# Notes

This report includes two tables of results. The first set of results are univariate relationships in the Midlife in the United States Study. The second set of results are from multivariate models including all stress variables simultaneously. In both cases, generalized additive models (GAMs) were used. Briefly, GAMs are semi-parametric models that allow the model to learn non-linear smooth relations between explanatory and outcome variables, without the analyst needing to pre-specify that a relationship is linear, quadratic, or some other form. Missing data were handled by creating 5 multiply imputed datasets using random forests with 100 trees, to allow non-linear relations and interactions, as needed.

For the univariate results, each stress variable was individually entered as an explanatory variable for each outcome with a flexible smoothed relationship estimated. For each relationship, an adjusted R2 (continuous outcomes) or deviance explained (ordinal outcomes) is presented with p-values for the overall smooth term in parentheses, both averaged across the multiply imputed datasets.

The “top” explanatory stress variables for each health outcome were chosen as follows: 1) after averaging the R2 or deviance explained and p-values across multiply imputed data, the top 5 based on R2 or deviance explained were selected as long as p < .10, 2) in addition, any explanatory variable with p < .001 was included.

The results are presented in detail below, but as a crude example, Lifetime Discrimination at MIDUS 1, Neighborhood Quality at MIDUS II, and Friend Strain at MIDUS II were the three variables most consistently included as a top predictor of a health outcome.

Key:

M1 = MIDUS Wave 1

M2 = MIDUS Wave 2

M2P4 = MIDUS Wave 2 Biomarker Project

# Univariate Results

|  | Self-rated Physical Health (M1) | Self-rated Mental Health (M1) | Self-rated Relative Health (M1) | Self-rated Physical Health (M2) | Self-rated Mental Health (M2) | Self-rated Relative Health (M2) | Chronic Conditions (M1) | Chronic Conditions (M2) | Episodic Memory (M2) | Executive Function (M2) | CRP (M2P4) | IL-6 (M2P4) | Fibrinogen (M2P4) | sICAM (M2P4) | sE-Selectin (M2P4) | Pulse Pressure (M2P4) | SBP (M2P4) | HRV RMSSD (M2P4) | LFHRV (M2P4) | HFHRV (M2P4) |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Work Inequality (M1) | 1.0% (<.0001) | 1.5% (<.0001) | 0.6% (<.0001) | 0.6% (<.0001) | 1.1% (<.0001) | 0.6% (<.0001) | 1.8% (<.0001) | 0.8% (<.0001) |  |  |  |  |  |  |  |  |  |  |  |  |
| Neighborhood Quality (M1) | 0.4% (<.0001) | 0.8% (<.0001) | 0.3% (<.0001) | 0.3% (<.0001) | 0.7% (<.0001) | 0.4% (<.0001) | 2.6% (<.0001) | 1.4% (<.0001) |  |  |  |  |  |  |  |  |  |  |  |  |
| Home Inequality (M1) | 0.3% (<.0001) | 0.4% (<.0001) | 0.1% (<.0001) | 0.2% (<.0001) | 0.5% (<.0001) | 0.1% (0.0007) | 1.4% (<.0001) | 0.7% (<.0001) |  |  |  |  |  |  |  |  |  |  |  |  |
| Family Strain (M1) | 0.3% (<.0001) | 0.9% (<.0001) | 0.3% (<.0001) | 0.1% (<.0001) | 0.5% (<.0001) |  | 1.8% (<.0001) | 0.7% (<.0001) |  |  |  |  |  |  |  |  |  |  |  |  |
| Friend Strain (M1) | 1.3% (<.0001) | 1.9% (<.0001) | 0.5% (<.0001) | 0.9% (<.0001) | 1.1% (<.0001) | 0.5% (<.0001) | 3.2% (<.0001) | 1.9% (<.0001) | 0.8% (<.0001) | 2.1% (<.0001) |  |  |  |  |  |  | 0.4% (0.0432) |  | 0.8% (0.0041) |  |
| Partner Strain (M1) | 0.1% (0.0005) |  |  |  |  |  | 1.8% (<.0001) | 0.6% (<.0001) | 0.4% (0.0003) |  |  |  |  |  |  |  | 0.4% (0.0385) | 0.5% (0.0303) |  |  |
| Family Inequality (M1) | 0.5% (<.0001) | 0.4% (<.0001) | 0.1% (<.0001) | 0.3% (<.0001) | 0.6% (<.0001) | 0.2% (<.0001) | 1.7% (<.0001) | 0.5% (<.0001) | 0.4% (0.0007) | 0.5% (0.0001) |  |  |  |  |  |  |  |  |  |  |
| Lifetime Discrimination (M1) | 0.4% (<.0001) | 0.5% (<.0001) |  | 1.3% (<.0001) | 1.0% (<.0001) | 0.4% (<.0001) | 2.0% (<.0001) | 7.5% (<.0001) | 1.0% (<.0001) | 0.5% (<.0001) | 2.3% (<.0001) | 2.9% (<.0001) | 2.0% (<.0001) | 1.3% (0.0004) | 1.2% (<.0001) |  |  | 0.6% (0.0374) |  | 0.6% (0.0338) |
| Daily Discrimination (M1) |  | 0.1% (<.0001) | 0.1% (<.0001) |  | 0.2% (<.0001) | 0.2% (<.0001) |  |  | 0.9% (<.0001) | 1.8% (<.0001) |  |  |  |  |  | 1.7% (<.0001) |  |  |  |  |
| Stressful Life Events (M2) | 0.2% (<.0001) | 0.5% (<.0001) | 0.3% (<.0001) | 0.4% (<.0001) | 0.9% (<.0001) | 0.5% (<.0001) |  |  |  |  |  |  | 1.0% (0.0007) |  |  |  |  |  |  |  |
| Chronic Job Discrimination (M2) | 0.4% (<.0001) | 0.6% (<.0001) | 0.3% (<.0001) | 1.0% (<.0001) | 0.9% (<.0001) | 0.8% (<.0001) | 1.4% (<.0001) | 2.8% (<.0001) |  | 0.6% (<.0001) | 1.1% (0.0001) | 0.9% (0.0007) |  |  | 1.6% (0.0006) |  |  |  |  |  |
| Work Inequality (M2) | 0.5% (<.0001) | 0.8% (<.0001) | 0.5% (<.0001) | 1.3% (<.0001) | 1.9% (<.0001) | 1.0% (<.0001) | 1.0% (<.0001) | 2.1% (<.0001) |  |  |  | 1.2% (<.0001) |  |  |  |  |  |  | 0.4% (0.0174) |  |
| Neighborhood Quality (M2) | 0.2% (<.0001) | 0.4% (<.0001) | 0.3% (<.0001) | 0.5% (<.0001) | 1.1% (<.0001) | 0.6% (<.0001) | 1.2% (<.0001) | 2.9% (<.0001) | 0.6% (<.0001) |  | 1.3% (0.0008) | 2.0% (<.0001) |  |  | 1.5% (0.0002) |  | 0.7% (0.0235) |  | 1.1% (0.0052) | 0.6% (0.0501) |
| Home Inequality (M2) | 0.2% (<.0001) | 0.3% (<.0001) | 0.1% (0.0001) | 0.4% (<.0001) | 0.6% (<.0001) | 0.3% (<.0001) | 0.5% (<.0001) | 1.2% (<.0001) |  | 0.5% (0.0007) |  |  |  |  |  |  |  |  |  |  |
| Family Strain (M2) | 0.1% (<.0001) | 0.2% (<.0001) | 0.1% (0.0001) |  | 0.6% (<.0001) | 0.2% (0.0002) | 0.4% (<.0001) | 1.0% (<.0001) |  |  |  |  |  |  |  |  |  |  |  |  |
| Friend Strain (M2) | 0.7% (<.0001) | 1.0% (<.0001) | 0.4% (<.0001) | 1.3% (<.0001) | 1.8% (<.0001) | 0.6% (<.0001) | 1.8% (<.0001) | 3.8% (<.0001) | 0.6% (<.0001) | 1.5% (<.0001) |  |  |  | 0.5% (0.0159) |  |  |  | 0.6% (0.0573) | 0.9% (0.0198) |  |
| Partner Strain (M2) |  |  |  | 0.3% (<.0001) | 0.2% (<.0001) | 0.2% (<.0001) | 1.1% (<.0001) | 3.3% (<.0001) |  |  | 1.7% (<.0001) | 1.4% (<.0001) | 3.1% (<.0001) |  | 1.5% (<.0001) |  |  | 0.9% (0.0019) |  | 1.2% (0.0007) |
| Family Inequality (M2) | 0.2% (<.0001) | 0.2% (<.0001) | 0.2% (<.0001) | 0.6% (<.0001) | 0.8% (<.0001) | 0.4% (<.0001) | 0.9% (<.0001) | 2.4% (<.0001) |  |  | 1.2% (0.0009) |  | 1.1% (0.0023) |  | 1.4% (0.0004) |  |  |  |  |  |
| Lifetime Discrimination (M2) | 0.4% (<.0001) | 0.6% (<.0001) | 0.3% (<.0001) | 1.0% (<.0001) | 2.2% (<.0001) | 0.8% (<.0001) | 1.0% (<.0001) | 2.3% (<.0001) |  |  |  |  |  |  |  | 1.0% (0.0002) | 0.4% (0.0104) |  |  |  |
| Daily Discrimination (M2) |  |  |  | 0.1% (0.0002) | 0.3% (<.0001) | 0.2% (<.0001) | 0.4% (<.0001) | 1.1% (<.0001) |  |  |  |  |  | 0.5% (0.0098) |  | 0.9% (0.0020) |  |  |  |  |
| Perceived Stress Scale (M2P4) |  |  |  | 0.1% (0.0002) | 0.1% (0.0003) | 0.1% (0.0003) |  | 0.7% (<.0001) |  |  |  |  |  | 1.6% (0.0002) | 0.8% (0.0009) |  |  | 0.6% (0.0585) |  | 0.7% (0.0392) |
| Emotional Abuse (M2P4) |  |  |  |  |  | 0.1% (0.0010) | 0.4% (<.0001) | 0.9% (<.0001) |  |  | 1.2% (0.0005) | 1.0% (0.0003) | 1.1% (0.0020) |  |  |  |  |  |  |  |
| Physical Abuse (M2P4) |  | 0.2% (<.0001) |  | 0.1% (0.0001) | 0.4% (<.0001) |  | 0.4% (0.0002) | 0.6% (<.0001) |  |  |  |  |  | 0.8% (0.0038) |  | 0.8% (0.0012) |  |  |  |  |
| Sexual Abuse (M2P4) |  |  |  | 0.2% (<.0001) | 0.2% (0.0002) |  | 0.4% (0.0003) | 0.8% (<.0001) |  |  |  | 1.2% (<.0001) |  |  |  |  |  |  | 0.5% (0.0765) |  |
| Emotional Neglect (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1.0% (0.0014) |  |  |  |  |
| Physical Neglect (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Minimization/Denial (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

For the multivariate results, a similar process was followed. However, all stress variables were entered into a model simultaneously (model with all variables). In order to select the top variables, statistical variable selection was performed by adding an additional penalty that would allow the coefficients for each explanatory variable to be estimated at zero, based on a REML criterion. Next, the top 5 explanatory variables were chosen, so long as they had p < .10. In addition, any explanatory variable with p < .001 was included. The set of “top” variables across imputations was compared, and any variable that showed up in the majority of imputations for a given health outcome was included. Another GAM was run using only the top explanatory variables for an outcome, and without using any statistical variable selection. In the table, p-values from the model including all variables are reported. However, R2 / deviance explained are presented for both the all variables model and the top variable only model to show the “lost” variance explained from using only the top variables.

The results are presented in detail below, but as a crude example, Family Inequality, checklist of Stressful Life Events, and the Perceived Stress Scale were the three variables most consistently included as a top predictor of a health outcome.

Key:

M1 = MIDUS Wave 1

M2 = MIDUS Wave 2

M2P4 = MIDUS Wave 2 Biomarker Project

# Multivariate Results

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Self-rated Physical Health (M1) | Self-rated Mental Health (M1) | Self-rated Relative Health (M1) | Self-rated Physical Health (M2) | Self-rated Mental Health (M2) | Self-rated Relative Health (M2) | Chronic Conditions (M1) | Chronic Conditions (M2) | Episodic Memory (M2) | Executive Function (M2) | CRP (M2P4) | IL-6 (M2P4) | Fibrinogen (M2P4) | sICAM (M2P4) | sE-Selectin (M2P4) | Pulse Pressure (M2P4) | SBP (M2P4) | HRV RMSSD (M2P4) | LFHRV (M2P4) | HFHRV (M2P4) |
| All Variables R2 / Deviance | 2.7% | 4.4% | 2.0% | 4.0% | 5.8% | 2.6% | 9.3% | 13.3% | 4.8% | 7.6% | 4.3% | 7.1% | 5.7% | 3.9% | 3.9% | 4.5% | 2.5% | 3.4% | 4.5% | 3.8% |
| Top Variables R2 / Deviance | 2.4% | 4.3% | 1.8% | 3.9% | 5.4% | 2.3% | 8.9% | 12.1% | 3.9% | 6.3% | 4.2% | 5.8% | 4.8% | 4.7% | 3.0% | 3.1% | 2.0% | 3.3% | 3.7% | 3.3% |
| Work Inequality (M1) |  | <.0001 | <.0001 |  |  | 0.0026 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Neighborhood Quality (M1) | 0.0001 | <.0001 | <.0001 |  |  |  | <.0001 |  |  |  |  |  |  | 0.0041 | 0.0064 |  | 0.0034 |  |  |  |
| Home Inequality (M1) | <.0001 | 0.0002 |  |  | 0.0007 |  |  |  |  | <.0001 |  |  |  |  |  |  |  |  |  |  |
| Family Strain (M1) |  | 0.0002 |  |  |  |  | <.0001 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Friend Strain (M1) |  |  |  |  |  |  | 0.0273 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Partner Strain (M1) |  | <.0001 |  |  |  |  | <.0001 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Family Inequality (M1) | <.0001 | <.0001 | 0.0005 | <.0001 | 0.0003 | 0.0005 | <.0001 |  | <.0001 | <.0001 |  |  |  |  |  | 0.0046 | 0.0090 |  | 0.0047 |  |
| Lifetime Discrimination (M1) |  |  |  |  |  |  | <.0001 |  |  |  |  |  |  |  |  |  | 0.0562 | 0.0028 |  | 0.0103 |
| Daily Discrimination (M1) |  |  |  |  |  |  |  |  | 0.0004 | <.0001 |  |  |  |  |  |  |  |  |  |  |
| Stressful Life Events (M2) | <.0001 | <.0001 |  | <.0001 | <.0001 | 0.0002 | <.0001 | <.0001 | <.0001 | 0.0002 | 0.0003 | <.0001 | 0.0010 | 0.0018 |  |  |  | 0.0347 |  |  |
| Chronic Job Discrimination (M2) |  |  |  | <.0001 |  |  | <.0001 | <.0001 | <.0001 | <.0001 |  | 0.0009 | 0.0080 |  |  | 0.0010 |  |  |  |  |
| Work Inequality (M2) |  |  |  |  | 0.0003 |  |  |  |  |  |  |  | 0.0019 |  |  |  |  |  |  |  |
| Neighborhood Quality (M2) |  |  |  | 0.0002 |  | 0.0005 |  |  |  | 0.0005 | 0.0333 |  |  |  |  |  |  |  |  |  |
| Home Inequality (M2) |  |  | 0.0003 | <.0001 | <.0001 | 0.0004 |  | 0.0653 |  |  |  | 0.0046 |  |  |  |  |  |  | 0.0022 |  |
| Family Strain (M2) |  |  | 0.0006 |  | 0.0002 |  |  |  | 0.0003 |  |  | 0.0024 |  |  | 0.0249 |  |  |  | 0.0027 |  |
| Friend Strain (M2) |  | 0.0002 |  | 0.0082 |  |  |  |  |  | 0.0098 |  |  |  |  |  |  |  |  |  |  |
| Partner Strain (M2) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Family Inequality (M2) |  | <.0001 |  | <.0001 | <.0001 |  |  | <.0001 | 0.0019 | <.0001 |  |  |  |  |  |  |  | 0.0278 | 0.0118 | 0.0189 |
| Lifetime Discrimination (M2) |  |  |  |  |  |  |  | <.0001 |  |  | 0.0073 | 0.0103 | <.0001 |  | 0.0063 |  |  | 0.0007 |  | 0.0002 |
| Daily Discrimination (M2) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Perceived Stress Scale (M2P4) | <.0001 | <.0001 | 0.0001 | <.0001 | <.0001 | <.0001 | 0.0002 | <.0001 |  |  |  |  |  |  |  | 0.0344 | 0.0293 | 0.0295 |  | 0.0234 |
| Emotional Abuse (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Physical Abuse (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.0020 | 0.0061 |  |  |  |  |  |
| Sexual Abuse (M2P4) |  |  |  |  |  |  |  |  |  |  | 0.0107 |  |  | 0.0146 |  |  |  |  |  |  |
| Emotional Neglect (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.0072 |  |  |  |  |  |  |
| Physical Neglect (M2P4) |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.0203 | 0.0172 |
| Minimization/Denial (M2P4) |  |  |  |  |  |  |  |  |  |  | 0.0125 |  |  | 0.0013 |  |  |  |  |  |  |