STRESS AND CARDIOVASCULAR RISK IN YOUTH

Karan S. Nayak BA[1], Austin M. Pollack MS[2], Landon D. Hamilton PhD[2], Paige C. Lueders BA[2], Gary J. Luckasen MD[2]

1.University of Colorado School of Medicine, Aurora, CO

2. Research North, UCHealth, Medical Center of the Rockies, Loveland, CO

Background

Stress is a well-established risk factor for cardiovascular disease (CVD) in adults, but its role in childhood remains unclear. This study evaluates the relationship between stress and CVD risk in pediatric populations, examining both its potential as an independent risk factor and its associations with related factors such as body mass index (BMI), diet, and physical activity. By investigating these connections, we highlight the influence of stress on children's biometric values and health behaviors.

Methods

The UCHealth Healthy Hearts and Minds (HHM) Program in Colorado conducted biometric screenings and health risk assessments on 59,492 elementary, middle, and high school students between 2014 and 2024. Student and parental stress were self-reported on a five-point Likert scale ranging from "No Stress" to "Very High." Relationships between stress, CVD risk factors, and health behaviors were analyzed using ANOVA and ordinal logistic regression models.

Contact: Karan Nayak
karan.nayak@cuanschutz.edu

Figures

Figure 1: Associations Between Student Stress Levels and Health Behaviors/CVD Risk Factors by Sex (All Grades)

Male Students (All grades)	No Stress	Low	Average	High	Very High	P-value
Sleep	8.79	8.67	8.41	8.02	7.67	< 0.001
Fruits and Veggies	4.37	4.17	3.98	3.93	3.92	< 0.001
Sugary Drinks	2.29	2.49	2.74	2.97	3.19	< 0.001
Physical Activity	5.09	4.99	4.68	4.60	4.47	< 0.001
BMI	19.39	19.73	20.41	20.88	20.77	< 0.001
Female Students (All grades)	**No Stress**	**Low**	**Average**	**High**	**Very High**	**P-value**
Sleep	9.11	8.79	8.34	7.93	7.53	< 0.001
Fruits and Veggies	4.76	4.49	4.18	4.03	4.07	< 0.001
Sugary Drinks	1.92	2.21	2.53	2.77	2.96	< 0.001
Physical Activity	4.68	4.53	4.18	4.09	3.98	< 0.001
BMI	18.90	19.29	20.39	21.21	21.75	< 0.001

References

1. Daniels SR;Greer FR;, Lipid screening and Cardiovascular Health in Childhood. *Pediatrics*
2. Jacques A, Chaaya N, Beecher K, Ali SA, Belmer A, Bartlett S. The impact of sugar consumption on stress driven, emotional and addictive behaviors. *Neuroscience & Biobehavioral Reviews* (2019).
3. *Luepker RV;Perry CL;McKinlay SM;Nader PR;Parcel GS;Stone EJ;Webber LS;Elder JP;Feldman HA;Johnson CC;, Outcomes of a field trial to improve children's dietary patterns and physical activity. the child and adolescent trial for Cardiovascular Health. catch collaborative group. JAMA,*
4. M. Clementi, Your child's mental health: Why does sleep matter? *Texas Children's*
5. *M. E. Bowers, R. Yehuda, Intergenerational transmission of stress in humans. Neuropsychopharmacology : official publication of the American College of Neuropsychopharmacology (2016),*
6. S. A. M;, Stress and cardiovascular disease: An update on current knowledge. *Annual review of public health*,

Results

Higher levels of student stress were associated with shorter sleep duration, lower fruit and vegetable intake, greater sugary drink consumption, reduced physical activity, and increased BMI (Figure 1). There were similar trends between sexes, but these associations were more pronounced in females. Ordinal regression models showed that elevated parental stress was a significant predictor of student stress across subgroups (odds ratios (ORs) 1.44–3.92). Shorter sleep duration also emerged as a strong predictor of higher stress (OR 0.67).

Conclusions

These findings identify that stress plays an important role in the early development of cardiovascular risk, both through direct effects and by influencing health behaviors. Recognizing stress as a potential pediatric CVD risk factor highlights the importance of early intervention and supports the need for further research to clarify its long-term impact on cardiovascular health.

Acknowledgements

UCHealth Healthy Hearts and Minds