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Personality And How Sound Affects Mood

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Abstract

This research seeks to determine the personality and relationship between current moods of individuals at Louisiana Tech University by conducting a sound test of a can opening with a pre and post mood assessment, Brief Mood Introspection Scale (BMIS). The real question is “Can a sound test change mood?” Using one-way analysis of variance (ANOVA), the study is intended to examine the relationship between the pre and post (BMIS). The results indicate that there is a statistically significant relationship between both BMIS assessments. To determine if the data is significant, we must show the analysis of both BMIS and its outcome. Concluding this study, the personality assessment, Big Five Factor Inventory extra short form (BFI-2-XS), results will be shown in context while the pre and post BMIS assessment will be compared.

Keywords: Brief Mood Introspection Scale (BMIS), analysis of variance (ANOVA), Big Five Factory Inventory extra short-form (BFI-2-XS)

1 Introduction

To perform this study, a personality assessment is required followed with a pre and post mood assessment to test the mood levels before and after of the sound test of a can opening. The Big Five Factor Inventory extra short form is used instead of its previous version the Big Five Factor Inventory-2 (BFI-2) to save time during assessment. At the level of the Big Five domains, the BFI-2-XS retain much of the full measure’s reliability and validity. The BFI-2-XS was first studied by Soto and John. The Brief Mood Introspection Scale has been used frequently in psychological research which is validated mood assessment that has over 272 citations starting from the original Mayer and Gashke article.

2 Background Literature and Related Studies

2.1 Google Sheets

Google Forms is used to administer the survey assessment online. It is an internet-based survey when using the survey platform. All variables in the assessments are to be answered before continuing to the next question. The survey was attached to the mass email sent out to the Louisiana Tech student body.

2.2 Big Five Factor Inventory-2 extra short form Validation

This 15-item questionnaire was developed from its predecessor, the BFI-2 which is a 60-item questionnaire that hierarchically assesses the Big Five personality domain and 15 more-specific facet traits. These five personality types include Openness, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (OCEAN). This condensed form of the BFI-2 allows the opportunity to save time in the assessment over the BFI-2. Even though the BFI-2-XS a shorter version of the BFI-2, it retains most of the full measure's reliability and validity. Therefore, the BFI-2-XS proves useful in assessing personality traits in research where, due respondent fatigues, the BFI-2 would not be feasible. The BFI-2-XS uses a Likert scale such that 1= disagree strongly, 2= disagree a little, 3= neutral; no opinion, 4= agree a little, and 5= agree strongly. Then these values are used to run statistical analysis test.

2.3 Brief Mood Introspection Scale

The Brief Mood Introspection Scale (BMIS) consists of 16 emotion adjectives, which was developed by Gashke and Mayer (1988). This assessment is to scale the current mood of the participants. Obtained from the BMIS, the two scores are being measured by the participants' pleasant and unpleasant mood level. The two mood levels, pleasant and unpleasant, consist of 8 mood states and every mood state is defined by two adjectives that relate to the mood states. The following are the mood states and the 2 relevant adjectives. (1) happy (happy, lively), (2) loving (loving, caring), (3) calm (calm, content) (4) energetic (active, peppy) (5) anxious or fearful (jittery, nervous), (6) angry (grouchy, fed up), (7) tired (tired, drowsy), (8) sad (gloomy, fed up). The first four mood states are form the pleasant mood scores, while the total score of the last four mood states produce the unpleasant mood scores. The BMIS is a four-point Meddis Style scale (XX= definitely do not feel; X = do not feel; V= slightly feel; VV= definitely feel). Then this scale will transform into a 4-point Likert scale, which is a more common scale when running statistical survey test. The BMIS is a factor-valid tool that is appropriate to the mood circumplex (Mayer and Gashke, 1988). The correlations with the Mood Introspection Scale (Mayer, Mamberg, and Volanth, 1988) and the Russell Adjective Scale (Russell, 1979).

2.4 Reverse Scoring

Questionnaires that use a Likert scale (eg. Strongly disagree, neutral, agree, strongly agree) for answering assessments. Reverse scoring means that numerical scoring scales runs in the opposite direction. Using the example of the Likert scale, the attributes can be in the answer of strongly disagree with a score of 1, disagree = 2, neutral = 3, agree = 4, and strongly disagree = 5 for each question. This is appropriate for the positively worded questions; however, we cannot use the same scoring for the negatively worded questions. Instead what we do is reverse score the negatively worded questions. Reverse Scoring is that the numerical scoring scale runs in the opposite direction. So, in the above example strongly disagree would attract a score of 5, disagree would be 4, neutral still equals 3, agree becomes 2 and strongly agree = 1. After the necessary scored items have been reversed, calculation of scores may continue.

2.5 Minitab Express

Minitab Express software provides introductory statistics in a package designed to let students focus on the concepts, not the software. Students have quick access to the statistics they need from menus and toolbars organized to complement leading textbooks. Minitab Express is available for both PC and Mac, allowing access to teach and share files effortlessly across platforms. Input data can be typed easily, imported, or copied into familiar worksheets and simple dialogs completed to allow creation of complementary graphs with a single analysis.

2.6 One-Way ANOVA

The One-Way ANOVA (“analysis of variance”) compares means of two or more independent groups in order to determine whether there is statistical evidence that the associated population means are significantly different. One-Way ANOVA is known as a parametric test. The variables that are required in the One-Way ANOVA test are dependent variables and independent variables, this variable divides the cases into two or more mutually exclusive levels or groups. The One-Way ANOVA often occurs in analyzing data from field studies, experiments, and Quasi-experiments. The One-Way ANOVA is commonly used to test the following: statistical differences among the means of two or more groups, statistical differences among the means of two or more interventions, statistical differences among the means of two or more change scores.

2.6.1 One-Way ANOVA Requirements

There must include a dependent variable and an independent variable with two or more groups. There must be cases that have values on both the dependent and independent

variables. There is no relationship between the subjects in each sample. Meaning that subjects in the first group cannot be in the second group, no subject in either group can influence subjects in the other group, and no group can influence the other group. There should be normal distribution of the dependent variable for each group. Also, avoid any outliers in the data set if possible.

3 Methods and Procedure

3.1 Survey Outline

The survey will begin with the personality assessment (BFI-2-XS) then following this is the pre-mood assessment (BMIS). Then, the sound clip of a can opening is played. When the sound clip is heard, the post-mood assessment (BMIS) will follow the sound test. Concluding the survey is the demographics assessment which includes gender, college class, and age.

3.2 Survey Process

For this research to take place, an IRB Form (institutional review board) must be processed and approved. This is also called the Department Head Approval Form. After the IRB Form is approved, a survey must be constructed to perform the study. The survey will consist of the BFI-2-XS assessment to determine personality and following the personality assessment is the pre-mood assessment using BMIS. After the pre-mood assessment, a sound clip of a can opening is played. After listening to the sound clip, the post-mood assessment begins, and the post-mood assessment also uses the BMIS. Lastly, in the survey, a basic demographics assessment is to be completed to determine age, gender, college department, current standing in college (such as freshman, sophomore... etc.). Creating a consent form for the surveyors to let them be aware of any rewards or consequences of taking the survey. Then an email with the consent form, survey, and contact information is sent to the student body at Louisiana Tech University.

3.3 Outliers in Data

The participants with the outliers subtracted from the data set will let $N=244$. The new participant data set includes 43.8525% male ($N=107$) and 56.1475% female ($N=137$). Between the ages 18 to 22, contains 95.9016% of the data. The percentage of the current education status are 26.2295% are freshman ($N=64$), 18.4426% are sophomore ($N=45$), 20.082% are juniors ($N=49$), 25.4098% are seniors ($N=62$), and 9.836% are graduate students ($N=24$). The data set includes the BFI-2-XS, the pre-BMIS, and the post-BMIS. Also contains simple demographics assessment (gender, education class, and age).

3.4 Data Analysis

According to Venkatesh, Brown, & Bata (2013), researchers can examine relationships between two variables by comparing the mean of the dependent variable between of at least two or more groups within the independent variable. Using this assumption, I divided the participants into two groups based on the scores of the independent variable. Then comparing the means of two groups on the dependent variable. This study includes two statistical analysis that consist of a descriptive analysis to describe how the data is distributed and the hypothesis testing with one-way analysis of variance (one-way ANOVA).

4 Data & Models

4.1 Descriptive Analysis

Descriptive Analysis Summary of BFI-2-XS

Associated Factor	Male		Female		Total	
	Mean	SD	Mean	SD	Mean	SD
BFI-2-XS						
Open-Mindedness						
Is fascinated by art, music or literature.	3.673	0.112	3.869	0.099	3.771	0.075
Has little interest in abstract ideas.	3.664	0.11	3.628	0.097	3.646	0.073
Is original, comes up with new ideas.	3.477	0.094	3.533	0.083	3.505	0.063
Conscientiousness						
Tends to be disorganized.	3.15	0.102	4.109	0.09	3.63	0.068
Has difficulty getting started on tasks.	2.757	0.119	3.175	0.105	2.966	0.079
Is reliable can always be counted on.	3.794	0.1	2.803	0.088	3.299	0.067
Extraversion						
Tends to be quiet.	3.206	0.112	3.336	0.099	3.271	0.075
Is dominant, acts as a leader.	2.617	0.109	2.737	0.097	2.677	0.073
Is full of energy.	1.841	0.076	1.679	0.067	1.76	0.05
Agreeableness						
Is compassionate, has a soft heart.	2.925	0.136	3	0.12	2.963	0.091
Is sometimes rude to others.	3.318	0.108	3.504	0.095	3.411	0.072
Assumes the best about people.	3.421	0.105	3.606	0.093	3.513	0.07
Negative Emotionally						
Worries a lot.	3.299	0.138	3.015	0.122	3.157	0.092
Tends to feel depressed, blue.	3.486	0.099	3.431	0.088	3.458	0.066
Is emotionally stable, not easily upset.	3.421	0.103	3	0.091	3.21	0.068

The study sample consisted of 244 participants. The table above shows the means and standard deviations of the results from the BFI-2-XS assessment conducted in the survey. Using a confidence level $\bar{0}.05$, the scores are processed with One-Way ANOVA and found under the Means tab of the results. For all entries by variable N $\bar{2}44$.

Descriptive Analysis Summary of Pre-BMIS

<i>Pre-Brief Mood Introspection Scale</i>	Male		Female		Total	
	Mean	SD	Mean	SD	Mean	SD
Pleasant						
Lively	2.701	0.082	2.613	0.072	2.657	0.055
Happy	2.953	0.08	3.007	0.071	2.98	0.054
Caring	3.131	0.074	3.518	0.066	3.325	0.049
Content	2.85	0.084	2.912	0.075	2.881	0.056
Peppy	1.972	0.089	1.876	0.078	1.924	0.059
Calm	2.916	0.086	2.818	0.076	2.867	0.057
Loving	2.991	0.08	3.38	0.071	3.185	0.053
Active	2.551	0.096	2.285	0.085	2.418	0.064
Unpleasant						
Sad	3.075	0.081	2.81	0.071	2.942	0.054
Tired	2.056	0.083	1.65	0.073	1.853	0.055
Gloomy	3.075	0.083	2.934	0.074	3.005	0.056
Jittery	3.112	0.096	3.08	0.085	3.096	0.064
Drowsy	2.542	0.097	2.277	0.086	2.41	0.065
Grouchy	3.196	0.085	3.175	0.075	3.186	0.057
Nervous	2.804	0.095	2.679	0.084	2.741	0.064
Fedup	2.963	0.096	2.92	0.085	2.941	0.064

This is the descriptive summary of the Brief Mood introspection Scale before the sound test. Using a confidence level of 0.05, the data set was processed using One-Way ANOVA and the results were found under the Mean tab (Participants is 244).

Descriptive Summary of Post BMIS

<i>Post Brief Mood Introspection Scale</i>	Male		Female		Total	
	Mean	SD	Mean	SD	Mean	SD
Pleasant						
Lively	2.645	0.085	2.489	0.075	2.567	0.057
Happy	2.879	0.082	2.796	0.072	2.837	0.055
Caring	2.832	0.087	3.153	0.077	2.993	0.058
Content	2.757	0.086	2.839	0.076	2.798	0.057
Peppy	1.972	0.089	1.818	0.079	1.895	0.06
Calm	2.879	0.086	2.774	0.076	2.826	0.057
Loving	2.841	0.093	3.117	0.082	2.979	0.062
Active	2.43	0.097	2.139	0.086	2.284	0.065
Unpleasant						
Sad	1.794	0.079	1.832	0.07	1.813	0.053
Tired	2.589	0.098	2.934	0.086	2.762	0.065
Gloomy	1.729	0.086	1.839	0.076	1.784	0.057
Jittery	1.925	0.09	1.839	0.079	1.882	0.06
Drowsy	2.318	0.102	2.46	0.09	2.389	0.068
Grouchy	1.785	0.087	1.708	0.077	1.747	0.058
Nervous	2.075	0.095	2.175	0.084	2.125	0.064
Fedup	1.972	0.095	1.876	0.084	1.924	0.063

The participants in this data set is 244. The means and standard deviations were calculated using one-way ANOVA and located under the “Mean” tab of the analysis. This uses a confidence level of 0.05.

Summary of one-way ANOVA

	Adj SS	DF	Mean Square	F-Value	P-Value
BFI-2-XS					
Open-Mindness					
Is fascinated by art, music or literature.	2.301	1	2.301	1.702	0.193
Has little interest in abstract ideas.	0.077	1	0.077	0.059	0.808
Is original, comes up with new ideas.	0.19	1	0.19	0.199	0.656
Conscientiousness					
Tends to be disorganized.	55.363	1	55.363	49.445	<0.0001
Has difficulty getting started on tasks.	10.506	1	10.506	6.956	0.009
Is reliable, can always be counted on.	59.058	1	59.058	55.148	<0.0001
Extraversion					
Tends to be quiet.	1.018	1	1.018	0.755	0.386
Is dominant, acts as a leader.	0.871	1	0.871	0.68	0.41
Is full of energy.	1.582	1	1.582	2.584	0.109
Agreeableness					
Is compassionate, has a soft heart.	0.336	1	0.336	0.17	0.681
Is sometimes rude to others.	2.076	1	2.076	1.678	0.196
Assumes the best about people.	2.062	1	2.062	1.74	0.188
Negative Emotionally					
Worries a lot.	4.862	1	4.862	2.389	0.123
Tends to feel depressed, blue.	0.184	1	0.184	0.175	0.676
Is emotionally stable, not easily upset.	10.626	1	10.626	0.451	0.002

This table shows the One-Way ANOVA results of the BFI-2-XS. A p-value of less than 0.05 was required for significance. The p-values bolded are less than the confidence level of 0.05. This means any of the bolded p-values will reject the null hypothesis.

Summary of one-way ANOVA

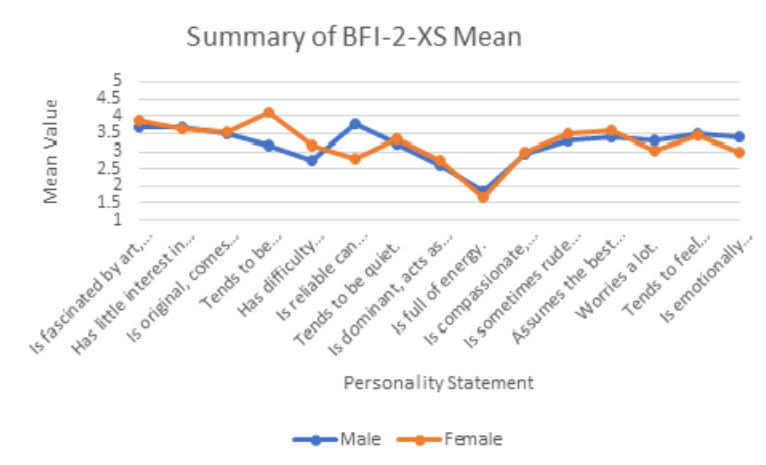
	Adj SS	DF	Mean Square	F-Value	P-Value
Pre-Brief Mood Introspection Scale					
Pleasant					
Lively	0.463	1	0.463	0.648	0.422
Happy	0.175	1	0.175	0.253	0.615
Caring	9.017	1	9.017	15.326	<0.0001
Content	0.231	1	0.231	0.302	0.583
Peppy	0.554	1	0.554	0.658	0.418
Calm	0.581	1	0.581	0.738	0.391
Loving	9.087	1	9.087	13.307	<0.0001
Active	4.274	1	4.274	4.339	0.038
Unpleasant					
Sad	4.205	1	4.205	6.04	0.015
Tired	9.924	1	9.924	13.581	<0.0001
Gloomy	1.185	1	1.185	1.595	0.208
Jittery	0.061	1	0.061	0.061	0.805
Drowsy	4.209	1	4.209	4.14	0.043
Grouchy	0.027	1	0.027	0.035	0.853
Nervous	0.937	1	0.937	0.966	0.327
Fedup	0.111	1	0.111	0.112	0.739

This table shows the One-Way ANOVA results of the Pre-Brief Mood Introspection Scale assessment. A p-value of less than 0.05 was required for significance. The p-values bolded are greater than the confidence level of 0.05. This means any of the bolded p-values will accept the null hypothesis.

Summary of one-way ANOVA

	Adj SS	DF	Mean Square	F-Value	P-Value
Pre-Brief Mood Introspection Scale					
Pleasant					
Lively	0.463	1	0.463	0.648	0.422
Happy	0.175	1	0.175	0.253	0.615
Caring	9.017	1	9.017	15.326	<0.0001
Content	0.231	1	0.231	0.302	0.583
Peppy	0.554	1	0.554	0.658	0.418
Calm	0.581	1	0.581	0.738	0.391
Loving	9.087	1	9.087	13.307	<0.0001
Active	4.274	1	4.274	4.339	0.038
Unpleasant					
Sad	4.205	1	4.205	6.04	0.015
Tired	9.924	1	9.924	13.581	<0.0001
Gloomy	1.185	1	1.185	1.595	0.208
Jittery	0.061	1	0.061	0.061	0.805
Drowsy	4.209	1	4.209	4.14	0.043
Grouchy	0.027	1	0.027	0.035	0.853
Nervous	0.937	1	0.937	0.966	0.327
Fedup	0.111	1	0.111	0.112	0.739

This table shows the One-Way ANOVA results of the Post Brief Mood Introspection Scale assessment. A p-value of less than 0.05 was required for significance. The p-values bolded are greater than the confidence interval of 0.05. This means any of the bolded p-values will accept the null hypothesis.

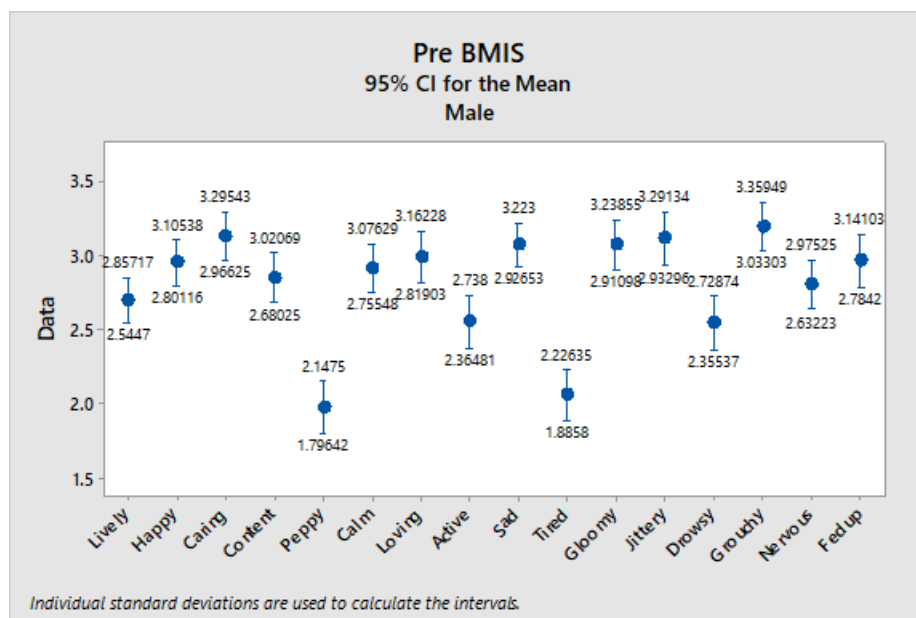


This chart shows the mean values of the personality statements in the BFI-2-XS. This depicts the means to have a better understanding of the BFI-2-XS results.

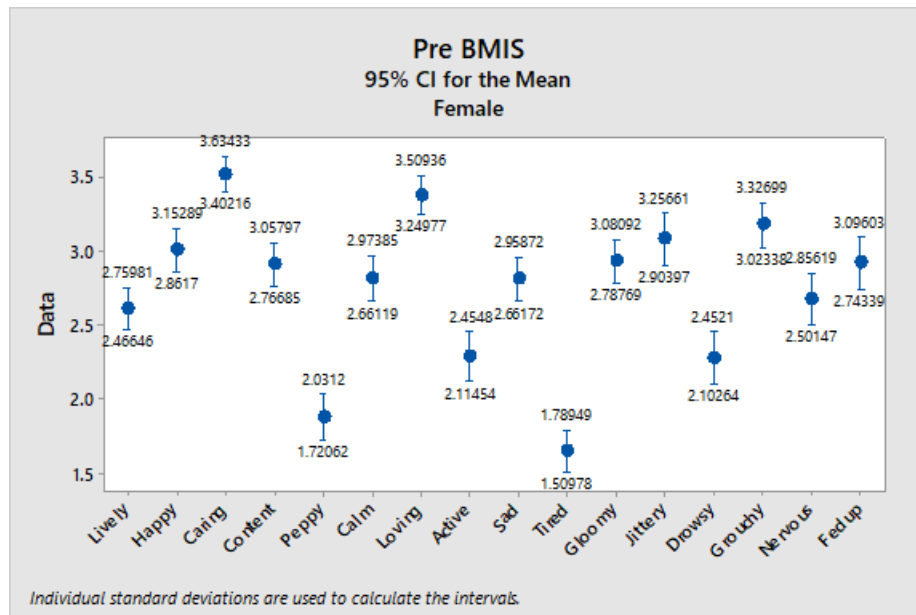
5 Interpretation & Results

A one-way ANOVA was conducted to evaluate the relationship between the pre-Brief Mood introspection Scale and the post Brief Mood Introspection Scale. The independent variable,

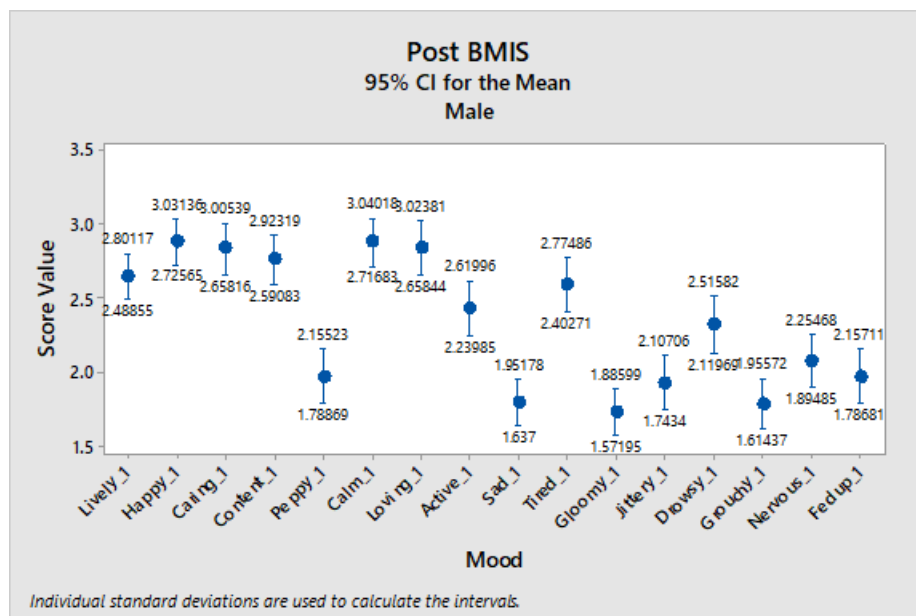
the gender (male or female), and the dependent variable were the assessment score results (BFI-2-XS, and both BMIs assessments. The confidence level of 0.05 will determine if the null hypothesis is rejected or not. If the confidence level of 0.05 is greater than the p-value, then we reject the null hypothesis. For the BFI-2-XS, the following are rejected by the null hypothesis: “Tends to be disorganized” (p= 0.001), “Has difficulty getting started on tasks” (p= 0.009), and “Is emotionally stable, not easily upset” (p= 0.002). For the pre-BMIS, the following are under the confidence level (0.05): “Caring” (p= 0.0001), “Loving” (p=0.0001), “Sad” (p= 0.015), “Tired” (p= 0.0001), and “Drowsy” (p= 0.043). For the post BMIS, the following are rejected by the null hypothesis: “Caring” (p= 0.006), “Loving” (p= 0.027), “Active” (p= 0.026), and “Tired” (p= 0.008). Changes in means did occur after the sound test of the can opening. The mood “Tired” showed the most difference in means, for both male and female, from the pre and post BMIS, which shows that sound test may have affected the post BMIS negatively or other factors such as survey fatigue can affect the results. Also, the female group shows a slight increase in “Drowsy”. Positive worded moods in the pre-BMIS are not significantly different from the post BMIS. Negatively worded moods show the most change from the pre-BMIS and the post BMIS. Slight increases of positively-worded moods ranging from 0.0001 to 0.299. Decreases in all negatively worded moods occur except for “Tired” and “Drowsy which increased in score. In Figure 1.1 and 1.2, the confidence level of 0.05 is used to determine the confidence intervals of the BMIS. Figure 1.1 uses the independent variable male and Figure 1.2 uses the independent variable female. In Figure 2.1 and Figure 2.2, the post BMIS confidence interval are depicted with Figure 2.1 having the male independent variable and Figure 2.2 having the female independent variable.



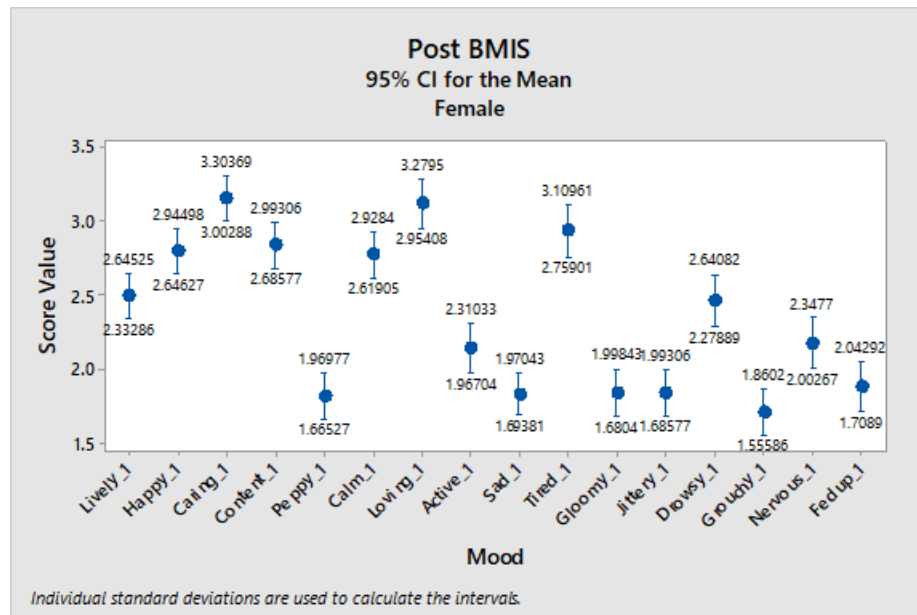
Using a confidence level of 0.05, the confidence intervals are found for the pre-BMIS assessment with the independent variable, male.



This figure uses a confidence level of 0.05 to determine the confidence interval for the pre-BMIS assessment with the independent variable, female.



This is the post BMIS confidence interval chart using a confidence level of 0.05 to calculate the endpoints of the confidence interval with the independent variable, Male.



This is the confidence interval chart for the independent variable, female. This chart uses a confidence level of 0.05 to calculate the endpoints of the confidence interval.

6 Conclusion

The purpose of this study was to examine the relationship between the pre and post Brief Mood Introspection Scale assessment by gender. Descriptive statistics allowed to determine the mean of the independent variable, gender, and the dependent variable, assessment scores. Thereafter, computing a One-Way ANOVA to analyze the data. The ANOVA test depicted the significant results allowing rejection to the null hypothesis for most cases in the research. A post-hoc test is not needed since the independent variable only has 2 groups in the category. These results support the conclusion that there is a statistically significant relationship between the independent variable, gender, and the dependent variable (BFI-2XS, pre-BMIS, post BMIS).

References

- [1] Erik B Erhardt, Edward J Bedrick, and Ronald M Schrader. Advanced data analysis-lecture notes. 2016.
- [2] Ali Ezzati, Julie Jiang, Mindy J Katz, Martin J Sliwinski, Molly E Zimmerman, and Richard B Lipton. Validation of the perceived stress scale in a community sample of older adults. *International journal of geriatric psychiatry*, 29(6):645–652, 2014.

- [3] Costas I Karageorghis, David-Lee Priest, Peter C Terry, Nikos LD Chatzisarantis, and Andrew M Lane. Redesign and initial validation of an instrument to assess the motivational qualities of music in exercise: The brunel music rating inventory-2. *Journal of sports sciences*, 24(8):899–909, 2006.
- [4] Fatih Cemil Kavcıoğlu. The role of meta-mood experience on the mood-congruency effect in recognizing emotions from facial expressions. *Unpublished doctorate dissertation. Middle East Technical University, School of Social Sciences, Ankara*, 2011.
- [5] John D Mayer and Yvonne N Gaschke. The experience and meta-experience of mood. *Journal of personality and social psychology*, 55(1):102, 1988.
- [6] John D Mayer, Michelle H Marnberg, and Alton J Volanth. Cognitive domains of the mood system. *Journal of Personality*, 56(3):453–486, 1988.
- [7] Robert R McCrae and Paul T Costa. Validation of the five-factor model of personality across instruments and observers. *Journal of personality and social psychology*, 52(1):81, 1987.
- [8] Beatrice Rammstedt and Oliver P John. Measuring personality in one minute or less: A 10-item short version of the big five inventory in english and german. *Journal of research in Personality*, 41(1):203–212, 2007.
- [9] Christopher J Soto and Oliver P John. Short and extra-short forms of the big five inventory–2: The bfi-2-s and bfi-2-xs. *Journal of Research in Personality*, 68:69–81, 2017.
- [10] Mouhamadou Thile Sow. Using anova to examine the relationship between safety & security and human development. *Journal of International Business and Economics*, 2(4):101–106, 2014.
- [11] Daniel Västfjäll, Margareta Friman, Tommy Gärling, and Mendel Kleiner. The measurement of core affect: A swedish self-report measure derived from the affect circumplex. *Scandinavian Journal of Psychology*, 43(1):19–31, 2002.
- [12] Jonna K Vuoskoski and Tuomas Eerola. The role of mood and personality in the perception of emotions represented by music. *Cortex*, 47(9):1099–1106, 2011.

[5] [9] [11] [6] [3] [10] [4] [1] [8] [12] [7] [2]