



**LONGITUDINAL STUDY OF LIKERT-SCALED WELLNESS VARIABLES
CHARACTERIZING THE EFFECTIVENESS OF Shae**



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Data collected between 1/1/2014 and 4/16/2017

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Executive Summary

The objective of this study was to characterize the effectiveness of Shae Precision Health and Wellness Program, in improving 10 separate wellness categories. These categories were: sleep quality, memory, energy levels, digestion, general mood, brain performance, stress level, sense of humor, confidence, and overall health.

The improvements (changes in wellness) were tracked using a self-assessment 5-point likert scale at 3 to 6 month intervals throughout their active participation with ph360 for up to 3 years. In total there were 2112 individual surveys, each taken by one of 442 individual subjects at different time points. Subject ages and genders were also recorded to determine if there were significant differences in wellness improvements based on these factors. Of the 442 subjects in this study, 361 (~82%) were female and 81 (~18%) were male. The subject ages ranged from 20 to 81 years old, with a mean age of ~52 years of age.

The statistical analysis consisted of a sequence of 4 basic parts: Part I Descriptive Statistics, Part II Exploratory Data Analysis (EDA), Part III ANOVA, and Part IV Modeling. The following is a summary of the findings:

- The Shae Precision Health and Wellness Program was effective in increasing individual wellness scores. Of the 442 subjects in the study, 439 (99.3%) showed improvements in wellness scores.
- Those who started with low baseline wellness scores showed dramatic improvements, especially within the first 3 survey checkpoints, and maintained their more positive responses close to the upper-end of the 5-point scale (with average wellness scores of ~4) over time. Even those who started with an average of 3 out of 5 showed a subtle upward trend with incremental improvements towards scores of 5 and maintaining high wellness scores.
- Female subjects had significantly lower initial baseline wellness scores than males across all wellness categories except stress level. For most of the wellness categories, males and females showed about the same level of improvement in wellness scores indicating the program works well for both genders. However, females showed greater improvement than males in the energy levels, general mood, confidence and overall health categories. Given that males on average had higher baseline wellness scores than females, for many of the wellness categories they maintained higher wellness scores for the duration of the study, despite females improving more with respect to baseline scores in certain categories.
- The Shae Precision Health and Wellness Program was equally effective across all ages in the study. There were almost no significant differences in improvement of wellness scores based on age or age group.
- Of the 10 wellness categories measured, all were very highly correlated to each other except for stress level which was uncorrelated. The Shae Precision Health and Wellness Program was nearly equally effective in improving the 9 correlated wellness categories. However, it appears to have been most effective in improving sleep quality, energy levels, digestion, general mood, confidence and overall health.

Methods

Inclusion criteria

- Must have participated min 3 months
- Must have updated their data at each survey report
- Survey data are 2-3 months apart for first 1 year, 6 months apart thereafter
- Health conditions excluded (eg: pregnancy, severe illness, hospitalization)

There was only 1 missing value found within 1 response variable, this value was imputed by averaging the other 9 response variables within that survey. There were no outliers found in this data set, so no points were removed before beginning the analysis.

- 1 Age Group; Age was rounded to the nearest decade and converted from numeric to factor.
- 1 Survey Number; For each subject, survey date was arranged oldest to newest and assigned a factor (1, 2, 3,...,N). So, survey number 1 is the first survey the subject took, and survey number N is the last survey the subject took, and in this way survey number is nested within subject.
- 10 Response CFBs; 10 response change from baseline (CFB) values were calculated from the 10 original response variables. Each of the response CFB values was calculated within subject by subtracting the baseline response (survey number = 1 response) from the other survey responses for that subject (survey number 2 to N responses, where N is the last survey response per subject).
- 1 Baseline Average; For each subject, the average of all 10 baseline responses (survey number 1 responses) was calculated.
- 1 Baseline Average Group; For each subject, baseline average was rounded to the nearest integer and converted from numeric to factor.
- 1 CFB Average; For each subject, the average of all 10 baseline responses (survey number 1 responses) was subtracted from the average of all 10 final responses (survey number = N responses).
- 1 CFB Average Group; For each subject, CFB average was rounded to the nearest 1/2 and converted from numeric to factor.

The responses expressed as change from baseline (CFB) were intended to more concisely answer questions of overall improvement, at the subject level (i.e. within subject), while controlling for the initial subject-to-subject variability in baseline wellness metrics.

Statistical Analysis

The statistical analysis consisted of a sequence of 4 basic parts: Part I Descriptive Statistics, Part II Exploratory Data Analysis (EDA), and Part III Regression Analysis. The objectives of each part of the analysis are as follows

Part I, Descriptive Statistics; This portion of the analysis was intended to give us a general sense of the data at a very high level, and to guide the Exploratory Data Analysis.

Part II, Exploratory Data Analysis; This portion of the analysis was intended to uncover and highlight interesting features in the data in more detail, and this information was then used to guide subsequent analyses. Specifically, interesting features found during the EDA, were subjected to more formal statistical testing in the ANOVA and Modeling parts of the analysis.

Part III, ANOVA; This portion of the analysis examined in detail the effect of independent variables (as grouping factors) on the dependent response variables. One-way and Two-way ANOVA were investigated. Additionally, repeated measures ANOVA was investigated via models in Part IV.

Part IV, Modeling; This portion of the analysis was the most formal and was intended to quantify specific effects observed less formally during previous parts of the analysis.

The analyses were all conducted in R using a variety of packages detailed in Appendix B.

Results

Demographics

The data in this analysis consisted of results from 2112 surveys, each survey was taken by one of 442 individual subjects. Each subject completed anywhere from 2 to 9 surveys each at different time points, spaced approximately 6 months apart. There were 10 primary response variables of interest measured by the surveys, each of these response variables corresponded to 10 distinct wellness categories. These categories were: sleep quality, memory, energy levels, digestion, general mood, brain performance, stress level, sense of humor, confidence, and overall health. The response variables were integers 1-5, with a Likert-Type Scaling (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree). In the original data there were also 4 independent predictor variables: subject, gender, age, and survey date. As previously mentioned, there were 442 subjects, of these subjects 361 (~82%) were female and 81 (~18%) were male. The subject ages varied from 20 to 81 years old, with a mean age of ~52 years old. The surveys were collected between 1/1/2014 and 4/16/2017.

Table 1 below summarizes grouped means of the responses by independent factors: survey number, age group, and gender. The left-hand side of the table includes the original response values (scaled red to blue), while the right-hand side of the table includes the change from baseline (CFB) response values (scaled light to dark green). The table clearly shows that there is a strong relationship between wellness scores and survey number. This is apparent in the first 8 rows of the table where wellness scores steadily increase with survey number. This trend holds for nearly all of the wellness categories, except for stress level which shows a dampened correlation to the other wellness parameters, with an apparent slight increase in stress level wellness with increasing survey number. Thus, as the individual progresses through Shae Precision Health and Wellness Program, **there is a consistent increase in wellness scores for all 10 wellness categories**, and this effect is more subdued within the stress level wellness category. Looking at the CFB grouped means on the right-hand side of the table, it is apparent that **the most dramatic improvements are made within the first couple check-ins (surveys 2 and 3, ~6 months and ~1 year into ph360 participation)**. Then after the first year, the improvements, or increases in CFB values, become smaller/subtler as mean wellness scores approach 4 on this 5-point scale. This apparent reduction in the "rate of improvement" is likely an effect of the measurement approaching the maximum of the scale, and likely doesn't indicate that ph360 participation is becoming less impactful, but simply shows that by the 1-year time point, a significant portion of the subjects have begun to reach their maximum wellness scores of 5.

While the effect of survey number completely dominates the data, this summary also shows an effect of gender, with males exhibiting higher wellness scores than females, as well as an even smaller or possibly non-existent effect of age (that will require more formal testing in later parts of the analysis to determine if this effect really exists). At first glance it appears that maybe wellness scores are lower for the youngest subjects and higher for the eldest subjects.

Please see Appendix A [A7] for complete results, including two-way tables combining multiple grouping factors.

Also, as an aside, we should not expect CFB values on the right-hand side of the table to equal the row differences in original response values on the left-hand side of the table. This is because the CFB values are calculated per subject, while the original response values are averaged across all subjects, and the number of surveys a given subject responded to varied, with less subjects or a lower n for each increase in survey number.

Table Summarizing Mean Survey Responses by Various Grouping Factors																						
Grouping	Group	Responses	Average Rating										Average Change from Baseline Rating									
			Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health
Survey Number (Order of Survey Responses Per Subject)	1	442	1.9	2.1	2.0	2.0	2.2	2.2	2.8	2.4	2.1	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	441	3.1	3.0	3.1	3.1	3.2	3.0	3.4	3.3	3.2	3.3	1.3	0.9	1.1	1.1	1.0	0.8	0.5	0.9	1.0	1.1
	3	441	3.7	3.5	3.6	3.5	3.6	3.4	3.7	3.6	3.7	3.9	1.8	1.4	1.7	1.5	1.5	1.2	0.8	1.2	1.6	1.7
	4	419	3.8	3.7	3.9	3.8	3.9	3.7	3.8	3.9	3.9	4.1	2.0	1.6	1.9	1.8	1.7	1.5	1.0	1.5	1.8	2.0
	5	235	4.0	3.9	4.1	3.9	4.0	3.7	3.9	3.9	4.1	4.2	2.2	1.7	2.2	1.9	1.9	1.5	1.3	1.6	2.0	2.1
	6	110	4.0	3.9	4.1	3.9	4.2	4.0	4.0	4.1	4.0	4.2	2.1	1.7	2.2	1.9	2.0	1.7	1.6	1.8	1.9	2.1
	7	16	4.2	4.3	4.3	4.3	4.5	4.3	3.2	4.3	4.3	4.3	1.4	1.4	1.4	1.6	1.6	1.3	0.6	1.4	1.7	1.4
	8	7	4.6	4.6	4.4	4.1	4.6	4.7	3.3	4.6	4.0	4.4	2.0	2.1	1.6	1.9	1.9	1.9	0.7	2.0	1.6	1.7
Age Group (All Subjects Grouped into Nearest Decade)	20	59	3.1	3.3	2.9	2.9	3.1	3.0	3.6	3.3	3.1	3.2	1.4	1.2	1.2	1.1	1.0	0.9	0.4	1.0	1.4	1.3
	30	160	3.6	3.3	3.4	3.5	3.4	3.4	3.4	3.5	3.5	3.6	1.4	1.0	1.1	1.1	1.2	0.9	0.9	0.8	1.1	1.3
	40	313	3.4	3.3	3.5	3.3	3.5	3.3	3.6	3.6	3.5	3.7	1.4	1.1	1.5	1.1	1.3	1.0	0.8	1.1	1.3	1.4
	50	492	3.2	3.1	3.2	3.2	3.3	3.2	3.5	3.3	3.3	3.5	1.4	1.0	1.4	1.3	1.2	1.0	0.7	0.9	1.3	1.3
	60	639	3.1	3.1	3.2	3.1	3.2	3.0	3.5	3.3	3.2	3.4	1.4	1.1	1.4	1.2	1.2	1.0	0.7	1.1	1.2	1.4
	70	383	3.4	3.3	3.4	3.3	3.4	3.3	3.5	3.4	3.5	3.5	1.5	1.2	1.2	1.3	1.2	1.1	0.7	1.0	1.3	1.4
	80	66	3.6	3.7	3.8	3.8	3.9	3.6	3.1	4.0	3.8	3.9	1.0	0.5	1.0	1.1	1.3	0.5	0.1	1.0	1.3	1.2
Gender	Female	1725	3.2	3.1	3.2	3.2	3.3	3.1	3.5	3.4	3.3	3.5	1.4	1.1	1.4	1.2	1.2	1.0	0.7	1.0	1.3	1.4
	Male	387	3.6	3.6	3.5	3.6	3.6	3.6	3.4	3.6	3.7	3.7	1.4	1.0	1.1	1.1	1.0	0.9	0.6	1.0	1.1	1.2

Table 1. Table summarizing descriptive statistics of the data.

The histograms below summarize the 2112 individual surveys by age and each is color-coded by a different grouping factor. The histograms clearly show that there was a non-uniform distribution of the ages of subjects, with more subjects at higher ages. The average age of subjects was 52 years old, with over 80% of the surveys taken by subjects over the age of 40. Histogram 1 shows that there were also differences in the gender distribution, with 1725 surveys taken by female subjects (mean age ~54) and only 387 surveys taken by male subjects (mean age ~48). Histogram 2 shows that there is a slight increase in baseline average response with increasing age. Histogram 3 shows that there are similar changes in baseline average response across all ages. In other words, improvements in wellness scores, as referenced by baseline scores, were similar across all subject ages.

Please see Appendix A [A8, A9, A10] for larger histograms.

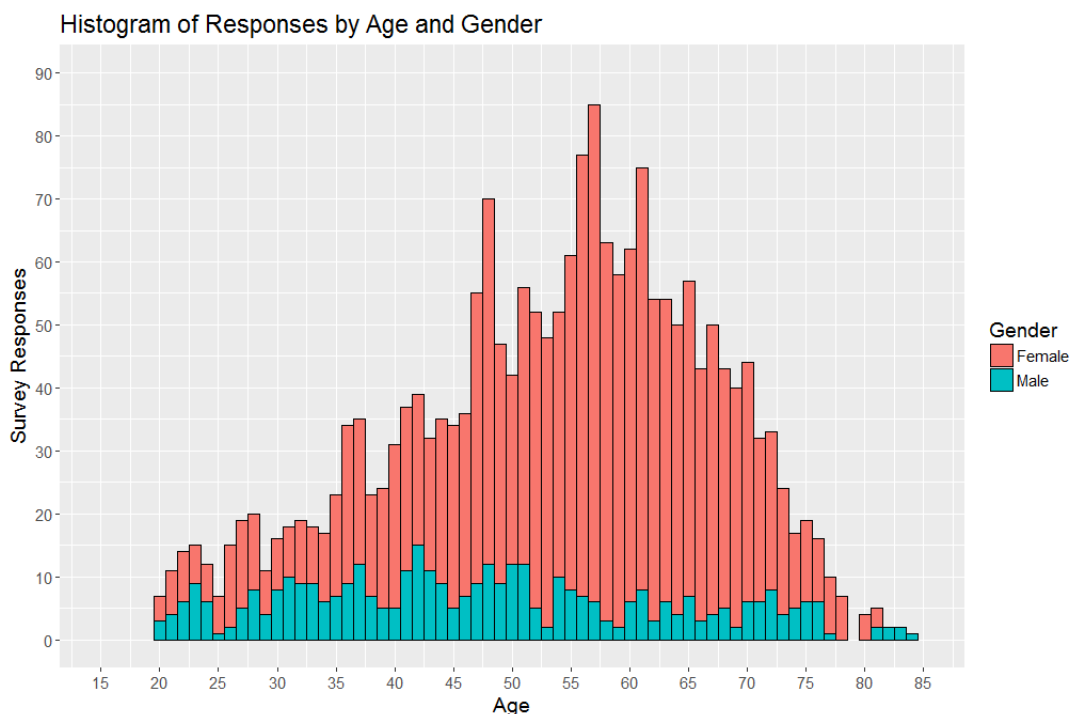


Figure 1. Surveys by Age Colored According to Gender.

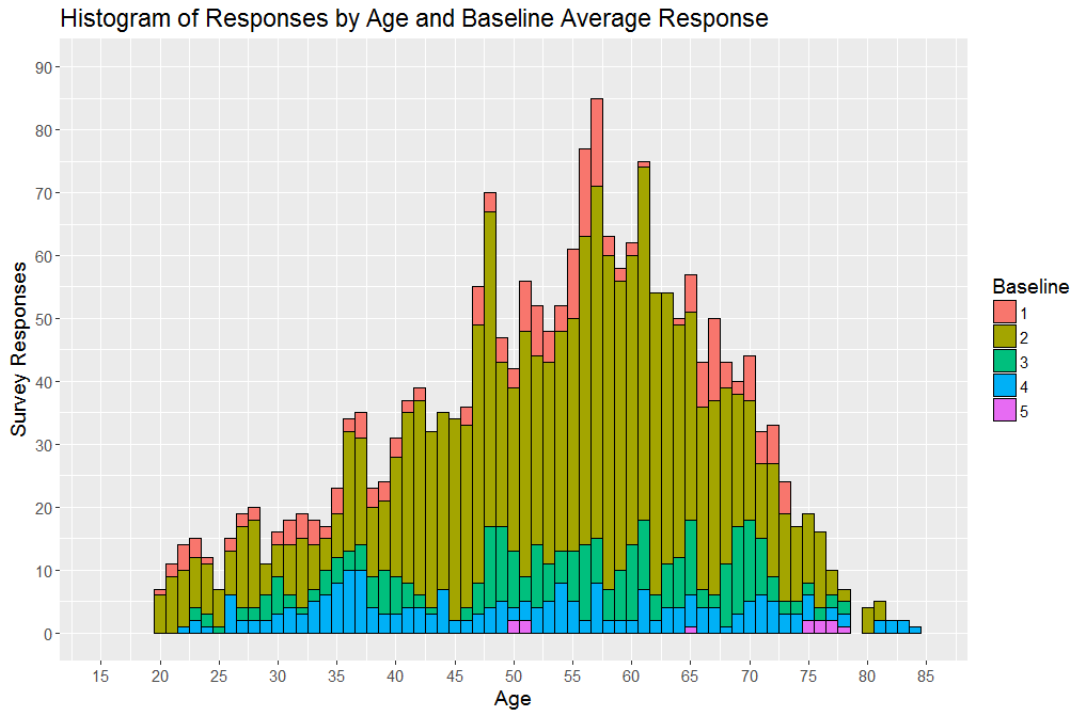


Figure 2. Surveys by Age Colored According to Baseline Average Response.

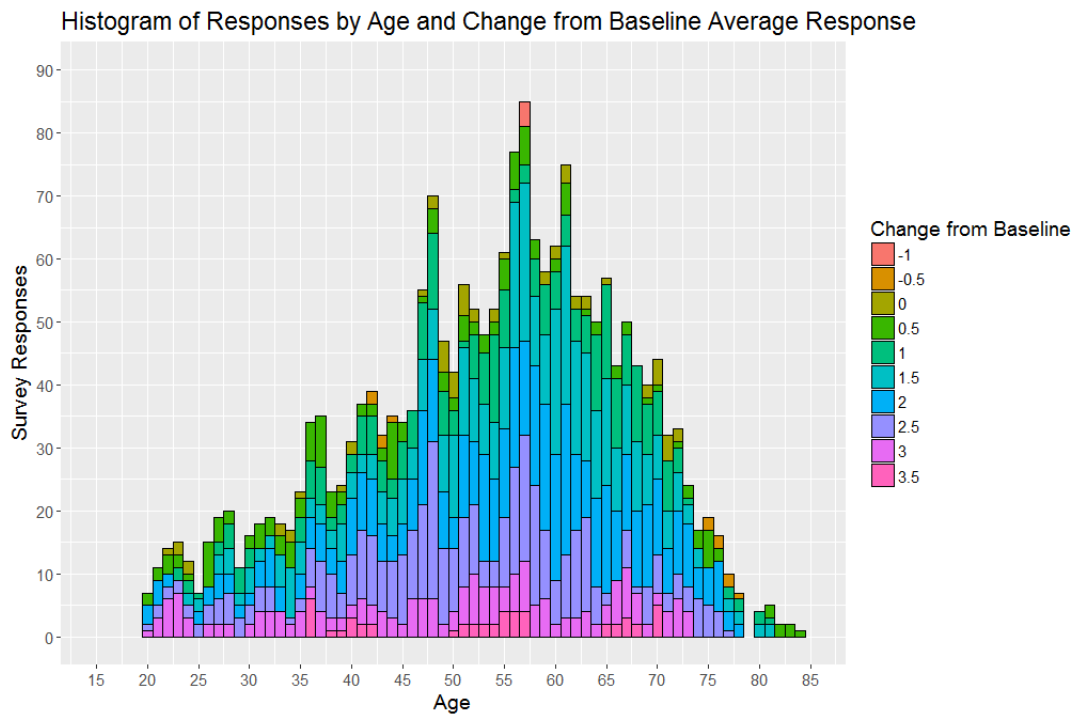


Figure 3. Surveys by Age Colored According to CFB Average Response.

Figure 4 below shows that there was consistent improvement over time for each of the 10 wellness categories, except for stress level after survey number 4. This plot also shows that the most rapid improvement occurs within the first two survey checkpoints (at ~3 and ~6 months). After this point, there is higher variability in the data as observed through larger error bars. Data from survey numbers 7-9 has the highest variability, since only a very small subset of the original 442 subjects reached the 7-9 survey numbers. Across all survey numbers the age groups follow the same basic trajectories, without significantly different group means (as observed by overlapping error bars). This means that the Shae Precision Health and Wellness Program is “equally” effective in improving wellness scores for all age groups. Please see Appendix A [A1] for large scale.

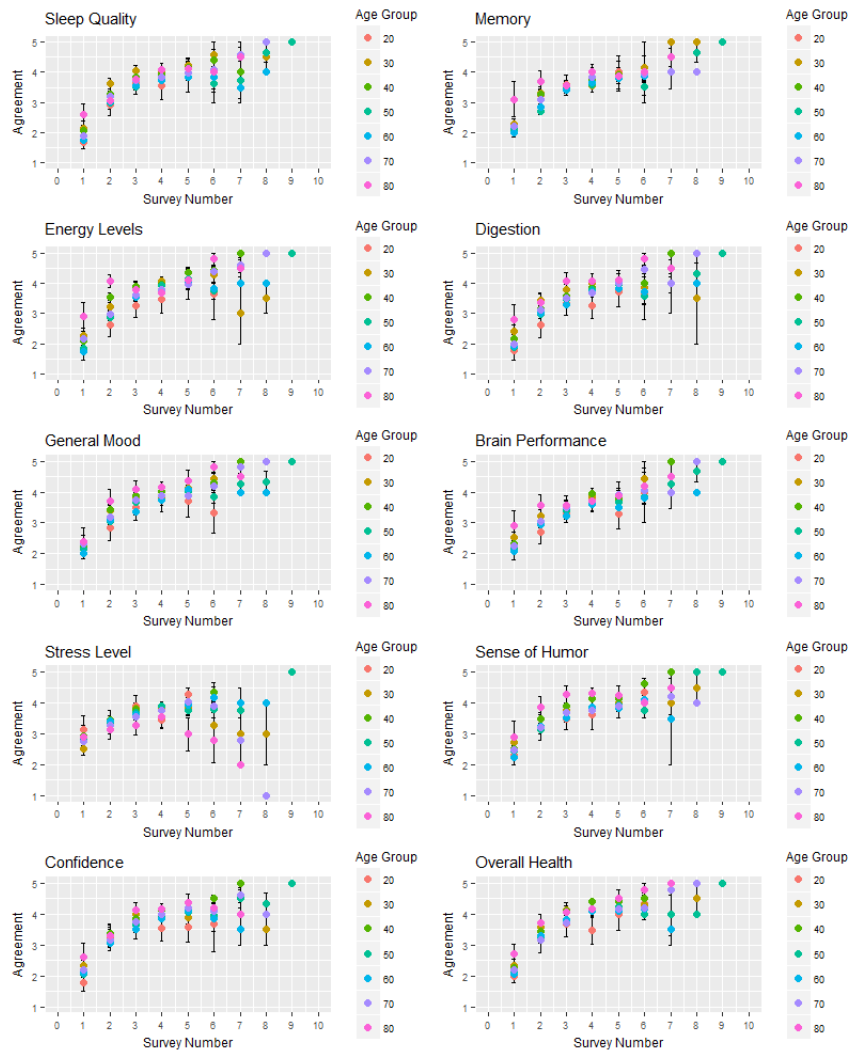


Figure 4. Summary of Wellness Metrics by Age Group and Over Time (Survey Number).

Figure 5 below shows that there was consistent improvement over time (survey number) for each of the 10 wellness categories, except for stress level after survey number 4. This plot also shows that the most rapid improvement occurs within the first three survey checkpoints (survey numbers 1, 2, and 3). After this point, for survey numbers 4-9 there is still improvement in mean wellness scores, but also there is higher variability in the data as observed through larger error bars. Across all survey numbers the genders follow the same basic trajectories, however there are significantly different group means (as observed by non-overlapping error bars). In most cases males have higher mean wellness scores than females at greater than 95% confidence. This means that the Shae Precision Health and Wellness Program is effective in improving wellness scores for both males and females. However, males have higher starting baseline wellness scores than females, and this pattern continues, so higher scores hold for the duration of the Shae Precision Health and Wellness Program. Please see Appendix A [A2] for a larger graphic.

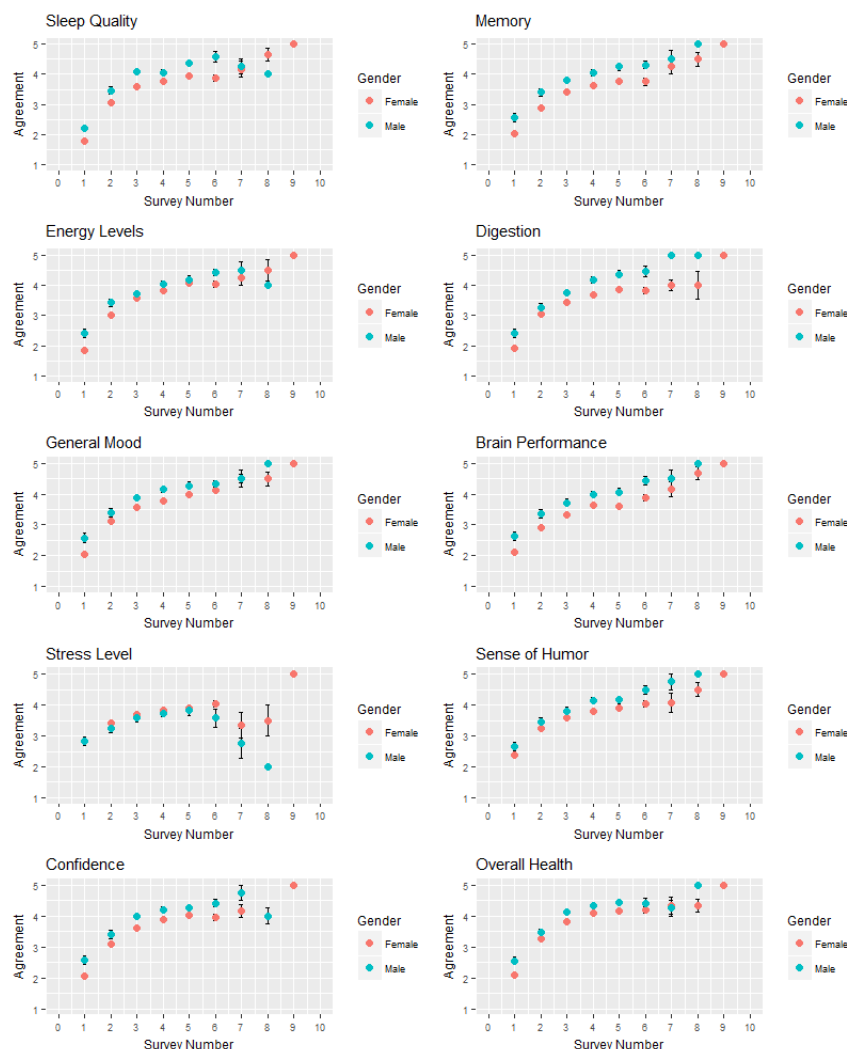


Figure 5. Summary of Wellness Metrics by Gender and Over Time (Survey Number).

Figure 6 below shows that the extent of improvement in wellness category scores shown over time (survey number) was highly dependent on the baseline starting point of the subject. These plots are grouped by “baseline average group”, this is the rounded average score per subject, for survey number 1, across all 10 wellness categories. These plots show that subjects in the 1 and 2 baseline average groups show the most rapid and greatest extent of improvement in wellness category scores. Subjects in the 3 baseline average group show improvement in wellness category scores, but not as rapidly or to the same extent as subjects in the 1 and 2 baseline average groups. Subjects in the 4 and 5 baseline average groups more-or-less maintained high scores throughout the course of the Program. This means that the Shae Precision Health and Wellness Program is most effective in improving wellness scores for those with low starting wellness scores. Please see Appendix A [A3] for a larger graphic.

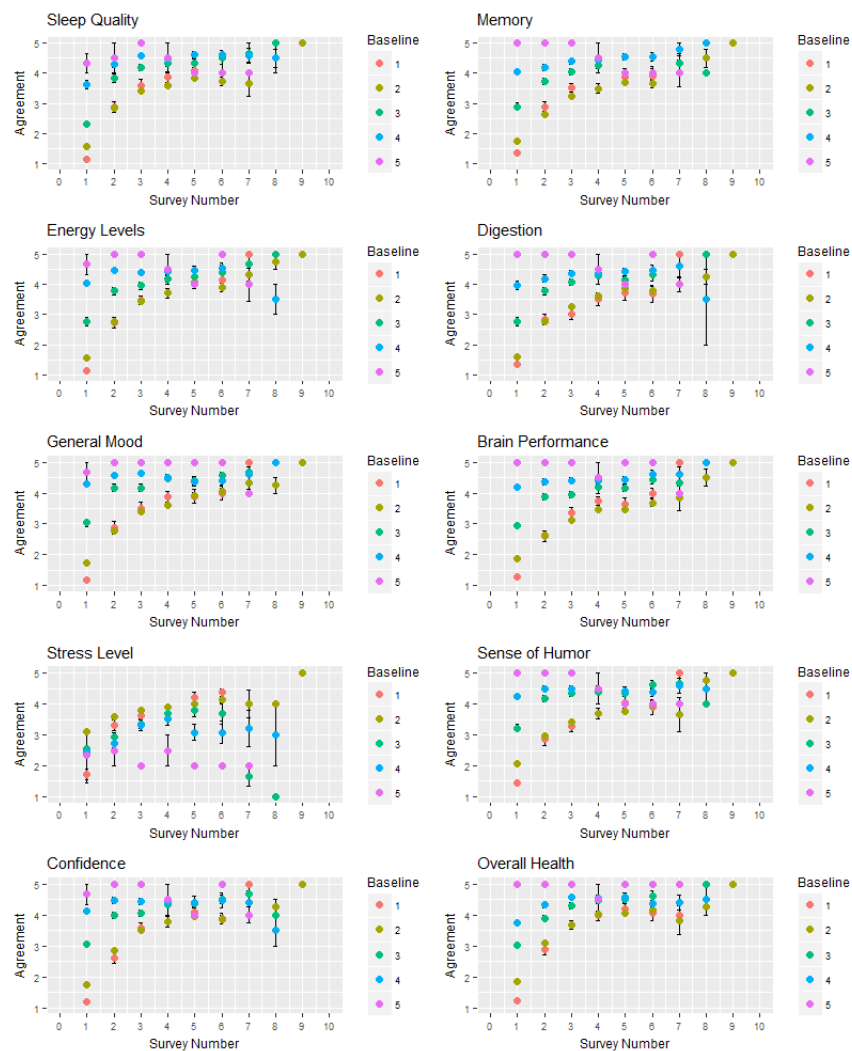


Figure 6. Summary of Wellness Metrics by Baseline Average Group and Over Time (Survey Number).

Figure 7 below shows the average change from baseline (CFB) wellness scores over time (survey number), color-coded by age group. This plot shows that most of the gains, or increases in CFB, occur within the first 3 checkpoints (survey numbers 2, 3, and 4). Also, this pattern of increase is the same across all age groups within the first 3 checkpoints. Beyond the 3rd checkpoint, for surveys 5-9 the variability increases to the point where it is difficult to draw conclusions about the data, especially within the age groups. However, there still appears to be a slight upward trend in the data (or subtle improvement in CFB wellness scores for surveys 5-9). **This means that the Shae Precision Health and Wellness Program is most effective in improving CFB wellness scores within the first 3 checkpoints, and this conclusion holds for all age groups.** Please see Appendix A [A4] for a larger graphic.

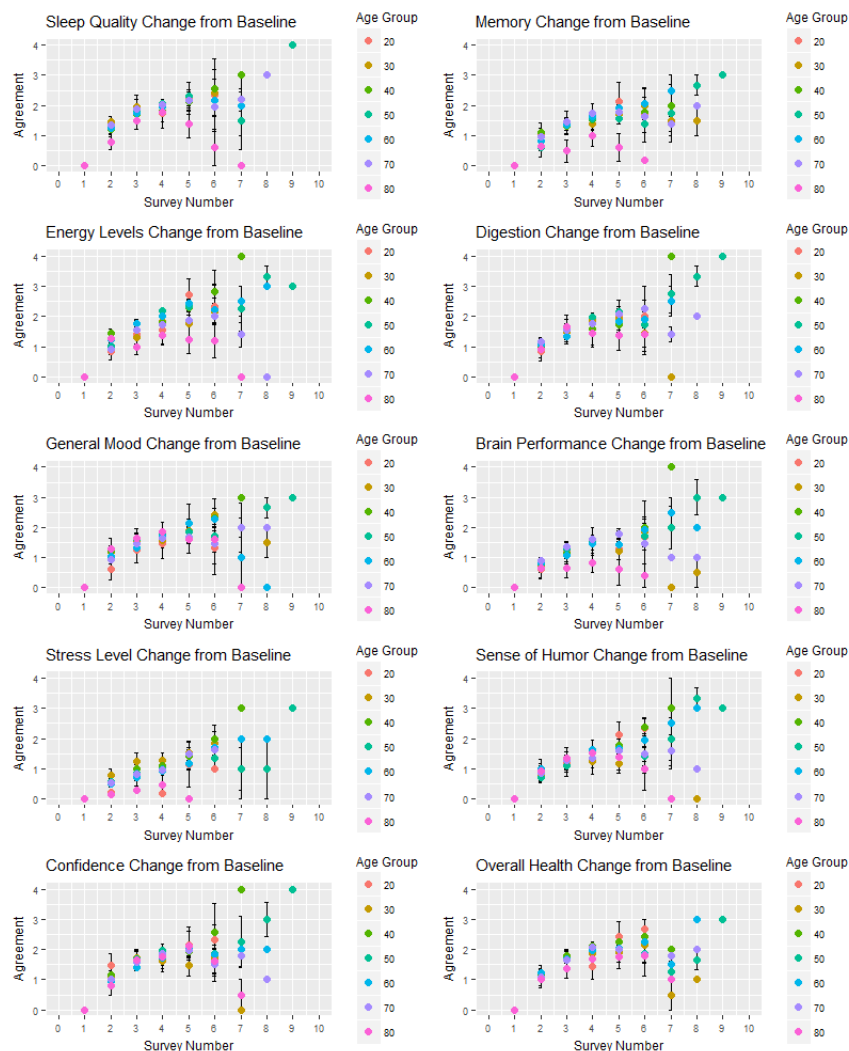


Figure 7. Summary of Change from Baseline Wellness Metrics by Age Group and Over Time (Survey Number).

Figure 8 below shows the average change from baseline (CFB) wellness scores over time (survey number), color-coded by gender. This plot shows that most of the gains, or increases in CFB, occur within the first 4 checkpoints (survey numbers 2, 3, 4, and 5). Also, this pattern of increase is basically the same for males and females within the first 4 checkpoints. However, it appears that for the wellness categories of energy levels, mood change, confidence, and overall health, the average CFB wellness scores are actually higher for females than for males. Beyond the 4th checkpoint, for surveys 6-9 the variability increases to the point where it is difficult to draw conclusions about the data. However, there still appears to be a slight upward trend in the data (or subtle improvement in CFB wellness scores for surveys 5-9) for the majority of wellness categories. This means that the Shae Precision Health and Wellness Program is most effective in improving CFB wellness scores within the first 3-4 checkpoints, and it appears that for several of the wellness categories females exhibit greater improvement in CFB wellness scores than males. Please see Appendix A [A5] for a larger graphic.

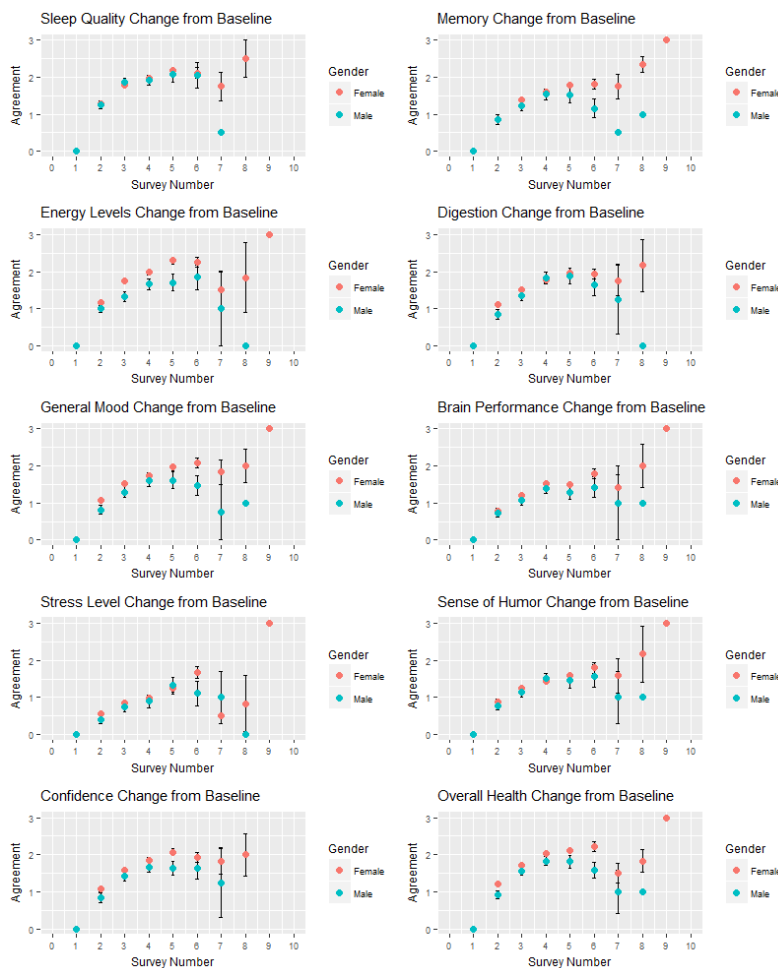


Figure 8. Summary of Change from Baseline Wellness Metrics by Gender and Over Time (Survey Number).

Figure 9 below shows the average change from baseline (CFB) wellness scores over time (survey number), color-coded by baseline average group. This plot shows that most of the gains, or increases in CFB, occur within the first 3 checkpoints (survey numbers 2, 3, and 4). Also, this pattern of increase is very different across all baseline average groups within the first 3 checkpoints. Basically, subjects in the 1, 2, and 3 baseline average groups exhibit the largest improvement in CFB wellness scores, while subjects in the 4 and 5 baseline average groups basically maintain their already high wellness scores. Beyond the 3rd checkpoint, for surveys 5-9 there are statistically significant differences between the baseline average groups, however the trends are flat for most of the wellness categories. However, for some of the wellness categories there still appears to be a slight upward trend in the data (or subtle improvement in CFB wellness scores for surveys 5-9). **This means that the Shae Precision Health and Wellness Program is most effective in improving CFB wellness scores within the first 3 checkpoints, and subjects with baseline average scores of 1, 2, and 3 exhibit greater improvements in average CFB than subjects with baseline average scores of 4 and 5 (as these subjects already have very high wellness scores to start with).** Please see Appendix A [A6] for a larger graphic.

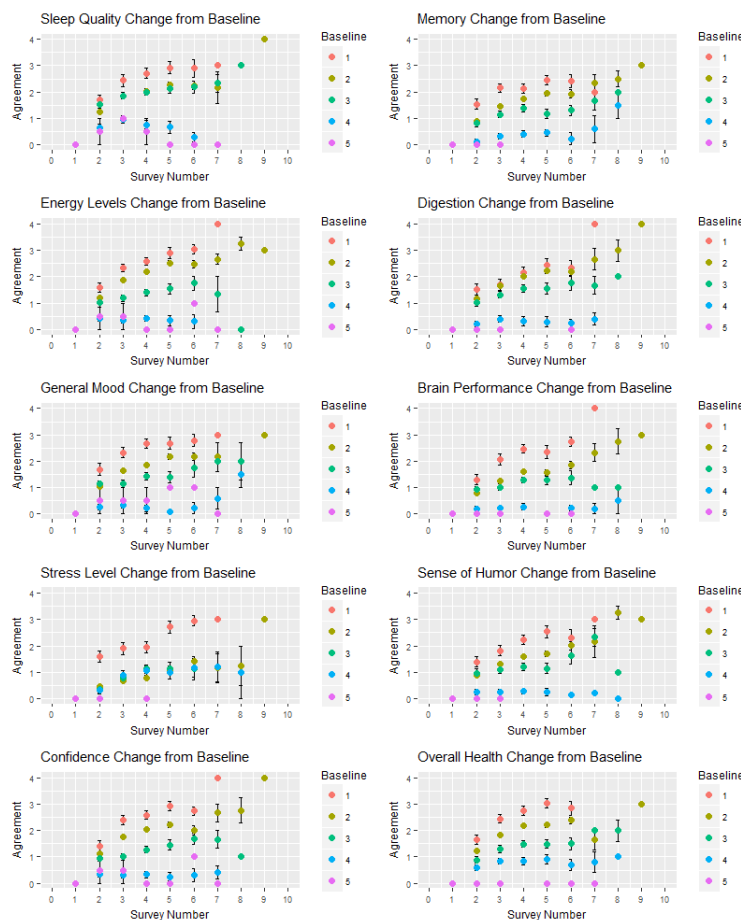


Figure 9. Summary of Change from Baseline Wellness Metrics by Baseline Average Group and Over Time (Survey Number).

Table 2 below is a 2-dimensional histogram of age group and average change from baseline (CFB) group. In the grid formed by age group and average CFB group categories, counts of subjects are recorded and color-coded. Basically, this is another way to visually express the data from histogram 3 on the last page. However, this graphical device makes it a bit easier to identify patterns, and thus is a more conclusive a method. The objective was to confirm that the previous conclusion of no difference in average CFB across age groups (or similar effectiveness of program across age groups) was correct, or to reject the conclusion by finding a pattern. The basic circular shape of the colored area confirms that the original conclusion was correct, that the Shae Precision Health and Wellness Program was similarly effective for all ages.

Table 2. Two-Dimensional Histogram of Age Group and CFB Group.

Two Dimensional Histogram of All 442 Subjects		Grouped by Average Change from Baseline (CFB)											Age %
		-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5	4	
Grouped by Age	20	0	0	1	2	1	1	2	2	4	0	0	2.9%
	30	0	0	1	5	3	9	7	6	4	0	0	7.9%
	40	0	1	1	9	10	9	13	16	5	3	0	15.2%
	50	0	0	4	5	19	19	23	21	11	1	0	23.3%
	60	1	0	2	7	14	39	39	27	8	2	0	31.4%
	70	0	0	3	4	13	14	21	9	8	3	0	17.0%
	80	0	1	0	2	2	2	3	0	0	0	0	2.3%
CFB %		0.2%	0.5%	2.7%	7.7%	14.0%	21.0%	24.4%	18.3%	9.0%	2.0%	0.0%	

Figure 10 below shows the relationship between average change from baseline (CFB) scores versus average baseline scores for all 442 subjects, color-coded by gender. Key take-aways are that nearly all of the 442 subjects (except for 3) showed improvement in wellness scores. Also, there is a strong inverse association between baseline scores and change from baseline scores. Subjects with lower initial baseline scores exhibited higher CFB scores and vice-versa. **This means that subjects with initially low baseline wellness scores typically have the most to gain from Shae Precision Health and Wellness Program.**

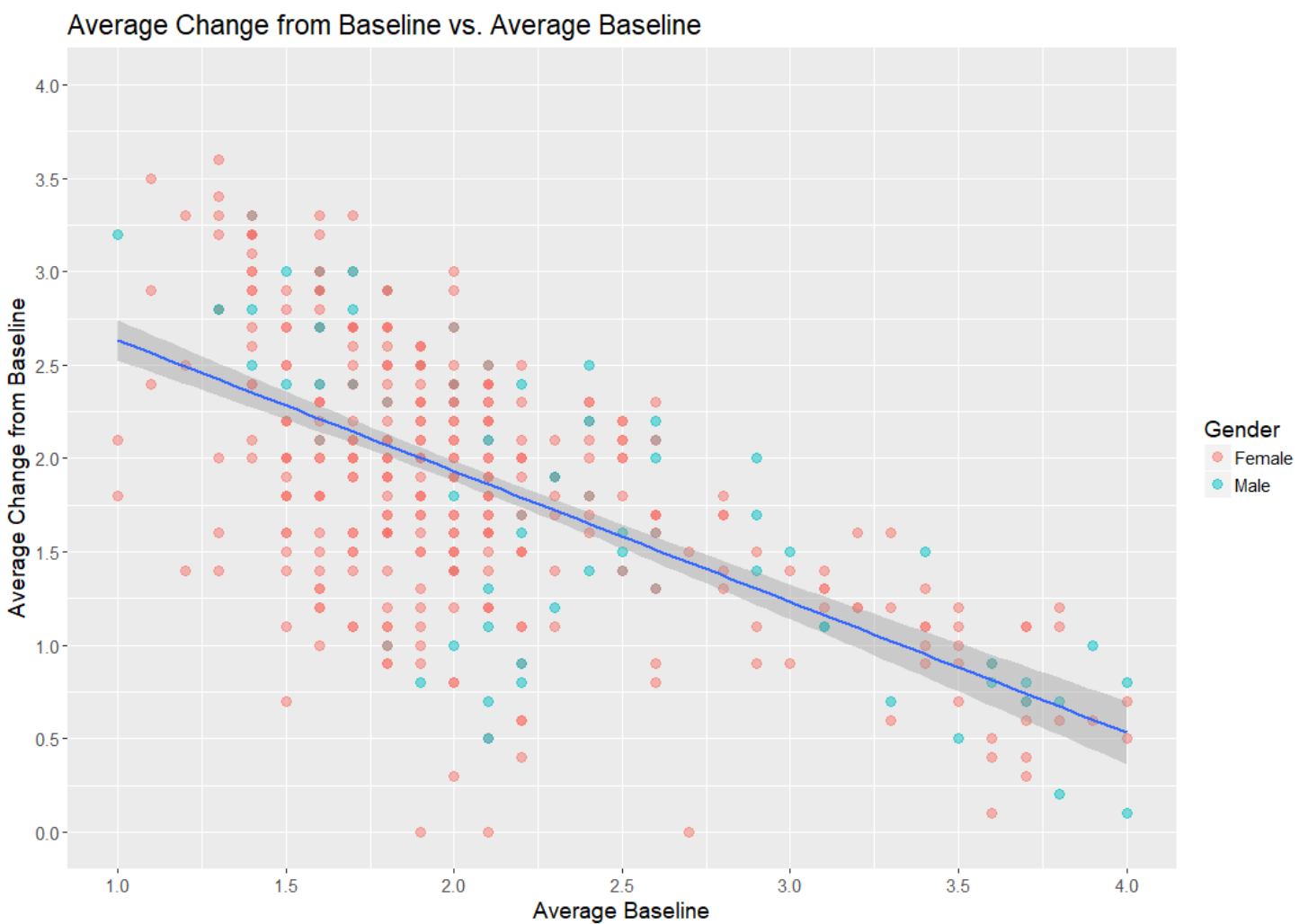


Figure 10. Scatterplot of Average Change from Baseline vs. Average Baseline.

Figure 11 below shows all correlation coefficients (Pearson's R's) for each pair of response variables. Also, included in the correlations analysis was the survey number variable. The table shows a very high level of correlation between all of the wellness categories except stress level, which was uncorrelated. The table also shows that survey number was also positively correlated to wellness category scores. **This means that all wellness categories except for stress level, increased with increasing survey number.** Please see Appendix A [A13] for a larger table of correlations.

Correlations Matrix of Survey Categories

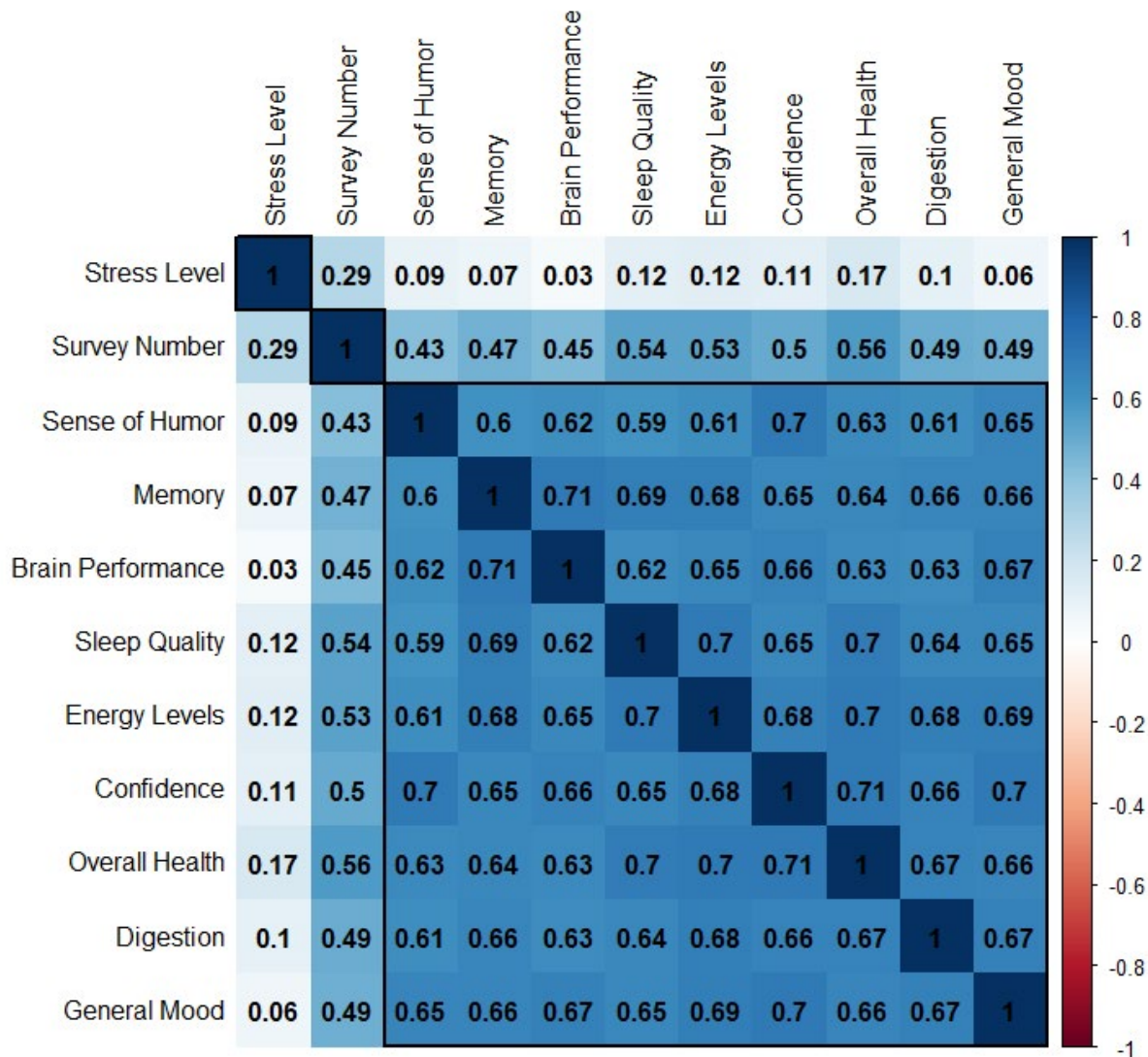


Figure 11. Correlations Matrix of Response Variables.

Changes in Wellness Variables

Table 4 below summarizes group-wise differences observed in one-way ANOVA, treating the 10 wellness categories as response variables and gender, age group, and survey number as grouping factors. Key take-aways from the ANOVA performed on the wellness scores were:

1. Males exhibit higher wellness scores than females across all categories, except for stress level.
2. There were only a few significant differences in wellness scores between age groups. The Shae Precision Health and Wellness Program was "equally" effective for all ages.
3. There were more statistically significant differences between early survey numbers 1, 2, and 3, than for later survey numbers 4, 5, 6,... This is because the largest improvements in wellness scores occurred during the first few checkpoints (survey numbers 2, 3, and 4).

Table 4. Table Highlighting Significant Group-wise Differences from One-Way ANOVA for 10 wellness categories.

Summary of ANOVA Modeling Wellness Category Scores by Grouping Factors: Gender, Age Group, Survey Number. Rows are Pairwise Differences (Left Group - Right Group). Colored Cells Identify Significance at 95% Confidence.																					
Gender		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
Male	Female	0.42	0.00	0.46	0.00	0.31	0.00	0.41	0.00	0.34	0.00	0.44	0.00	-0.12	0.07	0.27	0.00	0.38	0.00	0.29	0.00
Age Group		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
30	20	0.50	0.14	0.02	1.00	0.46	0.25	0.60	0.03	0.31	0.70	0.39	0.35	-0.22	0.87	0.25	0.82	0.37	0.46	0.41	0.27
40	20	0.35	0.47	0.00	1.00	0.60	0.02	0.44	0.18	0.37	0.42	0.29	0.62	0.00	1.00	0.36	0.37	0.43	0.20	0.47	0.09
50	20	0.09	1.00	-0.21	0.87	0.28	0.70	0.29	0.66	0.18	0.95	0.14	0.98	-0.10	1.00	0.07	1.00	0.23	0.83	0.23	0.80
60	20	0.05	1.00	-0.20	0.89	0.22	0.88	0.22	0.86	0.07	1.00	0.03	1.00	-0.10	1.00	0.05	1.00	0.16	0.96	0.20	0.88
70	20	0.27	0.73	0.03	1.00	0.42	0.24	0.41	0.23	0.31	0.60	0.28	0.63	-0.16	0.96	0.16	0.97	0.38	0.32	0.28	0.63
80	20	0.51	0.28	0.41	0.50	0.90	0.00	0.92	0.00	0.73	0.03	0.59	0.09	-0.47	0.26	0.70	0.02	0.67	0.05	0.72	0.01
40	30	-0.15	0.89	-0.02	1.00	0.15	0.91	-0.16	0.86	0.06	1.00	-0.10	0.98	0.23	0.42	0.10	0.98	0.05	1.00	0.06	1.00
50	30	-0.41	0.01	-0.23	0.37	-0.17	0.77	-0.31	0.10	-0.12	0.94	-0.25	0.28	0.12	0.91	-0.18	0.66	-0.14	0.90	-0.18	0.65
60	30	-0.45	0.00	-0.22	0.39	-0.24	0.38	-0.38	0.01	-0.24	0.37	-0.36	0.01	0.12	0.90	-0.21	0.47	-0.21	0.50	-0.21	0.43
70	30	-0.23	0.49	0.01	1.00	-0.04	1.00	-0.19	0.71	0.00	1.00	-0.11	0.97	0.07	1.00	-0.09	0.98	0.01	1.00	-0.13	0.91
80	30	0.01	1.00	0.39	0.31	0.45	0.22	0.32	0.60	0.42	0.28	0.20	0.92	-0.25	0.76	0.44	0.16	0.30	0.66	0.31	0.57
50	40	-0.26	0.07	-0.21	0.21	-0.32	0.01	-0.15	0.63	-0.18	0.45	-0.15	0.64	-0.10	0.89	-0.29	0.02	-0.19	0.35	-0.24	0.09
60	40	-0.30	0.01	-0.20	0.22	-0.38	0.00	-0.22	0.15	-0.30	0.02	-0.26	0.03	-0.10	0.85	-0.31	0.00	-0.26	0.04	-0.26	0.02
70	40	-0.08	0.99	0.03	1.00	-0.18	0.53	-0.03	1.00	-0.06	1.00	-0.01	1.00	-0.16	0.56	-0.20	0.33	-0.05	1.00	-0.19	0.39
80	40	0.16	0.97	0.41	0.17	0.30	0.62	0.48	0.08	0.36	0.37	0.30	0.53	-0.48	0.04	0.34	0.37	0.25	0.78	0.25	0.71
50	50	-0.04	1.00	0.01	1.00	-0.07	0.98	-0.07	0.98	-0.11	0.77	-0.11	0.70	0.00	1.00	-0.02	1.00	-0.07	0.97	-0.03	1.00
60	50	0.18	0.34	0.24	0.07	0.14	0.72	0.13	0.77	0.13	0.78	0.14	0.62	-0.06	0.99	0.09	0.94	0.15	0.62	0.05	1.00
70	50	0.42	0.15	0.62	0.00	0.62	0.01	0.63	0.00	0.54	0.02	0.45	0.07	-0.37	0.18	0.63	0.00	0.44	0.11	0.49	0.03
80	50	0.22	0.10	0.23	0.06	0.20	0.20	0.19	0.22	0.24	0.05	0.25	0.02	-0.05	0.99	0.11	0.75	0.22	0.11	0.08	0.95
60	60	0.46	0.08	0.61	0.00	0.68	0.00	0.70	0.00	0.66	0.00	0.56	0.01	-0.37	0.17	0.65	0.00	0.51	0.03	0.52	0.01
70	60	0.24	0.81	0.38	0.22	0.48	0.08	0.51	0.04	0.42	0.19	0.31	0.48	-0.32	0.39	0.54	0.02	0.29	0.59	0.44	0.09
Survey Number		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
2	1	1.26	0.00	0.84	0.00	1.12	0.00	1.06	0.00	1.02	0.00	0.78	0.00	0.53	0.00	0.86	0.00	1.02	0.00	1.14	0.00
3	1	1.79	0.00	1.35	0.00	1.65	0.00	1.47	0.00	1.48	0.00	1.18	0.00	0.83	0.00	1.21	0.00	1.55	0.00	1.69	0.00
4	1	1.94	0.00	1.56	0.00	1.89	0.00	1.75	0.00	1.69	0.00	1.48	0.00	0.97	0.00	1.44	0.00	1.80	0.00	1.96	0.00
5	1	2.15	0.00	1.71	0.00	2.15	0.00	1.93	0.00	1.88	0.00	1.47	0.00	1.06	0.00	1.52	0.00	1.95	0.00	2.04	0.00
6	1	2.13	0.00	1.71	0.00	2.14	0.00	1.93	0.00	2.01	0.00	1.75	0.00	1.12	0.00	1.68	0.00	1.90	0.00	2.07	0.00
7	1	2.31	0.00	2.17	0.00	2.35	0.00	2.24	0.00	2.34	0.00	2.03	0.00	0.35	0.95	1.82	0.00	2.18	0.00	2.15	0.00
3	2	0.53	0.00	0.51	0.00	0.53	0.00	0.41	0.00	0.46	0.00	0.40	0.00	0.29	0.00	0.35	0.00	0.53	0.00	0.55	0.00
4	2	0.68	0.00	0.71	0.00	0.77	0.00	0.70	0.00	0.67	0.00	0.70	0.00	0.43	0.00	0.58	0.00	0.78	0.00	0.82	0.00
5	2	0.89	0.00	0.86	0.00	1.02	0.00	0.87	0.00	0.85	0.00	0.70	0.00	0.52	0.00	0.66	0.00	0.92	0.00	0.90	0.00
6	2	0.87	0.00	0.87	0.00	1.02	0.00	0.88	0.00	0.98	0.00	0.97	0.00	0.59	0.00	0.82	0.00	0.88	0.00	0.93	0.00
7	2	1.05	0.00	1.33	0.00	1.23	0.00	1.18	0.00	1.32	0.00	1.25	0.00	-0.19	1.00	0.96	0.01	1.15	0.00	1.00	0.00
4	3	0.14	0.48	0.20	0.10	0.24	0.03	0.29	0.00	0.21	0.10	0.29	0.00	0.14	0.62	0.23	0.05	0.25	0.02	0.27	0.00
5	3	0.35	0.00	0.36	0.00	0.49	0.00	0.46	0.00	0.40	0.00	0.29	0.02	0.23	0.18	0.31	0.01	0.39	0.00	0.35	0.00
6	3	0.33	0.05	0.36	0.03	0.49	0.00	0.46	0.00	0.53	0.00	0.57	0.00	0.30	0.21	0.47	0.00	0.35	0.05	0.38	0.00
7	3	0.52	0.53	0.82	0.06	0.70	0.19	0.77	0.11	0.86	0.06	0.85	0.05	-0.48	0.75	0.61	0.40	0.62	0.32	0.45	0.61
5	4	0.21	0.22	0.15	0.70	0.25	0.08	0.18	0.54	0.18	0.53	0.00	1.00	0.09	0.98	0.08	0.99	0.15	0.75	0.08	0.98
6	4	0.19	0.73	0.16	0.90	0.25	0.42	0.18	0.84	0.31	0.17	0.28	0.27	0.16	0.92	0.24	0.51	0.10	0.99	0.11	0.98
7	4	0.38	0.88	0.61	0.35	0.46	0.75	0.48	0.71	0.65	0.34	0.56	0.52	-0.62	0.41	0.38	0.91	0.38	0.89	0.18	1.00
6	5	-0.02	1.00	0.00	1.00	-0.01	1.00	0.00	1.00	0.13	0.98	0.28	0.37	0.07	1.00	0.16	0.94	-0.04	1.00	0.03	1.00
7	5	0.17	1.00	0.46	0.74	0.21	1.00	0.31	0.97	0.47	0.79	0.56	0.53	-0.71	0.24	0.30	0.98	0.23	1.00	0.10	1.00
7	6	0.19	1.00	0.46	0.79	0.21	1.00	0.30	0.98	0.34	0.97	0.28	0.99	-0.78	0.18	0.14	1.00	0.28	0.99	0.08	1.00

Table 5 below summarizes group-wise differences observed in one-way ANOVA, treating the changes from baseline scores for the 10 wellness categories as response variables and gender, age group, and survey number as grouping factors. Key take-aways from the ANOVA performed on the CFB wellness scores were:

1. Females show greater improvement from baseline scores in the energy levels, general mood, confidence and overall health categories.
2. There were very few significant differences in CFB wellness scores between age groups. The Shae Precision Health and Wellness Program was "equally" effective for all ages.
3. There were more statistically significant differences between early survey numbers 1, 2, and 3, than for later survey numbers 4, 5, 6,... This is because the largest improvements in wellness scores occurred during the first few checkpoints (survey numbers 2, 3, and 4).

Table 5. Table Highlighting Significant Group-wise Differences from One-Way ANOVA for 10 CFB wellness categories.

Summary of ANOVA Modeling Wellness Category CFB Scores by Grouping Factors: Gender, Age Group, Survey Number. Rows are Pairwise Differences (Left Group - Right Group). Colored Cells Identify Significance at 95% Confidence.																					
Gender		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
Male	Female	-0.04	0.59	-0.12	0.07	-0.28	0.00	-0.11	0.14	-0.22	0.00	-0.11	0.08	-0.09	0.22	-0.07	0.33	-0.20	0.01	-0.21	0.00
Age Group		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
30	20	0.03	1.00	-0.13	0.99	-0.15	0.99	0.04	1.00	0.22	0.93	-0.03	1.00	0.49	0.15	-0.23	0.88	-0.24	0.88	0.00	1.00
40	20	-0.01	1.00	-0.05	1.00	0.25	0.85	0.01	1.00	0.30	0.67	0.06	1.00	0.38	0.35	0.09	1.00	-0.05	1.00	0.15	0.98
50	20	0.06	1.00	-0.16	0.96	0.21	0.92	0.23	0.87	0.23	0.88	0.12	0.99	0.26	0.74	-0.13	0.99	-0.04	1.00	0.02	1.00
60	20	0.00	1.00	-0.07	1.00	0.21	0.91	0.06	1.00	0.20	0.93	0.06	1.00	0.22	0.88	0.05	1.00	-0.20	0.93	0.06	1.00
70	20	0.12	0.99	0.02	1.00	0.02	1.00	0.22	0.89	0.17	0.97	0.21	0.85	0.30	0.63	-0.03	1.00	-0.09	1.00	0.08	1.00
80	20	-0.33	0.80	-0.65	0.04	-0.20	0.98	-0.01	1.00	0.32	0.83	-0.37	0.57	-0.30	0.83	0.00	1.00	-0.10	1.00	-0.08	1.00
40	30	-0.05	1.00	0.07	1.00	0.40	0.04	-0.03	1.00	0.08	1.00	0.09	0.98	-0.11	0.97	0.32	0.10	0.19	0.74	0.15	0.89
50	30	0.02	1.00	-0.04	1.00	0.36	0.06	0.19	0.68	0.00	1.00	0.15	0.80	-0.23	0.43	0.10	0.97	0.20	0.63	0.02	1.00
60	30	-0.03	1.00	0.06	1.00	0.36	0.04	0.03	1.00	-0.03	1.00	0.09	0.97	-0.28	0.18	0.28	0.13	0.05	1.00	0.06	1.00
70	30	0.09	0.99	0.14	0.88	0.16	0.86	0.19	0.73	-0.05	1.00	0.24	0.29	-0.19	0.67	0.21	0.56	0.15	0.88	0.08	0.99
80	30	-0.36	0.48	-0.53	0.04	-0.06	1.00	-0.05	1.00	0.10	1.00	-0.34	0.43	-0.79	0.00	0.23	0.87	0.15	0.99	-0.08	1.00
50	40	0.07	0.99	-0.11	0.88	-0.04	1.00	0.22	0.25	-0.08	0.98	0.06	0.99	-0.11	0.87	-0.22	0.17	0.01	1.00	-0.13	0.80
60	40	0.01	1.00	-0.01	1.00	-0.04	1.00	0.05	1.00	-0.11	0.90	0.00	1.00	-0.16	0.51	-0.04	1.00	-0.14	0.68	-0.08	0.96
70	40	0.13	0.83	0.07	0.99	-0.23	0.25	0.21	0.33	-0.14	0.83	0.15	0.62	-0.08	0.98	-0.12	0.88	-0.04	1.00	-0.06	0.99
80	40	-0.32	0.55	-0.60	0.00	-0.45	0.16	-0.02	1.00	0.02	1.00	-0.43	0.09	-0.68	0.00	-0.09	1.00	-0.05	1.00	-0.22	0.84
60	50	-0.05	0.99	0.10	0.85	0.00	1.00	-0.16	0.36	-0.03	1.00	-0.06	0.99	-0.05	1.00	0.18	0.18	-0.15	0.45	0.04	1.00
70	50	0.06	0.99	0.18	0.32	-0.19	0.35	0.00	1.00	-0.06	1.00	0.09	0.90	0.04	1.00	0.11	0.88	-0.05	1.00	0.06	0.99
80	50	-0.38	0.26	-0.49	0.03	-0.41	0.22	-0.24	0.81	0.09	1.00	0.49	0.02	-0.57	0.01	0.13	0.99	-0.05	1.00	-0.10	1.00
70	60	0.12	0.79	0.08	0.94	-0.20	0.27	0.16	0.49	-0.03	1.00	0.15	0.42	0.08	0.95	-0.08	0.96	0.10	0.88	0.02	1.00
80	60	-0.33	0.44	-0.59	0.00	-0.41	0.20	-0.07	1.00	0.12	0.99	-0.43	0.06	-0.52	0.03	-0.05	1.00	0.10	1.00	-0.14	0.98
80	70	-0.45	0.13	-0.67	0.00	-0.22	0.88	-0.23	0.83	0.15	0.98	-0.58	0.00	-0.60	0.01	0.02	1.00	-0.01	1.00	-0.16	0.96
Survey Number		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
2	1	1.27	0.00	0.85	0.00	1.13	0.00	1.06	0.00	1.03	0.00	0.78	0.00	0.53	0.00	0.87	0.00	1.03	0.00	1.15	0.00
3	1	1.80	0.00	1.36	0.00	1.66	0.00	1.47	0.00	1.49	0.00	1.19	0.00	0.82	0.00	1.22	0.00	1.56	0.00	1.70	0.00
4	1	1.96	0.00	1.59	0.00	1.92	0.00	1.78	0.00	1.71	0.00	1.50	0.00	0.96	0.00	1.46	0.00	1.82	0.00	1.99	0.00
5	1	2.16	0.00	1.73	0.00	2.19	0.00	1.94	0.00	1.90	0.00	1.46	0.00	1.26	0.00	1.57	0.00	1.98	0.00	2.06	0.00
6	1	2.10	0.00	1.70	0.00	2.19	0.00	1.89	0.00	1.97	0.00	1.73	0.00	1.57	0.00	1.76	0.00	1.88	0.00	2.11	0.00
7	1	1.44	0.00	1.44	0.00	1.38	0.00	1.63	0.00	1.56	0.00	1.31	0.00	0.62	0.50	1.44	0.00	1.69	0.00	1.38	0.00
3	2	0.53	0.00	0.51	0.00	0.53	0.00	0.41	0.00	0.46	0.00	0.40	0.00	0.29	0.01	0.35	0.00	0.53	0.00	0.55	0.00
4	2	0.69	0.00	0.74	0.00	0.79	0.00	0.72	0.00	0.68	0.00	0.72	0.00	0.43	0.00	0.59	0.00	0.79	0.00	0.84	0.00
5	2	0.89	0.00	0.88	0.00	1.06	0.00	0.87	0.00	0.87	0.00	0.67	0.00	0.72	0.00	0.70	0.00	0.95	0.00	0.91	0.00
6	2	0.83	0.00	0.85	0.00	1.06	0.00	0.83	0.00	0.95	0.00	0.94	0.00	1.04	0.00	0.90	0.00	0.85	0.00	0.96	0.00
7	2	0.17	1.00	0.59	0.39	0.25	0.99	0.56	0.55	0.54	0.64	0.53	0.52	0.09	1.00	0.57	0.51	0.66	0.30	0.23	0.99
4	3	0.16	0.35	0.23	0.03	0.26	0.02	0.31	0.00	0.22	0.09	0.32	0.00	0.14	0.73	0.24	0.04	0.26	0.02	0.29	0.00
5	3	0.36	0.00	0.37	0.00	0.53	0.00	0.46	0.00	0.42	0.00	0.27	0.03	0.43	0.00	0.35	0.00	0.42	0.00	0.36	0.00
6	3	0.30	0.15	0.34	0.05	0.53	0.00	0.42	0.01	0.49	0.00	0.54	0.00	0.75	0.00	0.55	0.00	0.32	0.13	0.41	0.00
7	3	-0.36	0.91	0.08	1.00	-0.28	0.99	0.15	1.00	0.08	1.00	0.12	1.00	-0.20	1.00	0.22	1.00	0.13	1.00	-0.32	0.93
5	4	0.20	0.33	0.14	0.74	0.27	0.07	0.16	0.73	0.19	0.48	-0.04	1.00	0.29	0.07	0.11	0.96	0.16	0.65	0.07	1.00
6	4	0.14	0.95	0.11	0.98	0.27	0.36	0.11	0.99	0.26	0.42	0.22	0.51	0.61	0.00	0.31	0.19	0.06	1.00	0.12	0.97
7	4	-0.52	0.55	-0.15	1.00	-0.55	0.59	-0.16	1.00	-0.15	1.00	-0.19	1.00	-0.34	0.97	-0.02	1.00	-0.13	1.00	-0.62	0.24
6	5	-0.06	1.00	-0.03	1.00	0.00	1.00	-0.05	1.00	0.07	1.00	0.27	0.36	0.32	0.34	0.20	0.83	-0.10	1.00	0.05	1.00
7	5	-0.72	0.15	-0.29	0.97	-0.82	0.10	-0.31	0.98	-0.34	0.96	-0.15	1.00	-0.63	0.51	-0.13	1.00	-0.30	0.98	-0.68	0.14
7	6	-0.66	0.29	-0.26	0.99	-0.82	0.13	-0.27	0.99	-0.41	0.92	-0.41	0.85	-0.95	0.07	-0.33	0.97	-0.19	1.00	-0.73	0.11

Table 6 below shows the average change from baseline (CFB) wellness scores over time (survey number), color-coded by baseline average group. This plot shows that most of the gains, or increases in CFB, occur within the first 3 checkpoints (survey numbers 2, 3, and 4). Also, this pattern of increase is very different across all baseline average groups within the first 3 checkpoints. Basically, subjects in the 1, 2, and 3 baseline average groups exhibit the largest improvement in CFB wellness scores, while subjects in the 4 and 5 baseline average groups basically maintain their already high wellness scores. Beyond the 3rd checkpoint, for surveys 5-9 there are statistically significant differences between the baseline average groups, however the trends are flat for most of the wellness categories. However, for some of the wellness categories there still appears to be a slight upward trend in the data (or subtle improvement in CFB wellness scores for surveys 5-9). This means that the Shae Precision Health and Wellness Program is most effective in improving CFB wellness scores within the first 3 checkpoints, and subjects with baseline average scores of 1, 2, and 3 exhibit greater improvements in average CFB than subjects with baseline average scores of 4 and 5 (as these subjects already have very high wellness scores to start with). Please see Appendix A [A6] for a larger graphic.

Table 6. Summary of Change from Baseline Wellness Metrics by Baseline Average Group and Over Time (Survey Number).

Summary of Two-Way ANOVA Modeling Wellness Category Scores by Grouping Factors: Age Group and Gender. Colored Cells Identify Significance at 95% Confidence.																				
Gender	Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)
Age Group	5.45	0.00	4.72	0.00	6.33	0.00	5.84	0.00	4.63	0.00	4.96	0.00	2.00	0.06	5.24	0.00	3.87	0.00	4.22	0.00
Gender	25.31	0.00	39.55	0.00	12.78	0.00	27.49	0.00	17.17	0.00	33.98	0.00	3.56	0.06	10.24	0.00	24.96	0.00	14.86	0.00
Interaction Age Group and Gender	2.14	0.05	2.26	0.04	1.81	0.09	2.55	0.02	2.56	0.02	2.17	0.04	1.25	0.28	2.96	0.01	2.09	0.05	1.45	0.19

Figure 12 below is a way to visualize the data from the two-way ANOVA in table 6. In these plots many of the age/gender groups are significantly different from each other. Also, within each age group and for all wellness categories except stress level, **males exhibited higher wellness scores than females**. Please see Appendix A [A17] for a larger graphic.

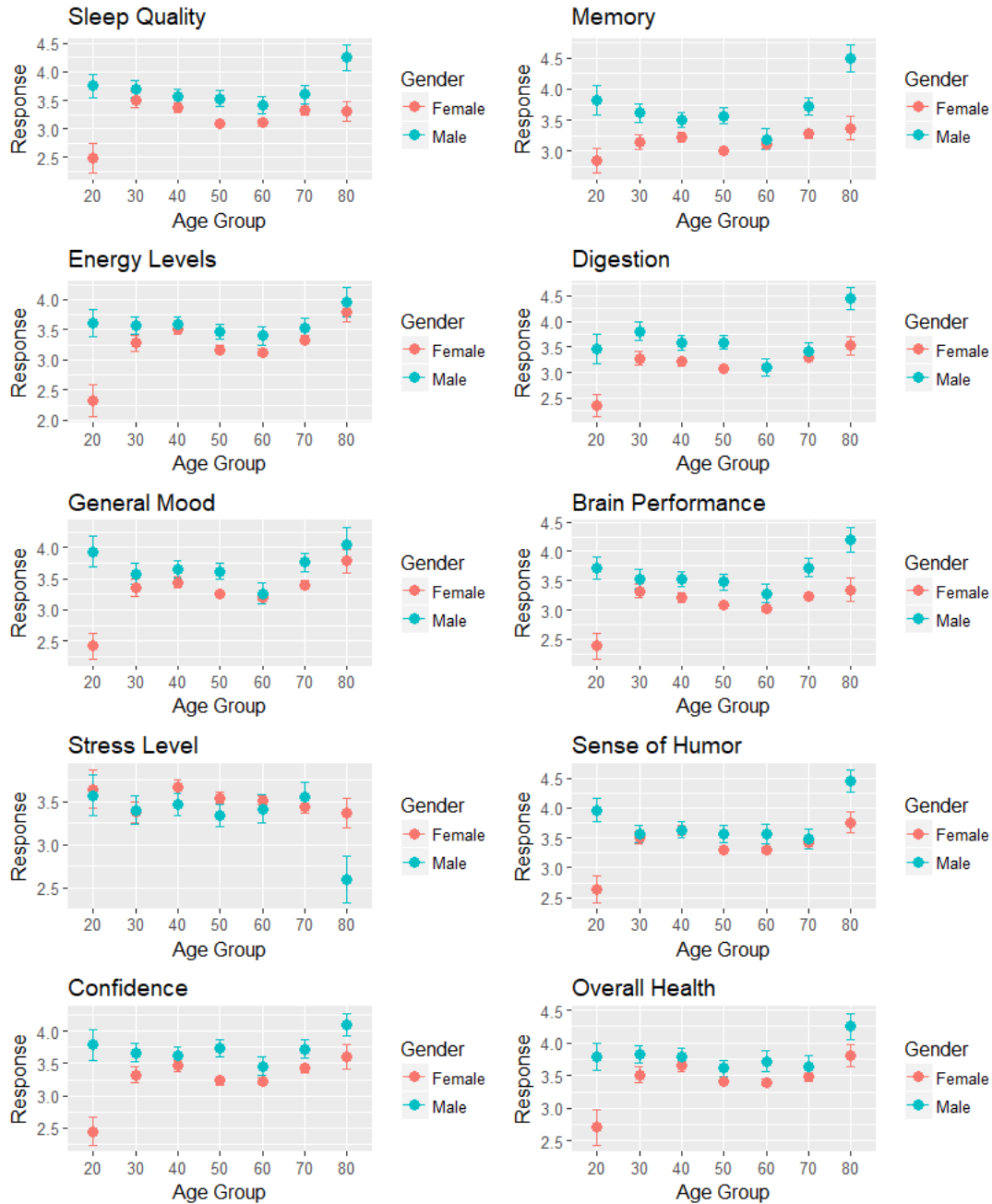


Figure 12. Two-Way ANOVA Interval Plots.

Further analyses

The best model for this data was found to be a mixed effects time-series model. The model included fixed main effects for age, gender and survey number. In this model subject was specified as a random effect. Also, this model included an AR1 correlation structure for survey number (as survey number represented repeated measures within each subject). This model performed basically the same as the equivalent model including all two-way interactions, thus during model selection, the simpler model was retained as it was more parsimonious (with lower AIC and BIC). The model indicates that males have 0.24-0.46 higher wellness scores for all categories except stress level. Also, there is on average a half point improvement in scores per survey number. However, the improvements are greater than a half point per survey number early in the Shae Precision Health and Wellness Program (survey numbers 2 and 3), and lower than a half point per survey number later in program participation.

Conclusions

The Shae Precision Health and Wellness Program was effective in increasing individual wellness scores. Of the 442 subjects in the study, 439 showed improvements in wellness scores after using the program. The improvements were most dramatic for subjects with originally low baseline wellness scores. Also, the majority of the improvement is realized within the first 3 survey checkpoints (surveys 2, 3 and 4), at which point subjects close in on the upper-end of the 5-point scale (with average wellness scores of ~4). Beyond the 3rd checkpoint there is a subtle upward trend, where some subjects are still showing incremental improvements towards scores of 5, and others have reached and are maintaining high wellness scores.

The Shae Precision Health and Wellness Program is effective in improving wellness scores for both males and females. However, there were some significant differences between male and female subjects. Female subjects comprised 82% of the sample studied, and they had significantly lower initial baseline wellness scores than males across all wellness categories except stress level. For most of the wellness categories, males and females showed about the same level of improvement in wellness scores. However, females showed greater improvement than males in the energy levels, general mood, confidence and overall health categories. Given that males on average had higher baseline wellness scores than females, for many of the wellness categories they maintained higher wellness scores for the duration of the study, despite females actually improving more with respect to baseline scores in certain categories.

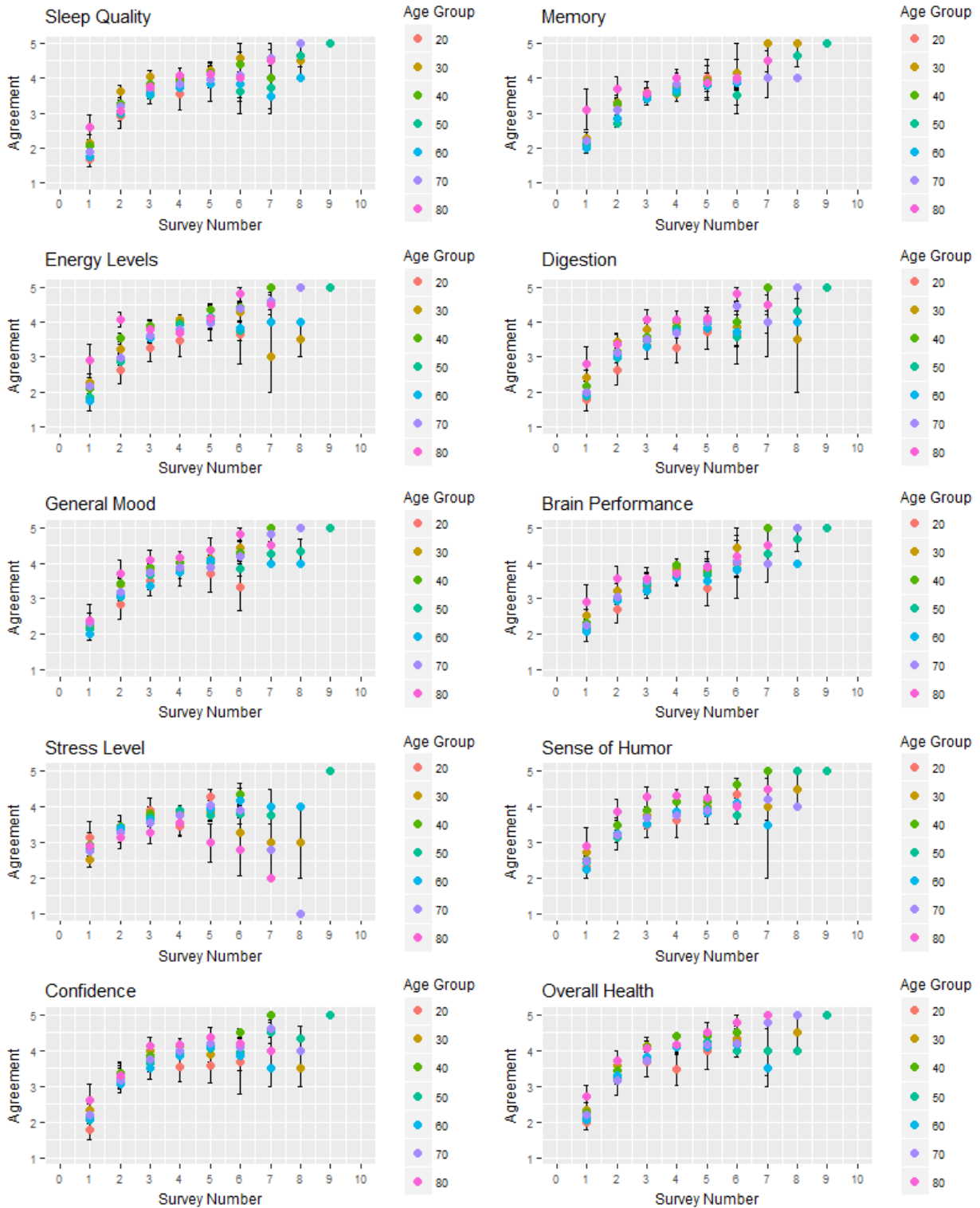
The Shae Precision Health and Wellness Program was equally effective across all ages in the study. There were almost no significant differences in improvement of wellness scores based on age or age group.

Of the 10 wellness categories measured, all were very highly correlated to each other except for stress level which was uncorrelated. The ph360 Personalized Health and Wellness Program was nearly equally effective in improving the 9 correlated wellness categories. However, it appears to have been most effective in improving sleep quality, energy levels, digestion, general mood, confidence and overall health.

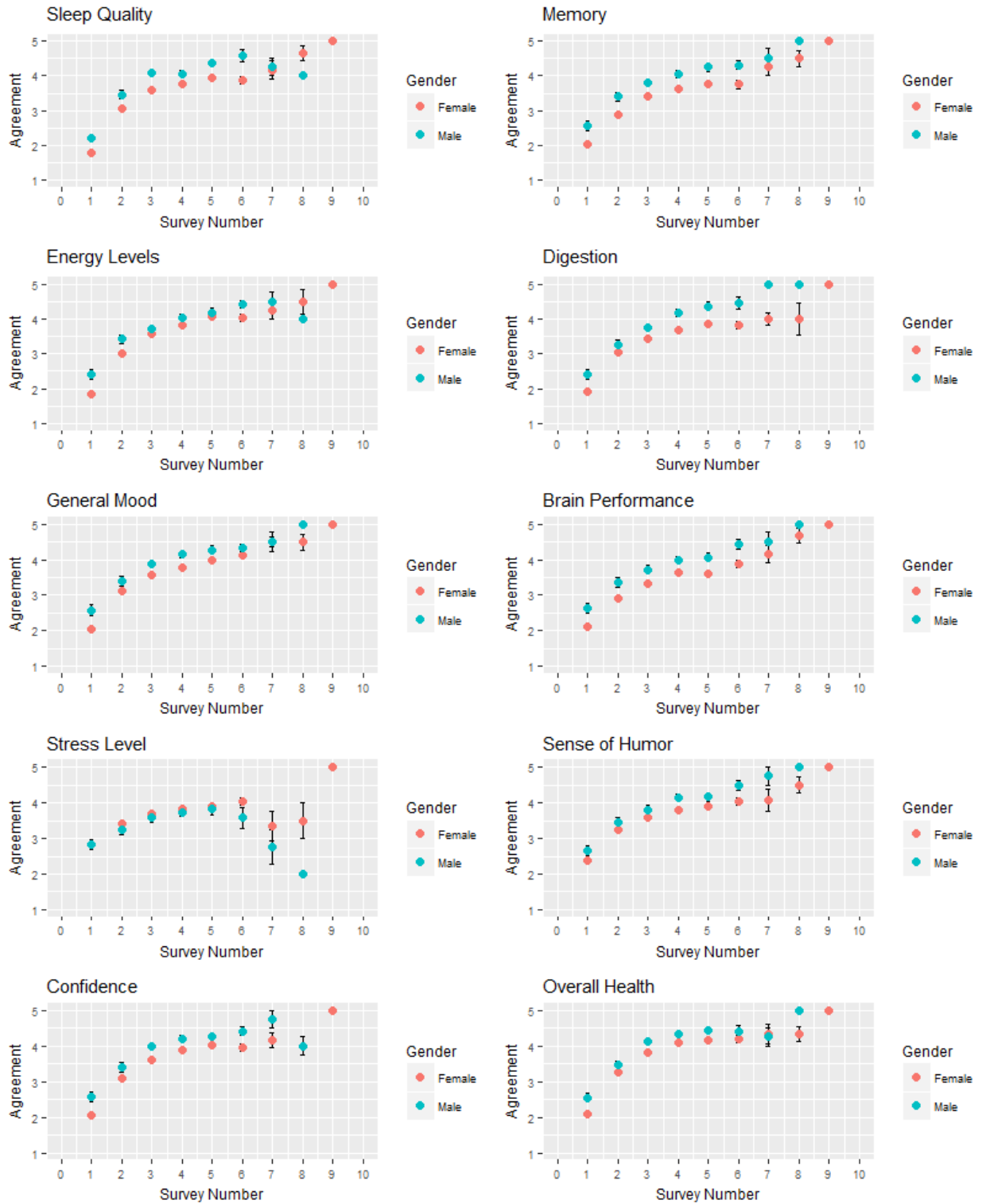
In conclusion, participation in the Shae Precision Health and Wellness Program results in almost all individuals experiencing a benefit with reference to variables of wellness & quality of life.

APPENDIX A

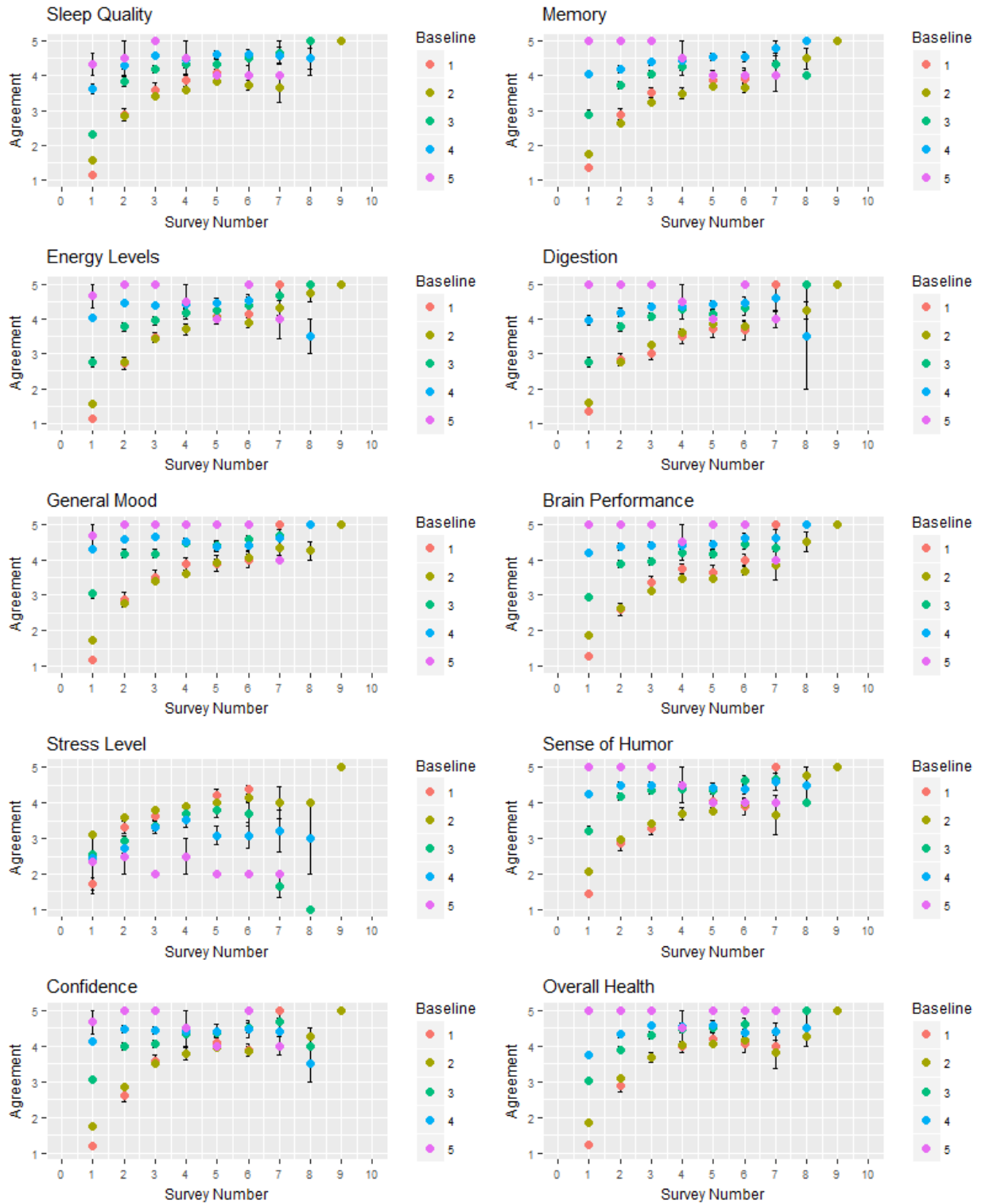
[A1] Summary of wellness metrics by age group and over time.



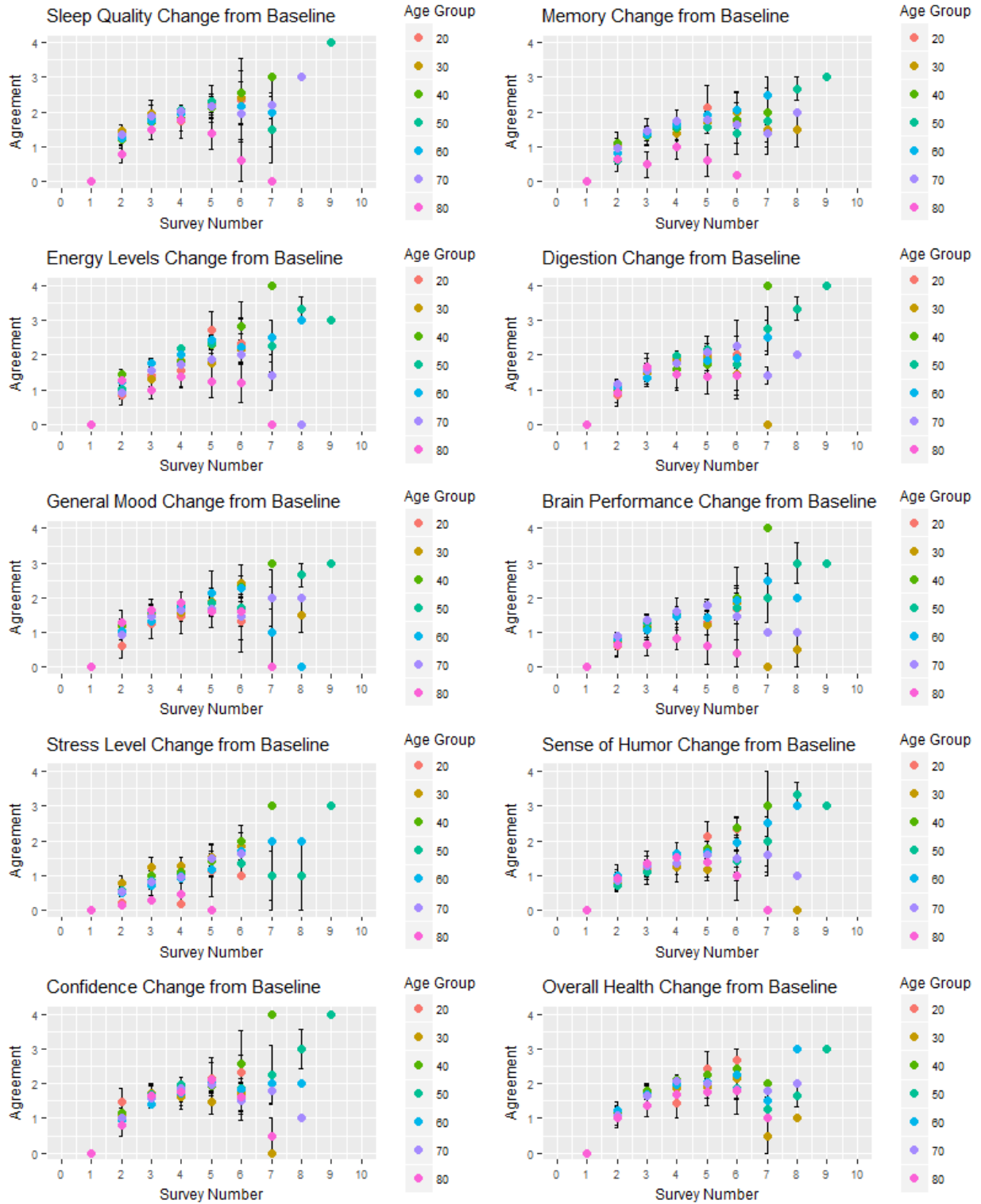
[A2] Summary of wellness metrics by gender and over time.



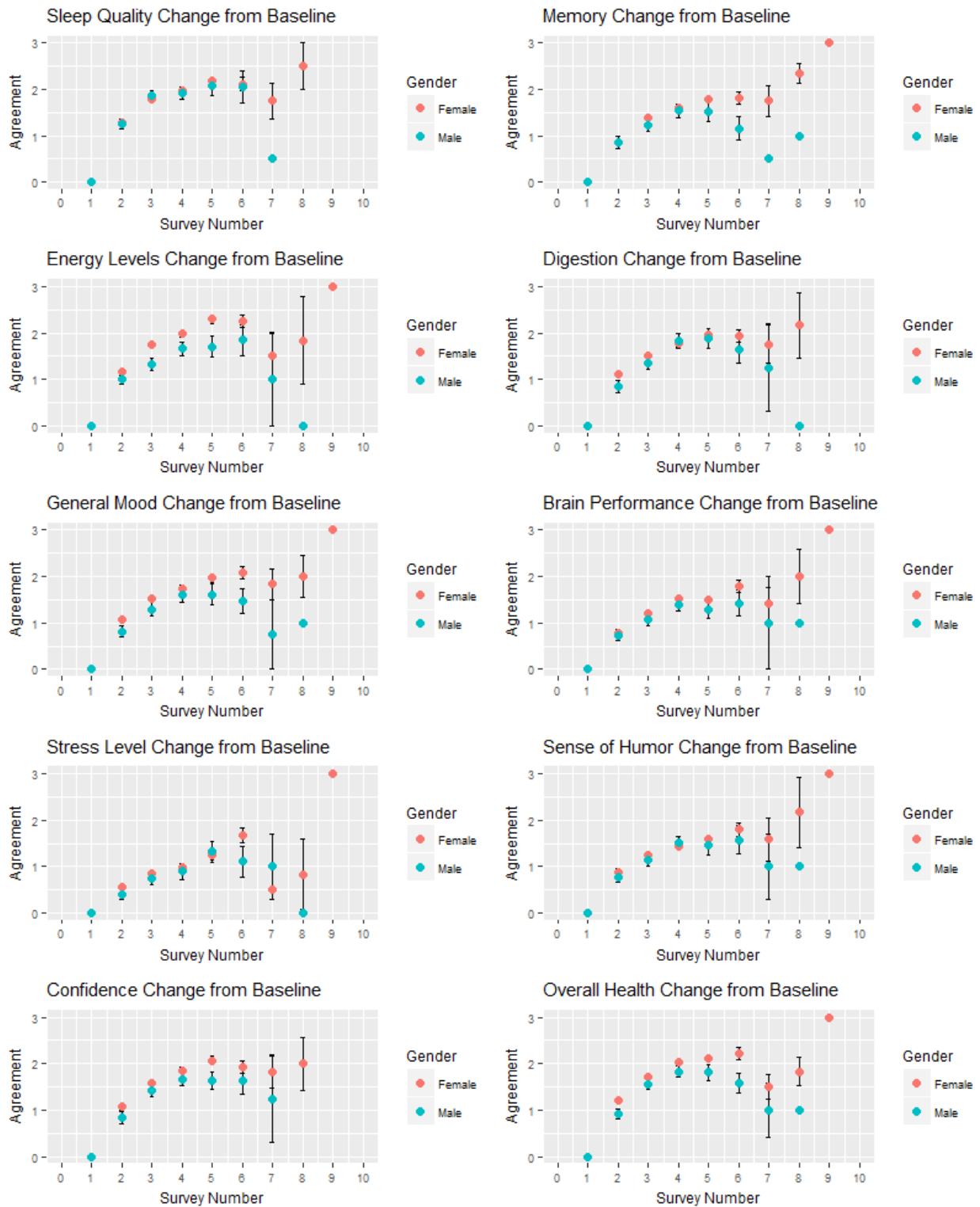
[A3] Summary of wellness metrics by baseline average group and over time.



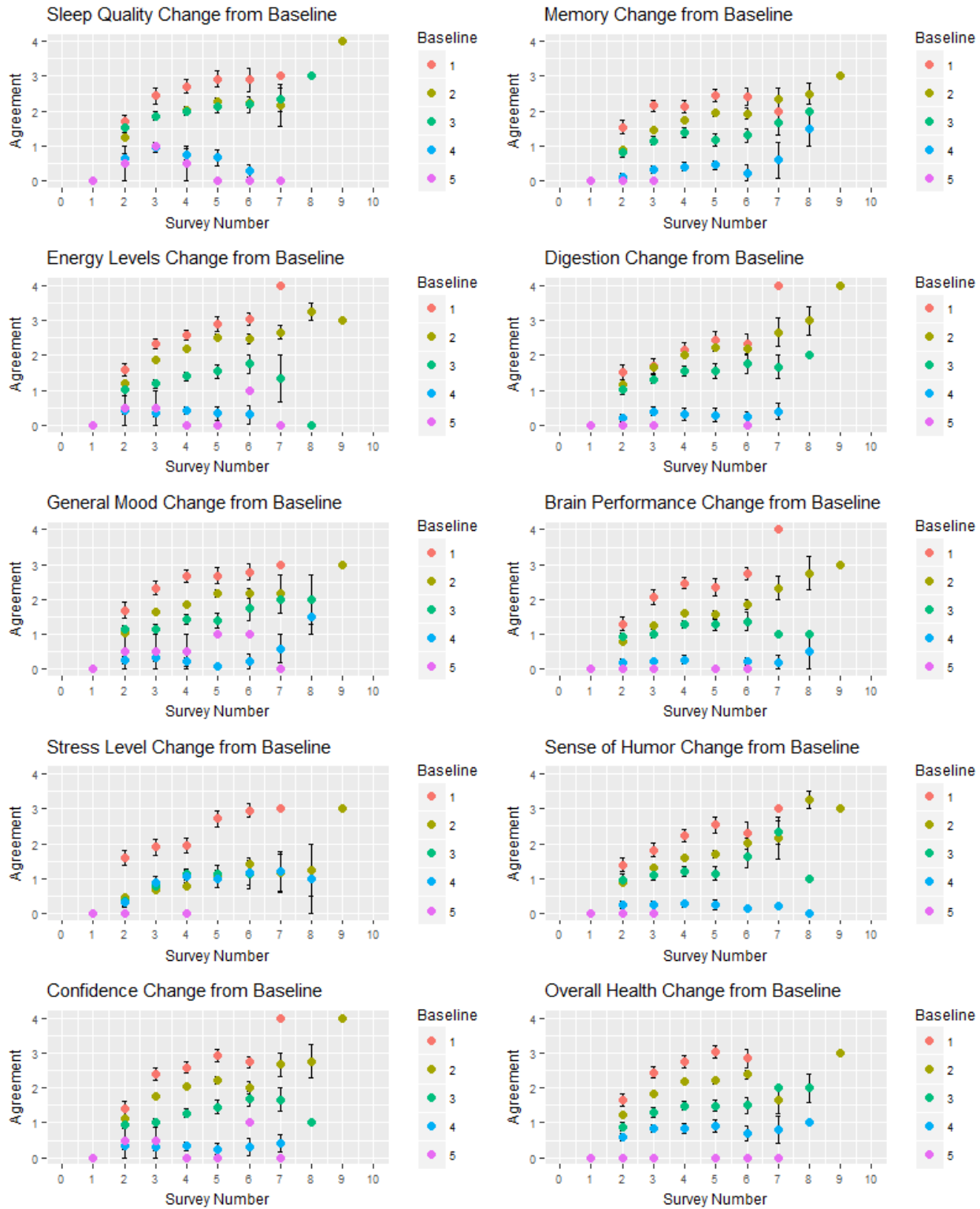
[A4] Summary of change from baseline wellness metrics by age group and over time.



[A5] Summary of change from baseline wellness metrics by gender and over time.



[A6] Summary of change from baseline wellness metrics by baseline average group and over time.



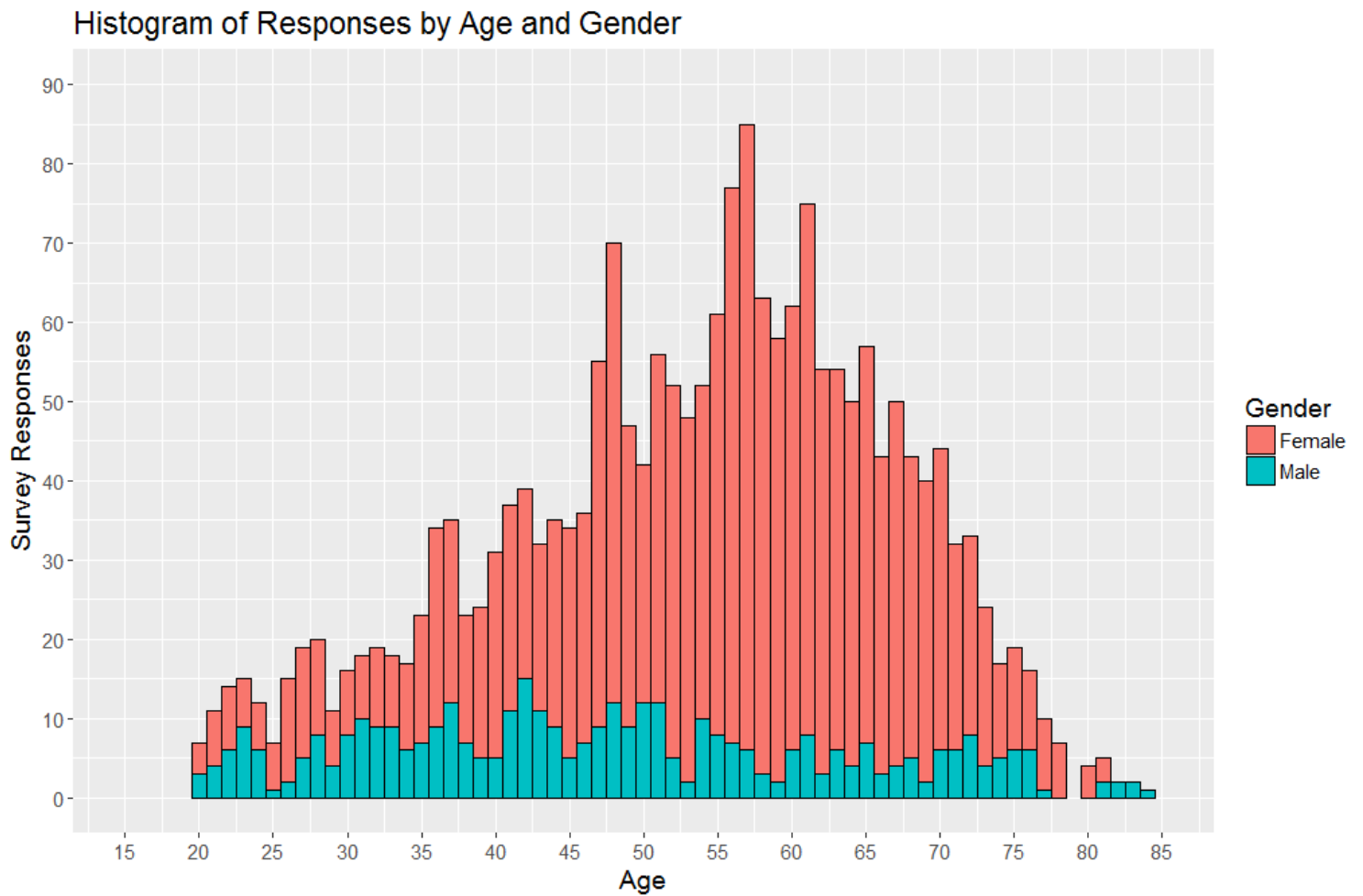
[A7] Tables Summarizing Descriptive Statistics of the Data Set.

Table Summarizing Mean Survey Responses by Various Grouping Factors																						
Grouping	Group	Responses	Average Rating										Average Change from Baseline Rating									
			Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health
Survey Number (Order of Survey Responses Per Subject)	1	442	1.9	2.1	2.0	2.0	2.2	2.2	2.8	2.4	2.1	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	441	3.1	3.0	3.1	3.1	3.2	3.0	3.4	3.3	3.2	3.3	1.3	0.9	1.1	1.1	1.0	0.8	0.5	0.9	1.0	1.1
	3	441	3.7	3.5	3.6	3.5	3.6	3.4	3.7	3.6	3.7	3.9	1.8	1.4	1.7	1.5	1.5	1.2	0.8	1.2	1.6	1.7
	4	419	3.8	3.7	3.9	3.8	3.9	3.7	3.8	3.9	3.9	4.1	2.0	1.6	1.9	1.8	1.7	1.5	1.0	1.5	1.8	2.0
	5	235	4.0	3.9	4.1	3.9	4.0	3.7	3.9	3.9	4.1	4.2	2.2	1.7	2.2	1.9	1.9	1.5	1.3	1.6	2.0	2.1
	6	110	4.0	3.9	4.1	3.9	4.2	4.0	4.0	4.1	4.0	4.2	2.1	1.7	2.2	1.9	2.0	1.7	1.6	1.8	1.9	2.1
	7	16	4.2	4.3	4.3	4.3	4.5	4.3	4.2	4.3	4.3	4.3	1.4	1.4	1.4	1.6	1.6	1.3	0.6	1.4	1.7	1.4
	8	7	4.6	4.6	4.4	4.1	4.6	4.7	3.3	4.6	4.0	4.4	2.0	2.1	1.6	1.9	1.9	1.9	0.7	2.0	1.6	1.7
Age Group (All Subjects Grouped into Nearest Decade)	20	59	3.1	3.3	2.9	2.9	3.1	3.0	3.6	3.3	3.1	3.2	1.4	1.2	1.2	1.1	1.0	0.9	0.4	1.0	1.4	1.3
	30	160	3.6	3.3	3.4	3.5	3.4	3.4	3.4	3.5	3.5	3.6	1.4	1.0	1.1	1.1	1.2	0.9	0.9	0.8	1.1	1.3
	40	313	3.4	3.3	3.5	3.3	3.5	3.3	3.6	3.6	3.5	3.7	1.4	1.1	1.5	1.1	1.3	1.0	0.8	1.1	1.3	1.4
	50	492	3.2	3.1	3.2	3.2	3.3	3.2	3.5	3.3	3.3	3.5	1.4	1.0	1.4	1.3	1.2	1.0	0.7	0.9	1.3	1.3
	60	639	3.1	3.1	3.2	3.1	3.2	3.0	3.5	3.3	3.2	3.4	1.4	1.1	1.4	1.2	1.2	1.0	0.7	1.1	1.2	1.4
	70	383	3.4	3.3	3.4	3.3	3.4	3.3	3.5	3.4	3.5	3.5	1.5	1.2	1.2	1.3	1.2	1.1	0.7	1.0	1.3	1.4
	80	66	3.6	3.7	3.8	3.8	3.9	3.6	3.1	4.0	3.8	3.9	1.0	0.5	1.0	1.1	1.3	0.5	0.1	1.0	1.3	1.2
	Female	1725	3.2	3.1	3.2	3.2	3.3	3.1	3.5	3.4	3.3	3.5	1.4	1.1	1.4	1.2	1.2	1.0	0.7	1.0	1.3	1.4
Male	387	3.6	3.6	3.5	3.6	3.6	3.6	3.4	3.6	3.7	3.7	1.4	1.0	1.1	1.1	1.0	0.9	0.6	1.0	1.1	1.2	

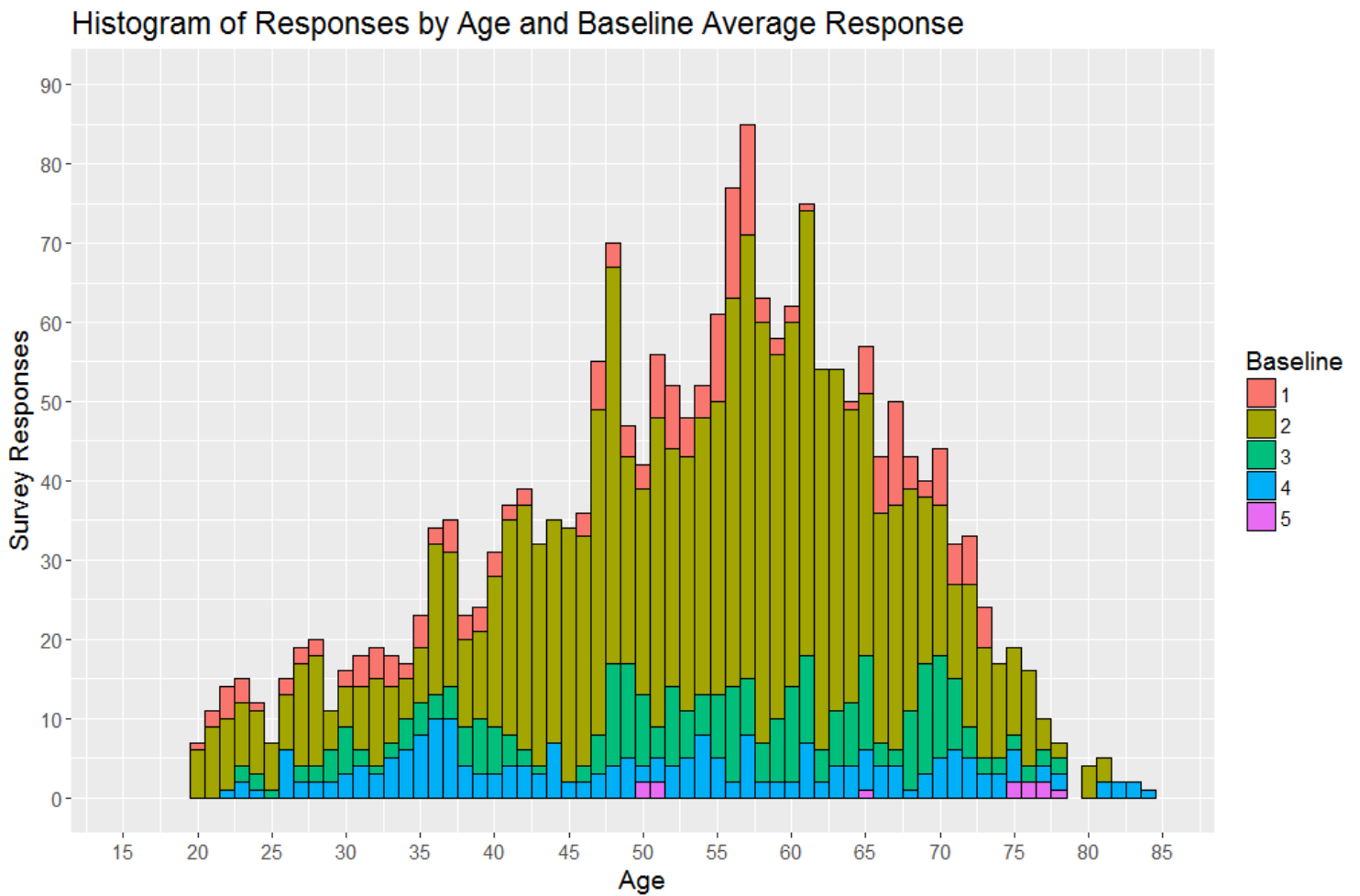
Table Summarizing Mean Survey Responses by Both Gender and Survey Number																						
Grouping Variables			Average Rating										Average Change from Baseline Rating									
Gender	Survey Number	Responses	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health
Female	1	361	1.8	2.0	1.9	1.9	2.1	2.1	2.8	2.4	2.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	360	3.1	2.9	3.0	3.0	3.1	2.9	3.4	3.3	3.1	3.3	1.3	0.9	1.2	1.1	1.1	0.8	0.6	0.9	1.1	1.2
	3	360	3.6	3.4	3.6	3.4	3.6	3.3	3.7	3.6	3.6	3.8	1.8	1.4	1.7	1.5	1.5	1.2	0.8	1.2	1.6	1.7
	4	343	3.8	3.6	3.8	3.7	3.8	3.6	3.8	3.8	3.9	4.1	2.0	1.6	2.0	1.8	1.7	1.5	1.0	1.4	1.9	2.0
	5	191	3.9	3.8	4.1	3.8	4.0	3.6	3.9	3.9	4.0	4.2	2.2	1.8	2.3	1.9	2.0	1.5	1.2	1.6	2.1	2.1
	6	91	3.9	3.8	4.0	3.8	4.1	3.9	4.0	4.0	4.0	4.2	2.1	1.8	2.3	1.9	2.1	1.8	1.7	1.8	1.9	2.2
Male	1	81	2.2	2.6	2.4	2.4	2.6	2.6	2.8	2.7	2.6	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	81	3.5	3.4	3.4	3.2	3.4	3.4	3.2	3.4	3.4	3.5	1.2	0.9	1.0	0.9	0.8	0.7	0.4	0.8	0.8	0.9
	3	81	4.1	3.8	3.7	3.8	3.9	3.7	3.6	3.8	4.0	4.1	1.9	1.2	1.3	1.4	1.3	1.1	0.8	1.1	1.4	1.6
	4	76	4.1	4.1	4.0	4.2	4.1	4.0	3.7	4.2	4.2	4.3	1.9	1.5	1.7	1.8	1.6	1.4	0.9	1.5	1.7	1.8
	5	44	4.4	4.3	4.2	4.4	4.3	4.1	3.8	4.2	4.3	4.5	2.1	1.5	1.7	1.9	1.6	1.3	1.3	1.5	1.6	1.8
	6	19	4.6	4.3	4.4	4.5	4.3	4.4	3.6	4.5	4.4	4.4	2.1	1.2	1.8	1.6	1.5	1.4	1.1	1.6	1.6	1.6

Table Summarizing Mean Survey Responses by Both Age Group and Survey Number																						
Grouping Variables			Average Rating										Average Change from Baseline Rating									
Age Group	Survey Number	Responses	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health
20	1	13	1.7	2.2	1.8	1.8	2.2	2.1	3.2	2.3	1.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	13	2.9	3.2	2.6	2.6	2.8	2.7	3.4	3.2	3.2	3.2	1.2	1.1	0.8	0.8	0.6	0.6	0.2	0.8	1.5	1.2
	3	12	3.7	3.6	3.3	3.3	3.5	3.3	3.9	3.5	3.5	3.7	1.9	1.4	1.4	1.5	1.3	1.2	0.8	1.2	1.7	1.7
	4	11	3.5	3.8	3.5	3.3	3.7	3.7	3.5	3.6	3.5	3.5	1.7	1.6	1.5	1.5	1.5	1.5	0.2	1.3	1.7	1.5
	5	7	3.9	4.0	4.0	3.7	3.7	3.3	4.3	3.9	3.6	4.0	2.3	2.1	2.7	2.0	2.1	1.3	1.1	2.1	2.1	2.4
	6	3	4.0	4.0	3.7	3.7	4.0	4.3	4.3	3.7	4.3	4.3	2.3	2.3	2.3	2.3	2.3	1.3	1.7	2.3	2.7	2.7
30	1	35	2.1	2.3	2.3	2.4	2.2	2.5	2.5	2.7	2.3	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	34	3.6	3.3	3.2	3.4	3.4	3.2	3.3	3.5	3.4	3.6	1.5	1.0	0.9	1.0	1.2	0.7	0.8	0.8	1.1	1.2
	3	33	4.1	3.5	3.6	3.8	3.8	3.5	3.8	3.8	4.0	4.1	2.0	1.3	1.3	1.5	1.6	1.1	1.2	1.1	1.7	1.8
	4	30	4.0	3.6	4.1	4.0	3.8	3.8	3.8	3.8	3.9	4.1	2.0	1.4	1.8	1.9	1.6	1.5	1.3	1.2	1.6	1.9
	5	17	4.2	3.9	4.1	4.1	4.1	3.9	3.9	4.0	3.9	4.2	2.1	1.7	1.8	1.9	1.9	1.2	1.5	1.2	1.5	1.9
	6	7	4.6	4.1	4.3	3.9	4.4	4.4	3.3	4.0	3.9	4.3	2.4	2.0	2.1	1.4	2.4	1.9	1.9	1.4	1.7	2.1
40	1	67	2.1	2.2	2.1	2.2	2.2	2.3	2.9	2.5	2.2	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	66	3.3	3.3	3.5	3.2	3.4	3.0	3.5	3.5	3.4	3.4	1.2	1.1	1.4	1.0	1.2	0.6	0.5	0.9	1.2	1.2
	3	63	3.8	3.6	3.9	3.6	3.9	3.6	3.8	3.9	3.8	4.1	1.7	1.3	1.8	1.3	1.6	1.2	1.0	1.3	1.6	1.8
	4	60	3.9	3.8	4.0	3.9	4.0	3.9	3.9	4.1	4.1	4.4	1.8	1.5	1.8	1.6	1.7	1.5	1.1	1.6	1.8	2.1
	5	38	4.2	3.9	4.3	4.0	4.1	3.8	3.9	4.1	4.1	4.4	2.1	1.8	2.3	1.7	1.9	1.4	1.4	1.8	1.9	2.2
	6	18	4.4	3.9	4.4	4.0	4.3	4.1	4.3	4.6	4.5	4.5	2.6	1.8	2.8	1.9	2.3	2.0	2.0	2.4	2.6	2.4
50	1	103	1.7	2.1	1.8	1.9	2.1	2.2	2.8	2.4	2.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	105	3.0	2.7	2.9	3.0	3.1	2.9	3.4	3.1	3.1	3.2	1.3	0.6	1.0	1.1	0.9	0.8	0.6	0.7	1.0	1.1
	3	102	3.5	3.5	3.5	3.5	3.7	3.4	3.7	3.5	3.7	3.8	1.8	1.4	1.8	1.6	1.7	1.5	0.9	1.6	1.7	1.7
	4	99	3.8	3.6	3.9	3.8	3.9	3.6	3.9	3.8	3.9	4.1	2.1	1.6	2.2	2.0	1.8	1.5	1.0	1.4	2.0	2.0
	5	54	4.1	3.8	4.1	4.0	4.0	3.7	3.8	3.9	4.1	4.2	2.3	1.6	2.3	2.1	1.9	1.4	1.2	1.4	2.0	2.0
	6	21	3.6	3.5	3.8	3.6	3.9	3.9	3.8	3.8	4.0	4.0	2.0	1.4	2.0	1.7	1.7	1.7	1.3	1.4	1.9	1.9
60	1	139	1.8	2.0	1.7	1.9	2.0	2.1	2.9	2.2	2.1	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	2	136	3.0	2.8	3.0	3.0	3.1	2.9	3.4	3.3	3.1	3.3	1.3	0.8	1.2	1.1	1.0	0.8	0.5	1.0	1.0	1.2
	3	136	3.5	3.4	3.6	3.3	3.4															

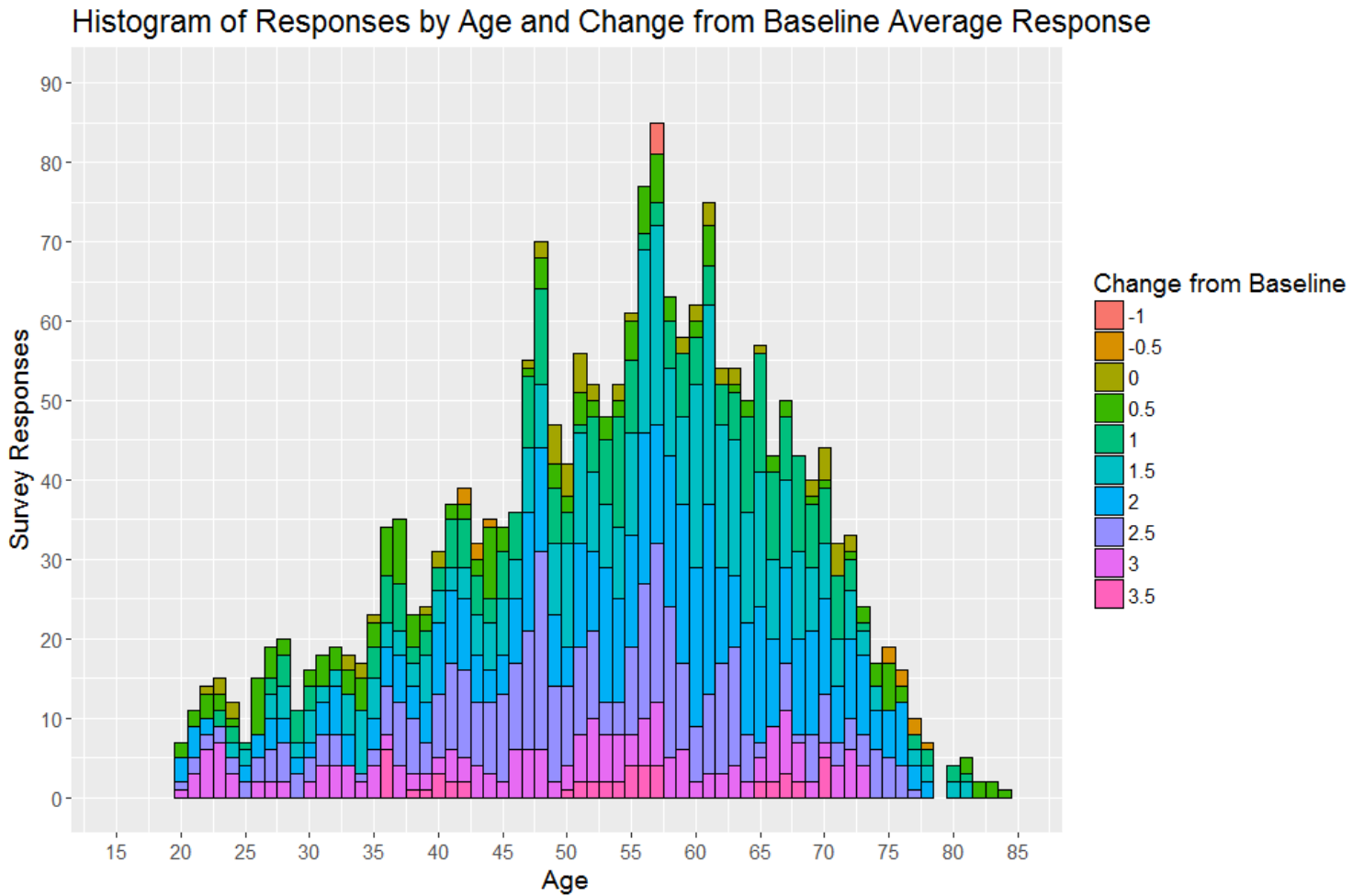
[A8] Histogram of Survey Responses by Age and Gender.



[A9] Histogram of Survey Responses by Age and Baseline Average Response.



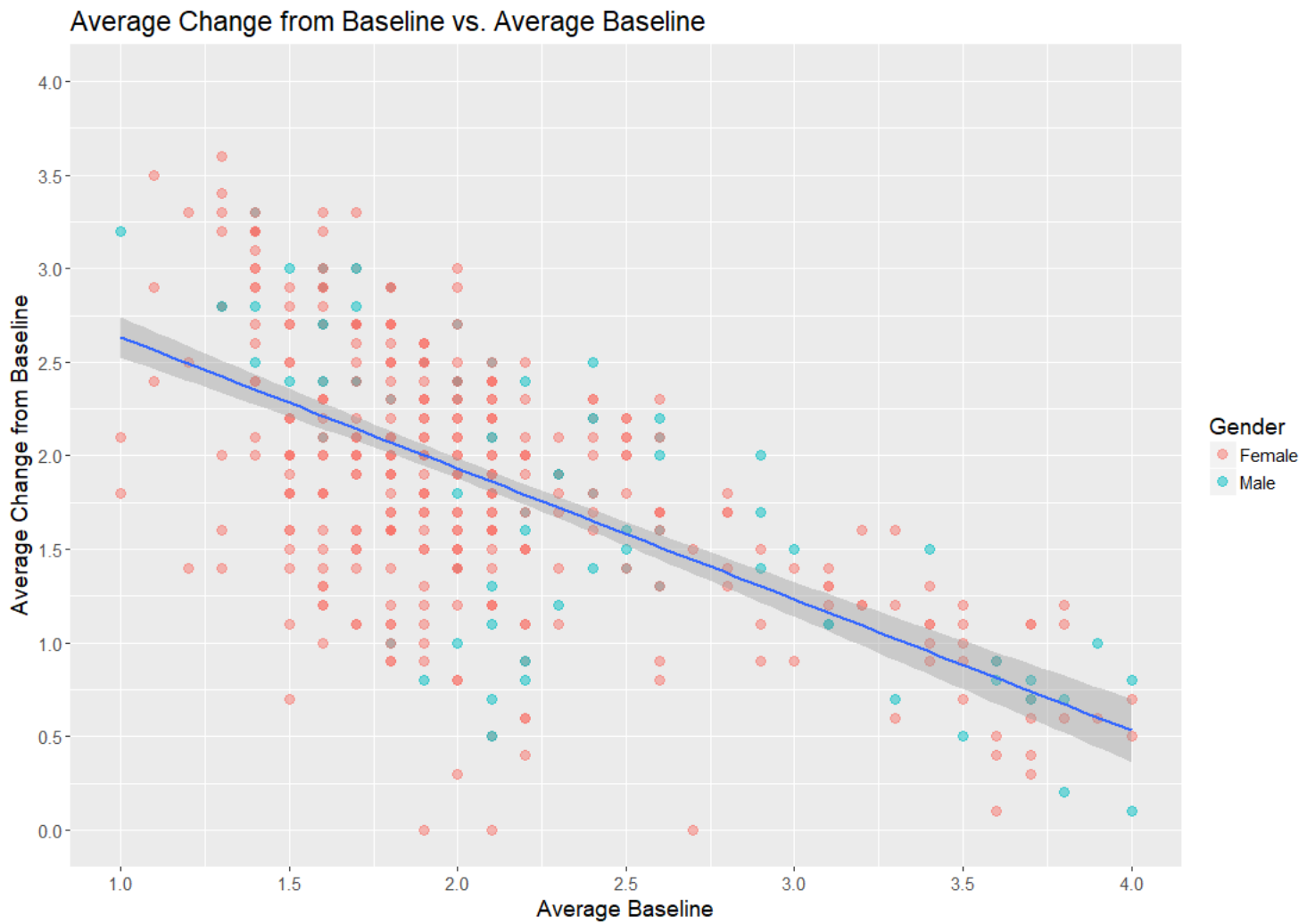
[A9] Histogram of Survey Responses by Age and Baseline Average Response.



[A11] Two-Dimensional Histogram of Age Group and CFB Group.

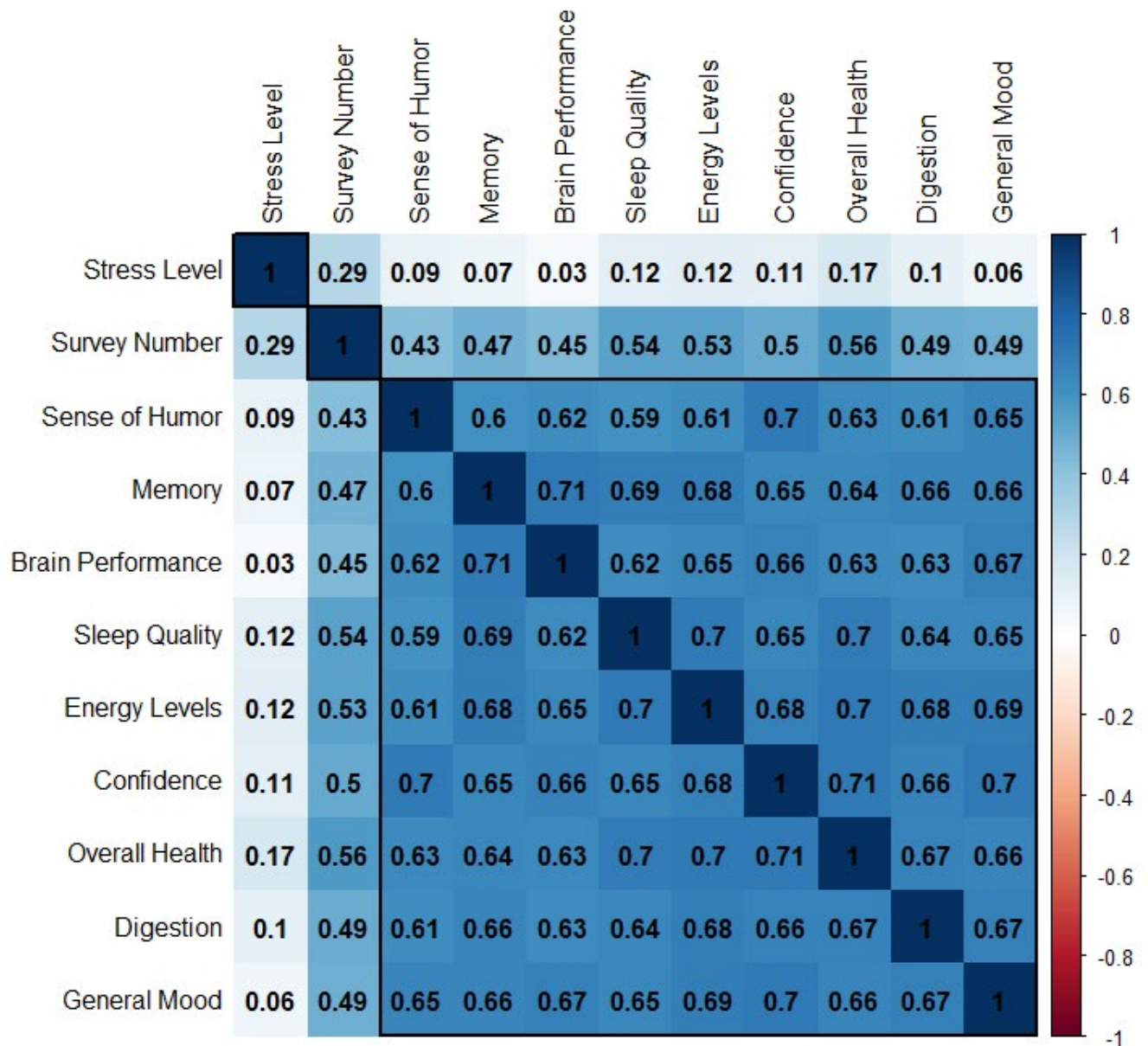
Two Dimensional Histogram of All 442 Subjects		Grouped by Average Change from Baseline (CFB)											Age %
		-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5	4	
Grouped by Age	20	0	0	1	2	1	1	2	2	4	0	0	2.9%
	30	0	0	1	5	3	9	7	6	4	0	0	7.9%
	40	0	1	1	9	10	9	13	16	5	3	0	15.2%
	50	0	0	4	5	19	19	23	21	11	1	0	23.3%
	60	1	0	2	7	14	39	39	27	8	2	0	31.4%
	70	0	0	3	4	13	14	21	9	8	3	0	17.0%
	80	0	1	0	2	2	2	3	0	0	0	0	2.3%
CFB %		0.2%	0.5%	2.7%	7.7%	14.0%	21.0%	24.4%	18.3%	9.0%	2.0%	0.0%	

[A12] Scatterplot of Average Change from Baseline vs. Average Baseline.



[A13] Correlations Matrix.

Correlations Matrix of Survey Categories



[A14] One-Way ANOVA Summary for Wellness Category Scores

Summary of ANOVA Modeling Wellness Category Scores by Grouping Factors: Gender, Age Group, Survey Number. Rows are Pairwise Differences (Left Group - Right Group). Colored Cells Identify Significance at 95% Confidence.

Gender		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
Male	Female	0.42	0.00	0.46	0.00	0.31	0.00	0.41	0.00	0.34	0.00	0.44	0.00	-0.12	0.07	0.27	0.00	0.38	0.00	0.29	0.00
Age Group		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
30	20	0.50	0.14	0.02	1.00	0.46	0.25	0.60	0.03	0.31	0.70	0.39	0.35	-0.22	0.87	0.25	0.82	0.37	0.46	0.41	0.27
40	20	0.35	0.47	0.00	1.00	0.60	0.02	0.44	0.18	0.37	0.42	0.29	0.62	0.00	1.00	0.36	0.37	0.43	0.20	0.47	0.09
50	20	0.09	1.00	-0.21	0.87	0.28	0.70	0.29	0.66	0.18	0.95	0.14	0.98	-0.10	1.00	0.07	1.00	0.23	0.83	0.23	0.80
60	20	0.05	1.00	-0.20	0.89	0.22	0.88	0.22	0.86	0.07	1.00	0.03	1.00	-0.10	1.00	0.05	1.00	0.16	0.96	0.20	0.88
70	20	0.27	0.73	0.03	1.00	0.42	0.24	0.41	0.23	0.31	0.60	0.28	0.63	-0.16	0.96	0.16	0.97	0.38	0.32	0.28	0.63
80	20	0.51	0.28	0.41	0.50	0.90	0.00	0.92	0.00	0.73	0.03	0.59	0.09	-0.47	0.26	0.70	0.02	0.67	0.05	0.72	0.01
40	30	-0.15	0.89	-0.02	1.00	0.15	0.91	-0.16	0.86	0.06	1.00	-0.10	0.98	0.23	0.42	0.10	0.98	0.05	1.00	0.06	1.00
50	30	-0.41	0.01	-0.23	0.37	-0.17	0.77	-0.31	0.10	-0.12	0.94	-0.25	0.28	0.12	0.91	-0.18	0.66	-0.14	0.90	-0.18	0.65
60	30	-0.45	0.00	-0.22	0.39	-0.24	0.38	-0.38	0.01	-0.24	0.37	-0.36	0.01	0.12	0.90	-0.21	0.47	-0.21	0.50	-0.21	0.43
70	30	-0.23	0.49	0.01	1.00	-0.04	1.00	-0.19	0.71	0.00	1.00	-0.11	0.97	0.07	1.00	-0.09	0.98	0.01	1.00	-0.13	0.91
80	30	0.01	1.00	0.39	0.31	0.45	0.22	0.32	0.60	0.42	0.28	0.20	0.92	-0.25	0.76	0.44	0.16	0.30	0.66	0.31	0.57
50	40	-0.26	0.07	-0.21	0.21	-0.32	0.01	-0.15	0.63	-0.18	0.45	-0.15	0.64	-0.10	0.89	-0.29	0.02	-0.19	0.35	-0.24	0.09
60	40	-0.30	0.01	-0.20	0.22	-0.38	0.00	-0.22	0.15	-0.30	0.02	-0.26	0.03	-0.10	0.85	-0.31	0.00	-0.26	0.04	-0.26	0.02
70	40	-0.08	0.99	0.03	1.00	-0.18	0.53	-0.03	1.00	-0.06	1.00	-0.01	1.00	-0.16	0.56	-0.20	0.33	-0.05	1.00	-0.19	0.39
80	40	0.16	0.97	0.41	0.17	0.30	0.62	0.48	0.08	0.36	0.37	0.30	0.53	-0.48	0.04	0.34	0.37	0.25	0.78	0.25	0.71
60	50	-0.04	1.00	0.01	1.00	-0.07	0.98	-0.07	0.98	-0.11	0.77	-0.11	0.70	0.00	1.00	-0.02	1.00	-0.07	0.97	-0.03	1.00
70	50	0.18	0.34	0.24	0.07	0.14	0.72	0.13	0.77	0.13	0.78	0.14	0.62	-0.06	0.99	0.09	0.94	0.15	0.62	0.05	1.00
80	50	0.42	0.15	0.62	0.00	0.62	0.01	0.63	0.00	0.54	0.02	0.45	0.07	-0.37	0.18	0.63	0.00	0.44	0.11	0.49	0.03
70	60	0.22	0.10	0.23	0.06	0.20	0.20	0.19	0.22	0.24	0.06	0.25	0.02	-0.05	0.99	0.11	0.79	0.22	0.11	0.08	0.95
80	60	0.46	0.08	0.61	0.00	0.68	0.00	0.70	0.00	0.66	0.00	0.56	0.01	-0.37	0.17	0.65	0.00	0.51	0.03	0.52	0.01
80	70	0.24	0.81	0.38	0.22	0.48	0.08	0.51	0.04	0.42	0.19	0.31	0.48	-0.32	0.39	0.54	0.02	0.29	0.59	0.44	0.09
Survey Number		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
2	1	1.26	0.00	0.84	0.00	1.12	0.00	1.06	0.00	1.02	0.00	0.78	0.00	0.53	0.00	0.86	0.00	1.02	0.00	1.14	0.00
3	1	1.79	0.00	1.35	0.00	1.65	0.00	1.47	0.00	1.48	0.00	1.18	0.00	0.83	0.00	1.21	0.00	1.55	0.00	1.69	0.00
4	1	1.94	0.00	1.56	0.00	1.89	0.00	1.75	0.00	1.69	0.00	1.48	0.00	0.97	0.00	1.44	0.00	1.80	0.00	1.96	0.00
5	1	2.15	0.00	1.71	0.00	2.15	0.00	1.93	0.00	1.88	0.00	1.47	0.00	1.06	0.00	1.52	0.00	1.95	0.00	2.04	0.00
6	1	2.13	0.00	1.71	0.00	2.14	0.00	1.93	0.00	2.01	0.00	1.75	0.00	1.12	0.00	1.68	0.00	1.90	0.00	2.07	0.00
7	1	2.31	0.00	2.17	0.00	2.35	0.00	2.24	0.00	2.34	0.00	2.03	0.00	0.35	0.95	1.82	0.00	2.18	0.00	2.15	0.00
3	2	0.53	0.00	0.51	0.00	0.53	0.00	0.41	0.00	0.46	0.00	0.40	0.00	0.29	0.00	0.35	0.00	0.53	0.00	0.55	0.00
4	2	0.68	0.00	0.71	0.00	0.77	0.00	0.70	0.00	0.67	0.00	0.70	0.00	0.43	0.00	0.58	0.00	0.78	0.00	0.82	0.00
5	2	0.89	0.00	0.86	0.00	1.02	0.00	0.87	0.00	0.85	0.00	0.70	0.00	0.52	0.00	0.66	0.00	0.92	0.00	0.90	0.00
6	2	0.87	0.00	0.87	0.00	1.02	0.00	0.88	0.00	0.98	0.00	0.97	0.00	0.59	0.00	0.82	0.00	0.88	0.00	0.93	0.00
7	2	1.05	0.00	1.33	0.00	1.23	0.00	1.18	0.00	1.32	0.00	1.25	0.00	-0.19	1.00	0.96	0.01	1.15	0.00	1.00	0.00
4	3	0.14	0.48	0.20	0.10	0.24	0.03	0.29	0.00	0.21	0.10	0.29	0.00	0.14	0.62	0.23	0.05	0.25	0.02	0.27	0.00
5	3	0.35	0.00	0.36	0.00	0.49	0.00	0.46	0.00	0.40	0.00	0.29	0.02	0.23	0.18	0.31	0.01	0.39	0.00	0.35	0.00
6	3	0.33	0.05	0.36	0.03	0.49	0.00	0.46	0.00	0.53	0.00	0.57	0.00	0.30	0.21	0.47	0.00	0.35	0.05	0.38	0.00
7	3	0.52	0.53	0.82	0.06	0.70	0.19	0.77	0.11	0.86	0.06	0.85	0.05	-0.48	0.75	0.61	0.40	0.62	0.32	0.45	0.61
5	4	0.21	0.22	0.15	0.70	0.25	0.08	0.18	0.54	0.18	0.53	0.00	1.00	0.09	0.98	0.08	0.99	0.15	0.75	0.08	0.98
6	4	0.19	0.73	0.16	0.90	0.25	0.42	0.18	0.84	0.31	0.17	0.28	0.27	0.16	0.92	0.24	0.51	0.10	0.99	0.11	0.98
7	4	0.38	0.88	0.61	0.35	0.46	0.75	0.48	0.71	0.65	0.34	0.56	0.52	-0.62	0.41	0.38	0.91	0.38	0.89	0.18	1.00
6	5	-0.02	1.00	0.00	1.00	-0.01	1.00	0.00	1.00	0.13	0.98	0.28	0.37	0.07	1.00	0.16	0.94	-0.04	1.00	0.03	1.00
7	5	0.17	1.00	0.46	0.74	0.21	1.00	0.31	0.97	0.47	0.79	0.56	0.53	-0.71	0.24	0.30	0.98	0.23	1.00	0.10	1.00
7	6	0.19	1.00	0.46	0.79	0.21	1.00	0.30	0.98	0.34	0.97	0.28	0.99	-0.78	0.18	1.00	0.28	0.99	0.08	1.00	1.00

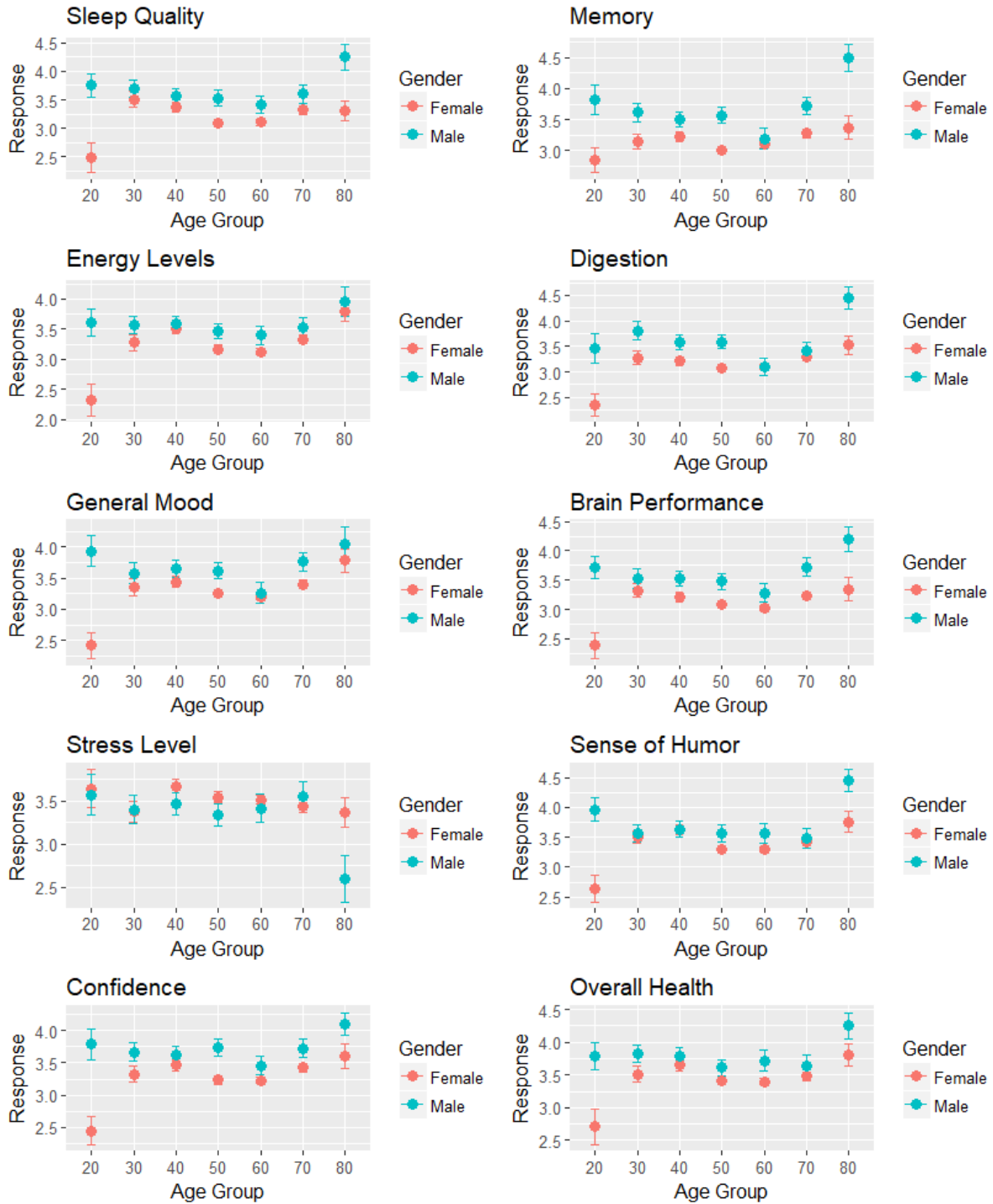
[A15] One-Way ANOVA Summary for Change from Baseline (CFB) Wellness Category Scores

Summary of ANOVA Modeling Wellness Category CFB Scores by Grouping Factors: Gender, Age Group, Survey Number. Rows are Pairwise Differences (Left Group - Right Group). Colored Cells Identify Significance at 95% Confidence.																					
Gender		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
Male	Female	-0.04	0.59	-0.12	0.07	-0.28	0.00	-0.11	0.14	-0.22	0.00	-0.11	0.08	-0.09	0.22	-0.07	0.33	-0.20	0.01	-0.21	0.00
Age Group		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
30	20	0.03	1.00	-0.13	0.99	-0.15	0.99	0.04	1.00	0.22	0.93	-0.03	1.00	0.49	0.15	-0.23	0.88	-0.24	0.88	0.00	1.00
40	20	-0.01	1.00	-0.05	1.00	0.25	0.85	0.01	1.00	0.30	0.67	0.06	1.00	0.38	0.35	0.09	1.00	-0.05	1.00	0.15	0.98
50	20	0.06	1.00	-0.16	0.96	0.21	0.92	0.23	0.87	0.23	0.88	0.12	0.99	0.26	0.74	-0.13	0.99	-0.04	1.00	0.02	1.00
60	20	0.00	1.00	-0.07	1.00	0.21	0.91	0.06	1.00	0.20	0.93	0.06	1.00	0.22	0.88	0.05	1.00	-0.20	0.93	0.06	1.00
70	20	0.12	0.99	0.02	1.00	0.02	1.00	0.22	0.89	0.17	0.97	0.21	0.85	0.30	0.63	-0.03	1.00	-0.09	1.00	0.08	1.00
80	20	-0.33	0.80	-0.65	0.04	0.20	0.98	-0.01	1.00	0.32	0.83	-0.37	0.57	-0.30	0.83	0.00	1.00	-0.10	1.00	-0.08	1.00
40	30	-0.05	1.00	0.07	1.00	0.40	0.04	-0.03	1.00	0.08	1.00	0.09	0.98	-0.11	0.97	0.32	0.10	0.19	0.74	0.15	0.89
50	30	0.02	1.00	-0.04	1.00	0.36	0.06	0.19	0.68	0.00	1.00	0.15	0.80	-0.23	0.43	0.10	0.97	0.20	0.63	0.02	1.00
60	30	-0.03	1.00	0.06	1.00	0.36	0.04	0.03	1.00	-0.03	1.00	0.09	0.97	-0.28	0.18	0.28	0.13	0.05	1.00	0.06	1.00
70	30	0.09	0.99	0.14	0.88	0.16	0.86	0.19	0.73	-0.05	1.00	0.24	0.29	-0.19	0.67	0.21	0.56	0.15	0.88	0.08	0.99
80	30	-0.36	0.48	-0.53	0.04	-0.06	1.00	-0.05	1.00	0.10	1.00	-0.34	0.43	-0.79	0.00	0.23	0.87	0.15	0.99	-0.08	1.00
50	40	0.07	0.99	-0.11	0.88	-0.04	1.00	0.22	0.25	-0.08	0.98	0.06	0.99	-0.11	0.87	-0.22	0.17	0.01	1.00	-0.13	0.80
60	40	0.01	1.00	-0.01	1.00	-0.04	1.00	0.05	1.00	-0.11	0.90	0.00	1.00	-0.16	0.51	-0.04	1.00	-0.14	0.68	-0.08	0.96
70	40	0.13	0.83	0.07	0.99	-0.23	0.25	0.21	0.33	-0.14	0.83	0.15	0.62	-0.08	0.98	-0.12	0.88	-0.04	1.00	-0.06	0.99
80	40	-0.32	0.55	-0.60	0.00	-0.45	0.16	-0.02	1.00	0.02	1.00	-0.43	0.09	-0.68	0.00	-0.09	1.00	-0.05	1.00	-0.22	0.84
60	50	-0.05	0.99	0.10	0.85	0.00	1.00	-0.16	0.36	-0.03	1.00	-0.06	0.99	-0.05	1.00	0.18	0.18	-0.15	0.45	0.04	1.00
70	50	0.06	0.99	0.18	0.32	-0.19	0.35	0.00	1.00	-0.06	1.00	0.09	0.90	0.04	1.00	0.11	0.88	-0.05	1.00	0.06	0.99
80	50	-0.38	0.26	-0.49	0.03	-0.41	0.22	-0.24	0.81	0.09	1.00	-0.49	0.02	-0.57	0.01	0.13	0.99	-0.05	1.00	-0.10	1.00
70	60	0.12	0.79	0.08	0.94	-0.20	0.27	0.16	0.49	-0.03	1.00	0.15	0.42	0.08	0.95	-0.08	0.96	0.10	0.88	0.02	1.00
80	60	-0.33	0.44	-0.59	0.00	-0.41	0.20	-0.07	1.00	0.12	0.99	-0.43	0.06	-0.52	0.03	-0.05	1.00	0.10	1.00	-0.14	0.98
80	70	-0.45	0.13	-0.67	0.00	-0.22	0.88	-0.23	0.83	0.15	0.98	-0.58	0.00	-0.60	0.01	0.02	1.00	-0.01	1.00	-0.16	0.96
Survey Number		Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
		diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj	diff	p adj
2	1	1.27	0.00	0.85	0.00	1.13	0.00	1.06	0.00	1.03	0.00	0.78	0.00	0.53	0.00	0.87	0.00	1.03	0.00	1.15	0.00
3	1	1.80	0.00	1.36	0.00	1.66	0.00	1.47	0.00	1.49	0.00	1.19	0.00	0.82	0.00	1.22	0.00	1.56	0.00	1.70	0.00
4	1	1.96	0.00	1.59	0.00	1.92	0.00	1.78	0.00	1.71	0.00	1.50	0.00	0.96	0.00	1.46	0.00	1.82	0.00	1.99	0.00
5	1	2.16	0.00	1.73	0.00	2.19	0.00	1.94	0.00	1.90	0.00	1.46	0.00	1.26	0.00	1.57	0.00	1.98	0.00	2.06	0.00
6	1	2.10	0.00	1.70	0.00	2.19	0.00	1.89	0.00	1.97	0.00	1.73	0.00	1.57	0.00	1.76	0.00	1.88	0.00	2.11	0.00
7	1	1.44	0.00	1.44	0.00	1.38	0.00	1.63	0.00	1.56	0.00	1.31	0.00	0.62	0.50	1.44	0.00	1.69	0.00	1.38	0.00
3	2	0.53	0.00	0.51	0.00	0.53	0.00	0.41	0.00	0.46	0.00	0.40	0.00	0.29	0.01	0.35	0.00	0.53	0.00	0.55	0.00
4	2	0.69	0.00	0.74	0.00	0.79	0.00	0.72	0.00	0.68	0.00	0.72	0.00	0.43	0.00	0.59	0.00	0.79	0.00	0.84	0.00
5	2	0.89	0.00	0.88	0.00	1.06	0.00	0.87	0.00	0.87	0.00	0.67	0.00	0.72	0.00	0.70	0.00	0.95	0.00	0.91	0.00
6	2	0.83	0.00	0.85	0.00	1.06	0.00	0.83	0.00	0.95	0.00	0.94	0.00	1.04	0.00	0.90	0.00	0.85	0.00	0.96	0.00
7	2	0.17	1.00	0.59	0.39	0.25	0.99	0.56	0.55	0.54	0.64	0.53	0.52	0.09	1.00	0.57	0.51	0.66	0.30	0.23	0.99
4	3	0.16	0.35	0.23	0.03	0.26	0.02	0.31	0.00	0.22	0.09	0.32	0.00	0.14	0.73	0.24	0.04	0.26	0.02	0.29	0.00
5	3	0.36	0.00	0.37	0.00	0.53	0.00	0.46	0.00	0.42	0.00	0.27	0.03	0.43	0.00	0.35	0.00	0.42	0.00	0.36	0.00
6	3	0.30	0.15	0.34	0.05	0.53	0.00	0.42	0.01	0.49	0.00	0.54	0.00	0.75	0.00	0.55	0.00	0.32	0.13	0.41	0.00
7	3	-0.36	0.91	0.08	1.00	-0.28	0.99	0.15	1.00	0.08	1.00	0.12	1.00	-0.20	1.00	0.22	1.00	0.13	1.00	-0.32	0.93
5	4	0.20	0.33	0.14	0.74	0.27	0.07	0.16	0.73	0.19	0.48	-0.04	1.00	0.29	0.07	0.11	0.96	0.16	0.65	0.07	1.00
6	4	0.14	0.95	0.11	0.98	0.27	0.36	0.11	0.99	0.26	0.42	0.22	0.51	0.61	0.00	0.31	0.19	0.06	1.00	0.12	0.97
7	4	-0.52	0.55	-0.15	1.00	-0.55	0.59	-0.16	1.00	-0.15	1.00	-0.19	1.00	-0.34	0.97	-0.02	1.00	-0.13	1.00	-0.62	0.24
6	5	-0.06	1.00	-0.03	1.00	0.00	1.00	-0.05	1.00	0.07	1.00	0.27	0.36	0.32	0.34	0.20	0.83	-0.10	1.00	0.05	1.00
7	5	-0.72	0.15	-0.29	0.97	-0.82	0.10	-0.31	0.98	-0.34	0.96	-0.15	1.00	-0.63	0.51	-0.13	1.00	-0.30	0.98	-0.68	0.14
7	6	-0.66	0.29	-0.26	0.99	-0.82	0.13	-0.27	0.99	-0.41	0.92	-0.41	0.85	-0.95	0.07	-0.33	0.97	-0.19	1.00	-0.73	0.11

[A16] Two-Way ANOVA Summary

Summary of Two-Way ANOVA Modeling Wellness Category Scores by Grouping Factors: Age Group and Gender. Colored Cells Identify Significance at 95% Confidence.																				
Gender	Sleep Quality		Memory		Energy Levels		Digestion		General Mood		Brain Performance		Stress Level		Sense of Humor		Confidence		Overall Health	
	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)	F value	Pr(>F)
Age Group	5.45	0.00	4.72	0.00	6.33	0.00	5.84	0.00	4.63	0.00	4.96	0.00	2.00	0.06	5.24	0.00	3.87	0.00	4.22	0.00
Gender	25.31	0.00	39.55	0.00	12.78	0.00	27.49	0.00	17.17	0.00	33.98	0.00	3.56	0.06	10.24	0.00	24.96	0.00	14.86	0.00
Interaction Age Group and Gender	2.14	0.05	2.26	0.04	1.81	0.09	2.55	0.02	2.56	0.02	2.17	0.04	1.25	0.28	2.96	0.01	2.09	0.05	1.45	0.19

[A17] Two-Way ANOVA Interval Plots



[A18] Model Summary

Model Summary Table: Random Effects Time Series Models best fit this data (Based on low residual standard deviation). For these models, coefficient values and p-values are listed below, the significant effects are colored. The magnitude of the effect is represented by the magenta cells, with darker cells corresponding to more improvement/increase within a given wellness category.

Model	Model Specification	Residual Error (Prediction - Actual) Statistics	Sleep Quality	Memory	Energy Levels	Digestion	General Mood	Brain Performance	Stress Level	Sense of Humor	Confidence	Overall Health									
Fixed Effects Time Series Model	gls(response~age+gender+survey,correlation=corAR1(form=~survey user_id,value=a1),data=data1,method="REML")	Mean	-0.10	-0.06	-0.06	-0.06	-0.07	-0.05	-0.03	-0.06	-0.06	-0.07									
		Standard Deviation	1.07	1.06	1.11	1.10	1.13	1.07	1.12	1.10	1.08	0.99									
Random Effects Time Series Model	lme(response~age+gender+survey,random=~1 user_id,correlation=corAR1(form=~survey user_id,value=a1),data=data1,method="REML")	Mean	-0.08	-0.04	-0.04	-0.04	-0.06	-0.03	-0.02	-0.04	-0.05	-0.06									
		Standard Deviation	0.93	0.86	0.92	0.95	0.96	0.85	0.84	0.84	0.94	0.87									
Linear Model	lm(response~age+gender+survey,data=data1)	Mean	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00									
		Standard Deviation	1.07	1.06	1.10	1.10	1.13	1.07	1.12	1.10	1.08	0.99									
Random Effects Time Series Interaction Model	lme(overall_health~age+gender+survey+age*gender+age*survey+survey*gender,random=~1 user_id,correlation=corAR1(form=~survey user_id,value=a1),data=data1,method="REML")	Mean	-0.08	-0.04	-0.04	-0.04	-0.06	-0.03	-0.02	-0.04	-0.05	-0.06									
		Standard Deviation	0.93	0.85	0.91	0.96	0.96	0.85	0.84	0.84	0.94	0.87									
Model	Coefficients	Value	P	Value	P	Value	P	Value	P	Value	P	Value	P	Value	P	Value	P	Value	P		
Random Effects Time Series Model	(Intercept)	1.69	0.00	1.72	0.00	1.72	0.00	1.69	0.00	1.85	0.00	1.93	0.00	2.98	0.00	2.28	0.00	1.75	0.00	1.98	0.00
	Age	0.00	0.87	0.00	0.25	0.00	0.84	0.00	0.50	0.00	0.65	0.00	0.78	0.00	0.14	0.00	0.81	0.00	0.27	0.00	0.98
	Gender Male	0.40	0.00	0.46	0.00	0.31	0.00	0.41	0.00	0.35	0.00	0.43	0.00	-0.12	0.24	0.24	0.02	0.39	0.00	0.29	0.00
	Survey Number	0.49	0.00	0.40	0.00	0.48	0.00	0.45	0.00	0.44	0.00	0.38	0.00	0.26	0.00	0.37	0.00	0.45	0.00	0.46	0.00

APPENDIX B

Packages utilized were:

```
library(psych)
library(nlme)
library(car)
library(multcompView)
library(lsmmeans)
library(ggplot2)
library(rcompanion)
library(Rmisc)
library(gridExtra)
library(corrplot)
```

Code:

Job 1 Longitudinal
Wellness Study for D: