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Exploring the association between self-esteem and blood pressure: A cross-sectional and longitudinal investigation

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Abstract

High self-esteem is linked to favorable outcomes including better mental health and relationships, however, its impact on cardiovascular health is less understood. This study examined the relationship between self-esteem and blood pressure levels using data from the Midlife in the United States (MIDUS) study (M_{age} = 54.53; 57% women; 20% non-White). We hypothesized that higher self-esteem would be associated with lower systolic and diastolic blood pressure concurrently and 10 years later. Self-esteem was measured with the Rosenberg Self-Esteem Scale, and blood pressure was clinically assessed. Cross-sectional analyses included 1194 participants; longitudinal analyses included 566 participants. Contrary to expectations, higher self-esteem was associated with increased SBP over time (p = 0.04). However, no significant cross-sectional relationships were found. These findings suggest self-esteem may not consistently predict blood pressure, although it could be related to SBP in the long term, warranting further research into the impact of self-esteem on cardiovascular health.

Keywords

blood pressure, cardiovascular disease, longitudinal, midlife, self-esteem

Self-esteem is an individual's overall sense of worth and value (Orth and Robins, 2022). Research into the benefits of high self-esteem has proliferated in recent years. Many studies have linked high levels of self-esteem to better outcomes for one's relationships, work, school, mental health, and psychological adjustment (Orth and Robins, 2022; Zell and Johansson, 2024). However, despite interest in the topic, there has been less research on the association between self-esteem and physical health outcomes.

The few longitudinal studies that have explored the relationship between self-esteem and physical health have been promising. Across 12 years, Orth et al. (2012) reported that high self-esteem predicted a lower cumulative score comprised of 10 health problems such as high blood pressure, stroke, and diabetes. Similarly, Trzesniewski et al. (2006) found that adolescent self-esteem predicted

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better cardiorespiratory health, healthier waist-to-hip ratio, and better perceived physical fitness at age 26. Another study with older adults found that self-esteem predicted increases in functional health, including activities such as "walking about three blocks" and "using stairs or inclines" (Reitzes and Mutran, 2006). Although these studies provide preliminary evidence that high self-esteem may be associated with better physical health, other research has reported null associations. Mäkikangas et al. (2004) found that self-esteem was concurrently but not longitudinally related to physical symptoms such as headache, palpitations, irregular heartbeat, and backache. Additionally, no studies have focused exclusively on the relationship between self-esteem and cardiovascular risk factors such as blood pressure.

High blood pressure is a major risk factor for cardiovascular disease (CVD), which is the leading cause of death in the United States (Tsao et al., 2023). Although most interventions to reduce high blood pressure focus on lifestyle changes like exercise and diet (Fu et al., 2020), psychosocial factors are increasingly recognized as relevant for CVD prevention (Lloyd-Jones et al., 2022; Yu et al., 2025). Indeed, several potential mechanisms may connect self-esteem with blood pressure. First, individuals with higher versus lower self-esteem tend to exhibit better coping strategies (Lane et al., 2002) and resilience to stress (Dumont and Provost, 1999). Chronic stress is a known contributor to high blood pressure levels and hypertension (O'Connor et al., 2021), so the stress-buffering effect of self-esteem may relate to lower blood pressure levels over time. Furthermore, individuals with high versus low self-esteem may have stronger social support networks and more positive interpersonal relationships (Stinson et al., 2008; Uchino et al., 1996), both of which can also help mitigate the physiological impact of stress (Norris and Kaniasty, 1996). Additionally, greater self-esteem may be linked to healthier lifestyle choices such as engaging in regular exercise and eating a balanced diet (Arsandaux et al., 2020; Jiménez Boraita et al., 2024), which also contribute to healthier blood pressure levels (Fu et al., 2020). Together, these mechanisms suggest that self-esteem may play a role in blood pressure.

The present research examines the association between self-esteem and levels of blood pressure cross-sectionally and longitudinally in U.S. adults. Consistent with past research showing that self-esteem may protect health (Zell and Johansson, 2024), individuals with high self-esteem were expected to have lower levels of systolic blood pressure (SBP) and diastolic blood pressure (DBP) concurrently and 10 years later. Unlike previous studies focusing on relatively homogeneous populations, data came from a large national sample of midlife and older adults from diverse racial and educational backgrounds.

Method

Participants

Participants included individuals in the Midlife in the United States (MIDUS) study. The MIDUS study explores psychological, social, and physiological factors contributing to health and well-being during middle age. The first phase of MIDUS (MIDUS I) included 7108 participants aged 25–74 who were mainly recruited throughout the U.S. via random digit dialing. The study's second phase took place from 2004 to 2005 (MIDUS II) and expanded the assessments from the first phase by adding the evaluation of biomarkers. Participants in the biomarker assessment traveled to one of three clinical research sites (University of Wisconsin, Georgetown University, or University of California, Los Angeles) for an overnight visit. In total, 1255 people participated in MIDUS II biomarker assessments. Participants in the biomarker sample did not differ significantly from those in the core MIDUS II survey based on age, sex, race, marital status, income, chronic

conditions, or body mass index; however, they were more highly educated (Dienberg Love et al., 2010). The third phase of the study began in 2013 (MIDUS III) and included a follow-up assessment of participants' biomarkers (n = 747).

The cross-sectional association between self-esteem and blood pressure was based on a subset of 1255 participants who participated in the biomarker assessment at MIDUS II. Participants missing data on blood pressure (n = 1) or self-esteem (n = 28) were not included in analyses. An additional 32 people were missing data on covariates and were excluded from analysis, leading to a final analytic sample of 1194 for cross-sectional analysis. The longitudinal investigation between MIDUS II self-esteem and MIDUS III blood pressure included 566 participants who completed the psychosocial assessment at MIDUS II and the biomarker assessment at MIDUS III (excluding three participants who completed the biomarker assessment at MIDUS III but not MIDUS II and 1 participant missing data on covariates).

Measures

Self-esteem. Self-esteem was assessed with the 7-item Rosenberg Self-Esteem Scale (Rosenberg, 1965). Participants indicated their level of agreement with statements on a scale ranging from 1 (strongly agree) to 7 (strongly disagree). An example item is: "On the whole, I am satisfied with myself." The scale was administered through a self-administered questionnaire. Scores were summed and ranged from 11 to 49, with total scores below 15 indicating low self-esteem. Among the 1195 participants in the analytic sample for the cross-sectional analyses, the mean score on the scale was 38.02 (SD = 7.67). To facilitate interpretation, primary analyses included standardized self-esteem based on the respective analytic samples (M = 0, SD = 1). However, findings were also reported in the raw, unstandardized self-esteem units.

Blood pressure. Blood pressure data were collected during the MIDUS II and MIDUS III assessments from participants at clinical research sites. SBP and DBP were each clinically assessed three times, with all three readings averaged together.

Covariates. Covariates included potential variables that could influence the associations of interest and were controlled for in statistical analyses. Demographic covariates included age (in years), gender (men, women), marital status (married, not married), race (White, non-White), education (less than a 4-year college degree, 4-year college degree or higher), and household income (in U.S. dollars). Additional covariates that were controlled for included antihypertensive medication use (yes, no) self-reported during biomarker assessments, as well as cigarette smoking (yes, no) self-reported at the core MIDUS II assessment.

Statistical analysis. Analyses were conducted using SPSS 29. Following preliminary analyses of descriptive statistics and examination of the distributions of each variable for outliers, linear regression models were used to examine the association between self-esteem (both standardized and unstandardized) and blood pressure. For the cross-sectional analyses, four models were investigated: the first model explored the relationship between MIDUS II self-esteem and MIDUS II DBP with participants' age statistically controlled. The second model additionally adjusted for gender, marital status, race, education, income, antihypertensive medication use, and cigarette smoking. The third model examined the relationship between MIDUS II self-esteem and MIDUS II SBP, controlling for participants' age. The fourth model additionally controlled for all other covariates. The same four models were examined longitudinally with self-esteem at MIDUS II predicting blood pressure at MIDUS III, controlling for MIDUS II blood pressure in the fully adjusted models.

Table 1. Characteristics of participants in each analytic sample at MIDUS II.

Characteristic at MIDUS II	MIDUS II Cross-Sectional Sample (N = 1194)	MIDUS II to MIDUS III Longitudinal Sample (N = 566)
Mean age (*SD*), years	54.53 (11.67)	52.20 (9.95)
Gender		
Female	57%	54.2%
Male	43%	45.8%
Race		
White	79.8%	93.1%
Non-white	20.2%	6.9%
Marital status		
Married	65.3%	75.3%
Not married	34.7%	24.7%
Education		
Less than 4-year degree	57%	48.8%
4-year degree or higher	43%	51.2%
Mean household income (*SD*)	70,477.92 (58,892.56)	84,194.07 (63,212.13)
Antihypertensive medication use		
Yes	8.8%	7.1%
No	91.2%	92.9%
Cigarette smoker		
Yes	8.8%	11%
No	91.2%	89%
Mean self-esteem (*SD*)	38.02 (7.67)	38.51 (7.03)
Mean systolic blood pressure (*SD*), mmHg	131.48 (18.06)	129.88 (17.23)
Mean diastolic blood pressure (*SD*), mmHg	75.71 (10.57)	76.02 (10.56)

Results

Preliminary analysis

The MIDUS II baseline characteristics of the 1194 participants in the cross-sectional sample and the 566 participants in the longitudinal sample are displayed in Table 1. Individuals in the longitudinal sample appeared to be more socioeconomically advantaged than individuals in the cross-sectional sample, but levels of self-esteem and blood pressure were similar across analytic samples. Indeed, MIDUS II self-esteem scores were consistent with averages across the entire MIDUS II sample (MIDUS, 2020). In addition, mean levels of MIDUS II SBP and DBP were congruent with levels reported in a nationally-representative sample of U.S. adults during the same period (Wright et al., 2011). SBP and DBP levels during the MIDUS III assessment (M_{SBP} = 128.33, SD = 17.8; M_{DBP} = 76.94, SD = 9.42) were also comparable with those from MIDUS II. Notably, 7.1–8.8% of participants reported using antihypertensive medication at MIDUS II. This proportion remained consistent at MIDUS III, where 7.1% of participants reported taking such medication.

Cross-sectional analysis

The results of the linear regression analyses are displayed in Table 2 for standardized self-esteem and Table 3 for unstandardized self-esteem. There was no significant association between self-esteem and SBP when controlling for age and other covariates. Similarly, no relationship was found between self-esteem and DBP in either age-adjusted or fully adjusted models. Overall, results of the cross-sectional analyses showed that self-esteem was not associated with concurrent blood pressure levels.

Table 2. Regression coefficients (SE) for the relationship between standardized self-esteem[a] and systolic or diastolic blood pressure (SBP or DBP).

Model	MIDUS II Cross-Sectional Sample (N = 1194)	MIDUS II to MIDUS III Longitudinal Sample (N = 566)
Age-Adjusted SBP	−0.12 (0.51)	1.48 (0.76)
Fully-Adjusted SBP[b]	0.28 (0.52)	1.46* (0.73)
Age-Adjusted DBP	−0.36 (0.31)	0.33 (0.39)
Fully-Adjusted DBP[b]	−0.25 (0.31)	0.24 (0.37)

[a]Self-esteem was standardized based on the respective analytic samples (M = 0, SD = 1) so regression coefficients represent the change in either SBP or DBP for each standard deviation increase in the total self-esteem score, holding all other predictors constant.
[b]Adjusted for demographic characteristics (age, gender, race, marital status, education, and household income), use of antihypertensive medication, and cigarette smoking. Longitudinal models also adjusted for MIDUS II SBP or DBP, depending on the specific outcome under consideration.
*$p < 0.05$.

Table 3. Regression coefficients (SE) for the relationship between unstandardized self-esteem and systolic or diastolic blood pressure (SBP or DBP).

Model	MIDUS II Cross-Sectional Sample (N = 1194)	MIDUS II to MIDUS III Longitudinal Sample (N = 566)
Age-Adjusted SBP	−0.02 (0.07)	0.21 (0.11)
Fully-Adjusted SBP[a]	0.04 (0.07)	0.21* (0.10)
Age-Adjusted DBP	−0.05 (0.04)	0.05 (0.06)
Fully-Adjusted DBP[a]	−0.03 (0.04)	0.03 (0.05)

[a]Adjusted for demographic characteristics (age, gender, race, marital status, education, and household income), use of antihypertensive medication, and cigarette smoking. Longitudinal models also adjusted for MIDUS II SBP or DBP, depending on the specific outcome under consideration.
*$p < 0.05$.

Longitudinal analysis

The results of the longitudinal analyses are displayed in Table 2 for standardized self-esteem and Table 3 for unstandardized self-esteem. Linear regression models revealed no significant relationship between self-esteem and DBP. However, contrary to initial predictions, self-esteem was positively associated with SBP in the fully adjusted models. In bivariate correlation analyses without covariates, a small positive correlation (r = 0.11) was evident between MIDUS II self-esteem and MIDUS III SBP. In contrast, the association between self-esteem and DBP at MIDUS III was negative and notably weaker ($r = -0.03$). This suggests that in this sample, individuals with high levels of self-esteem at MIDUS II also tended to have higher SBP at MIDUS III. However, self-esteem at MIDUS II did not predict DBP at MIDUS III regardless of the covariates that were statistically controlled for.

Discussion

This study explored the cross-sectional relationship between self-esteem and blood pressure levels and investigated whether self-esteem could predict blood pressure levels 10 years later. Although we hypothesized that higher self-esteem would be inversely associated with

blood pressure, results found that self-esteem was not associated with blood pressure concurrently. However, a small positive association was found between self-esteem and SBP 10 years later. The longitudinal relationship between self-esteem and SBP remained significant even when controlling for demographic characteristics, the use of antihypertensive medication, and cigarette smoking. Overall, findings suggest the relationship between self-esteem and blood pressure may be mostly null for midlife adults. However, further inquiry is needed to explore the unexpected relationship between self-esteem and SBP longitudinally.

Although our findings indicate that self-esteem may not consistently predict blood pressure levels, other studies have reported potential links between self-esteem and physical health (Mäkikangas et al., 2004, Orth and Robins, 2022; Reitzes and Mutran, 2006; Trzesniewski et al., 2006). Preliminary evidence suggests that self-esteem may influence physical health by improving the quality of social relationships (Orth and Robins, 2022). The quality of social support, in turn, may affect the cardiovascular, endocrine, and immune systems, thereby influencing health outcomes (Stinson et al., 2008; Uchino et al., 1996). Moreover, self-esteem can enhance feelings of resilience, decreasing the prevalence of pain and physical symptoms (Mäkikangas et al., 2004). This theoretical reasoning points to self-esteem as a factor that may contribute to improvements in physical health. However, the extent of this contribution remains unknown and may not be as prominent as hypothesized.

Individual differences in psychological and physiological responses to stressors may also contribute to the inconsistent findings in self-esteem research. Individuals with high self-esteem may possess effective coping strategies and greater self-efficacy, which can buffer the impact of stress on blood pressure. Conversely, individuals with low self-esteem may display a range of harmful coping strategies that exacerbate the physiological effects of stress (Mullis and Chapman, 2000; Pintrich and De Groot, 1990). Additionally, the influence of the psychosocial environment, including family dynamics, socioeconomic status, and cultural factors, must be considered. These external factors may influence blood pressure more than self-esteem alone (Carels et al., 1998; Rozanski et al., 1999). For instance, research suggests that self-esteem increases throughout adulthood, peaking around ages 60–70. Thus, midlife and older individuals may have higher self-esteem than younger individuals (Orth et al., 2018). These individual differences could obscure associations between self-esteem and blood pressure.

Although self-esteem is generally associated with beneficial health outcomes (Orth and Robins, 2022; Zell and Johansson, 2024), our study suggests that the impact of self-esteem on blood pressure may not be straightforward. Most participants in our sample had blood pressure levels that were elevated (Whelton et al., 2022), which may indicate that associations between self-esteem and blood pressure could vary depending on an individual's baseline health status and course of treatment. This underscores the need for further research to explore potential moderating factors such as baseline health, age or developmental period, and the presence of other protective or risk factors. Future research endeavors should also consider the intricate interplay between individual differences, possible mediating variables, and psychosocial factors to illuminate the connections between self-esteem and blood pressure.

As with other research on self-esteem, the present study has several limitations. First, results did not account for factors like diet, physical activity, and medical conditions that could be associated with the blood pressure outcomes. Moreover, some MIDUS participants could not be included in the longitudinal analysis due to missing data or non-participation in the biomarker assessment. This resulted in reduced racial diversity in the longitudinal sample compared to the cross-sectional sample (6.9% vs 20% Non-

white, respectively), limits the generalizability of longitudinal findings to more diverse populations, and may underrepresent the experiences of disadvantaged individuals over time. This pattern of missingness may have introduced selection bias in the analytic samples with healthier or more socioeconomically advantaged individuals being more likely to participate than less healthy or less advantaged individuals (Radler and Ryff, 2010). Using multiple imputation or other related strategies to address missing data or sample representativeness may be helpful. Additionally, follow-up studies could incorporate a more expansive longitudinal design to test whether self-esteem in early adulthood is associated with higher blood pressure later in life. These limitations are balanced by a large cohort of midlife participants with clinical assessments of both SBP and DBP, which are established CVD risk factors.

In conclusion, the absence of a clear association between self-esteem and blood pressure in this study suggests that the relationship between psychological factors and physiological health outcomes is complex and likely influenced by many competing variables. Until further research is conducted, it is too early to make any causal claims about the relationship between self-esteem and blood pressure. Additional research into this relationship could support implementing programs to improve and maintain self-esteem throughout adulthood.

Data sharing statement

Publicly available data from the MIDUS study was used for this research. De-identified data and documentation for the MIDUS study are available at https://www.icpsr.umich.edu/web/ICPSR/series/203.

Declaration of conflicting interests

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Ethics approval

MIDUS Study procedures were approved by Institutional Review Boards at the University of Wisconsin, Madison. Because the current authors had no interaction with human subjects, no further ethical approval was needed.

Informed consent

All participants in the Midlife in the United States (MIDUS) study provided written informed consent.

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