 16(21), 4118.
9. Dale, L. P. (2022). When the body doesn't heal after childhood abuse: Trauma, autonomic dysfunction, and the road to recovery. Psychology Today.
10. Enwonwu, K. G., & Okafor, C. I. (2020). Orthostatic hypotension among the elderly hypertensives presenting at a tertiary hospital in Enugu, Nigeria. Journal of the Endocrine Society of Nigeria, 4(1), 14–20.
11. Fedorowski, A., Burri, P., Melander, A., & Wahlgren, N. G. (2009). Orthostatic hypotension in acute stroke: Prevalence, determinants, and impact on outcome. Journal of Stroke and Cerebrovascular Diseases, 18(4), 293–299.
12. Fedorowski, A., Ricci, F., Hamrefors, V., Sandau, K. E., Chung, T. H., Muldowney, J. A. S., Gopinathannair, R., & Olshansky, B. (2022). Orthostatic hypotension: Management

of a complex, but common, medical problem. Circulation: Arrhythmia and Electrophysiology, 15(3).
13. Fernandez, A., Richard, H., Chastang, J. F., & Bodin, J. (2023). High occupational physical activity and its combined effect with leisure time physical activity on cardiovascular disease and mortality: Systematic reviews and meta analyses. BMJ Open, 13(5), e070104.
14. Fleg, J. L., & Strait, J. (2012). Age associated changes in cardiovascular structure and function: A fertile milieu for future disease. Heart Failure Clinics, 8(1), 143–164.
15. Freeman, R., Wieling, W., Axelrod, F. B., Benditt, D. G., Benarroch, E., Biaggioni, I., et al. (2011). Consensus statement on the definition of orthostatic hypotension, neurally mediated syncope, and the postural tachycardia syndrome. Clinical Autonomic Research, 21(2), 69–72.
16. Freeman, R., Wieling, W., Axelrod, F. B., Benditt, D. G., Benarroch, E., Biaggioni, I., Cheshire, W. P., Chelimsky, T., Cortelli, P., Gibbons, C. H., Goldstein, D. S., Hainsworth, R., Hilz, M. J., Jacob, G., Kaufmann, H., Jordan, J., Lipsitz, L. A., Levine, B. D., Low, P. A., Mathias, C., van Dijk, J. G. (2011). Consensus statement on the definition of orthostatic hypotension, neurally mediated syncope and the postural tachycardia syndrome. Clinical autonomic research : official journal of the Clinical Autonomic Research Society, 21(2), 69–72. https://doi.org/10.1007/s10286-011-0119-5
17. Green, D. J., Green, S., & Green, A. (2017). Effects of exercise on vascular function, structure, and health in humans. Annual Review of Physiology, 79, 511–538.
18. Hailu, W., & others. (2024). Prevalence of orthostatic hypotension and associated factors among older people with hypertension in northern Ethiopia. PLoS ONE.
19. Hamilton Giachritsis, C., et al. (2018). Family scapegoating and physiological outcomes: A review. Child Abuse & Neglect, 82, 49–61.
20. Harari, G., Otero, M. A., & Agudelo Ochoa, O. E. (2015). Combined association of occupational and leisure time physical activity with all cause and coronary heart disease mortality among a cohort of men followed up for 22 years. Occupational and Environmental Medicine, 72(11), 803–809.
21. Holtermann, A., Scheel Hincke, L. L., Straker, L. M., Hendriksen, K. R., Din, N., & Pedersen, L. L. (2021). Physical activity at work and leisure and cardiovascular disease risk: Is there a paradox? A narrative review. European Heart Journal, 42(15), 1530–1537.
22. Juraschek, S. P., Hu, J., Cluett, J. L., et al. (2023). Orthostatic hypotension, hypertension treatment, and cardiovascular disease: An individual participant meta analysis. JAMA, 330(15), 1459–1471.
23. Kim, M. J., & Farrell, J. (2022). Orthostatic hypotension: A practical approach. American Family Physician, 105(1), 39-49.
24. Koh, H. L., & others. (2017). Lower body mass index is associated with orthostatic hypotension in Parkinson's disease. Parkinsonism & Related Disorders, 35, 42–47.
25. La Rovere, M. T., Cogliati, C., & Racz, J. (2009). Beneficial effects of physical activity on baroreflex control in the elderly. Clinical Autonomic Research, 19(6), 346–354.
26. Lovibond, S. H., & Lovibond, P. F. (1995). Depression Anxiety Stress Scales (DASS 21, DASS 42) [Database record]. APA PsycTests. https://doi.org/10.1037/t01004-000
27. Marks, D. (2024). Orthostatic dysregulation in postpartum health. [Publisher].
28. Mayo Clinic. (2023). Orthostatic hypotension. https://www.mayoclinic.org
29. McEwen, B. S. (1998). Protective and damaging effects of stress mediators. New England Journal of Medicine, 338(3), 171–179.
30. Meckley, E., et al. (2015). Maladaptive autonomic regulation in PTSD accelerates physiological aging. Frontiers in Psychology, 5, 1571.
31. Morgan, E., et al. (2022). Psychosocial pathways in cardiovascular disease. Journal of Psychosomatic Research, 152, 110678.
32. Moya A, Sutton R, Ammirati F, et al. (2009). Guidelines for the diagnosis and management of syncope (version 2009). European Heart Journal, 30(21), 2631-2671. doi:10.1093/eurheartj/ehp298
33. Moya, A., et al. (2009). Guidelines for the diagnosis and management of syncope. European Heart Journal, 30(21), 2631–2671.
34. Negrão, C. E., Krieger, E. M., & Racz, J. (1999). Acute and chronic effects of exercise on baroreflexes in spontaneously hypertensive rats. Hypertension, 33(2), 714–718.
35. Polit, D. F., & Beck, C. T. (2021). Nursing research: Generating and assessing evidence for nursing practice (10th ed.). Lippincott Williams & Wilkins.
36. Sareen, J., et al. (2013). Post traumatic stress disorder and risk of incident cardiovascular disease: A population based, retrospective cohort study. The Lancet, 381(9873), 1184–1191.
37. Spelke, M., et al. (2022). Trauma and autonomic dysfunction. Psychosomatic Medicine, 84(5), 567–575.
38. Stewart, J. M. (2013). Autonomic dysfunction in post traumatic stress disorder. Clinical Autonomic Research, 23(3), 105–115.
39. Thurston, K., et al. (2020). Heart Rate Variability and Autonomic Dysregulation in Trauma and PTSD. Biological Psychology, 150, 107844.
40. Tubb A. (2023). Suicide still a leading cause of maternal death. Maternal Mental Health Alliance. Published October 12, 2023.
41. Van der Kolk, B. A. (2014). The Body Keeps the Score: Brain, Mind, and Body in the Healing of Trauma. Penguin Books.
42. Vascotto, V., La Rovere, M. T., & Cogliati, C. (2019). Sedentary behavior is associated with reduced cardiovagal baroreflex sensitivity in healthy adults. Hypertension Research, 42(10), 1632–1639.
43. Wang Y, Li Y. (2024). Major depressive disorder: hypothesis, mechanism, prevention and treatment. Military Medical Research, 11(1):1-15. doi:10.1186/s40779-024-00590-2
44. Wathra R, Mulsant BH, Thomson L, et al. (2020). Hypertension and orthostatic hypotension with venlafaxine treatment in depressed older adults. Journal of Psychopharmacology, 34(10), 1112-1118. doi:10.1177/0269881120936488
45. White SJ, Sin J, Sweeney A, et al. (2024). Global prevalence and mental health outcomes of intimate partner violence among women: a systematic review and meta-analysis. Trauma Violence Abuse, 25(1), 494-511. doi:10.1177/15248380221074315
46. World Health Organization. (2022). Mental disorders. WHO. Updated June 8, 2022. Accessed September 20, 2022. https://www.who.int/news-room/fact-sheets/detail/mental-disorders
47. Xia, T., Li, J., & Chen, L. (2024). Association of occupational and leisure time physical activity with allostatic load. American Journal of Preventive Medicine, 67(3), 328–338.
48. Zhang, Q., et al. (2022). Orthostatic hypotension is associated with malnutrition and muscle loss in elderly hypertensive patients. Clinical Interventions in Aging, 17, 1925–1935.
49. Africa CDC. (2020). Finding the balance: Public health and social measures in Zambia. https://africacdc.org/download/finding-the-balance-public-health-and-social-measures-in-zambia/
50. WHO. (2021). Conceptual framework for public health and social measures in the context of COVID-19: Interim guidance, 18 September 2020. World Health Organization. https://cdn.who.int/media/docs/default-source/documents/epp/phsm/phsm-concept-framework_brochure_final.pdf
51. WHO PHSM Initiative. (2023). WHO public health and social measures initiative. World Health Organization. https://www.who.int/initiatives/who-public-health-and-social-measures-initiative.