# MULTIVARIATE ANALYSIS ON STRESS AND ITS INFLUENCE ON INDIVIDUAL'S HEAVY DRINKING, PERCEIVED HEALTH AND PERCEIVED LIFE SATISFACTION

**Kamakshaiah Musunuru***

**kamakshaiah.m@gmail.com**

**ABSTRACT**

*Stress is prevalent in life which might determine both mental and physical health of individual in particular and society in general. There are abundant of theories that attempt to find various causes or triggers of stress while bringing emphasis on both stressors and respective coping strategies. There are also theories which explain stress in terms of body-mind complex, cognition, sociology and etc. One of the major factors which is affected by stress is perhaps health. Stress, when mismanaged leads to plethora of health problems. This descriptive study is an attempt to understand stress with respect to certain other factors like heavy drinking, perceived health and life satisfaction. The data used is secondary in nature, which was collected from Statistics Canada. Correlation and MANOVA were used in order to realize the objectives of the study. All the variables are strictly correlated with Karl Pearson correlation coefficient ranging from 0.73 to 0.99. In significant test all variables do not belie with alternative hypothesis, which means the association/relationship is not zero. In MANOVA, the null hypotheses were accepted as all p-values are more than significance level (0.01). Apart from this, most interestingly the variables are behaving like cohorts whereby resulting cohort effect.*

## INTRODUCTION

It appears that the real meaning of stress is still difficult to comprehend. Although, we talk about stress many times in real life, it is still a nascent area for research. Mostly, stress is considered to be antecedents of some happening which is not expected (Castro, F. G. 1989).[1] Some think that stress is thinking about unwanted happenings in life, others interprets as a cognitive or physical reaction to an event (perhaps both). Although, mind and body play enormous roll in getting stressed, it is in deed, the thought that is most important aspect, perhaps which determining the stress.[2][3] It is the sin, but not the sinner, might be a typical approach to understand stress.

In fact the stress is a cognitive process, which might trigger certain bodily responses to a given stimulus.[4][5] Why somebody sweats or shivers when anticipating a danger? Why some one tends to be emotional, when something hurts his/her ego? Why someone grow anger, when he/she feels hungry? Why someone could not sleep well when denigrated by some other? These are some typical questions, answers to which might perhaps reveal abnormal nature of stress. Some times the situations are stressful, might not be cognitive in nature, but it might be due to lack of sufficient preparations or coping skills.

How we understand stress and stress provoking situations, perhaps impact our health.[6] A careful observation upon events commonly known as stressors and individual cognitive reactions to the same might help to gain control over stress. While some typical symptoms of stress are; pressurization, anxiety, memory loss, ulcers, insomnia and etc. and effects can be mental health problems, cardiovascular disease and etc.[7] Yoshitaka (2006) in his study on aboriginal tribes founded that the stress is prevalent and play significant role in every body's life.[8] He also argues that stress is not only creates health related issues but emanates at different intertwined levels like socio-economic, cultural, historical, political and etc.

* *Assistant Professor, Faculty of Management, Symbiosis Centre for Distance Learning, Pune (Maharashtra)*

apart from finding various reasons, he also suggests certain stress coping strategies like; collective strengths, gaining strengths through spirituality, cultivating cultural identity, using personal/ individual aspects of strengths and making positive transformations in meaningful ways. Burton (2008), in his case on healthy workplace, while proposing certain avenues that makes workplace more interesting to an individual, emphasizes on stress management training as one of the important avenues that an employer provides to an individual to feel better.[9] In fact, he exhorts that individual's mental and physical well-being depends upon identifying workplace stressors and getting them ready to face them through stress management.

There are other studies which emphasize on certain important factors of society. If the health depends on perceived stress of an individual, then where from this stress arises in individual?[10] Certainly the primary cause can be society. The conceptual and methodological tools of social stress theory and research are relevant in investigating the pathways linking social structure and health (Peggy, Vivienne, Lisa, 2002).[11] They argue that social roles and social economic positions are consequential for health because they are responsible for daily life struggles, these struggles in turns might responsible for stress.

**OBJECTIVES & HYPOTHESIS**

The following are the objectives to the study:

1. To study about stress and its influence on other factors like heavy drinking, health perception and life satisfaction.
2. To know and aware that whether the effect of stress could be same across various age groups and gender.

Both descriptive and inferential statistical tools were used in the analysis. Apart from simple tables and graphs, MANOVA is used in order to test the hypothesis and for further analysis. In MANOVA, the test of hypothesis is a default mechanism, apart from that there is a provision for further analysis as test of fitness, test of normality, test of significance and leverage analysis. In MANOVA the null hypothesis could be:

$H0 = \mu1 + \mu2 + \mu3 + \mu4$

Where $\mu$ is a vector of means for a given number of dependent variables, here, the dependent variables are heavy drinking, perceived health and life satisfaction. This study is carried out under the basic assumption that the above mentioned variables may tend to depend on perceived life stress. Hence, $\mu1$, $\mu2$, $\mu3$, $\mu4$ represents the vectors of means for a given variable respectively. In other words; this could be as below:

$$H_0 = \begin{pmatrix} \bar{x} & 11 \\ \bar{x} & 12 \\ . & \\ . & \\ \bar{x} & p_1 \end{pmatrix} = \quad = \quad = \ldots\ldots =$$

Where p represents the total number of dependent variables for k levels, our test statistic will be ? and is computed as:

Where W and T cross product matrices of sum of squares within, B is between effect, if B is very large then ? approaches zero, how ever, if B is very small or zero then ? approaches to one.

To put it simply; $W = W_1 + W_2 + W_3 + W_4$ for all respective variables; where

$$\begin{pmatrix} \bar{x} & \\ \bar{x} & \\ . & \\ . & \\ \bar{x} & p_3 \end{pmatrix}$$

$$SS_2 = \sum_{J=1}^{4} \left( y_2(i) - \bar{y}_{12} \right)^2$$

$$SS_{12} = SS_{12} \sum_{J=1}^{4} \left( y_1(i) - \bar{y}_{11} \right) \left( y_2(i) - \bar{y}_{12} \right)$$

In general worlds; the following can be hypotheses to the study:

H0= There is no significant difference among variables under the study

H1= There is significant difference among variables under the study

**METHODS**

The research is primarily descriptive in nature. Zikmund explains the outcome of descriptive research is to "paint a picture" of a given situation by addressing who, what, when, where, and how questions.[12] Although this research is not as much vigorous as these statements few of these probing tags were addressed with the help of analysis. The attempt

was made to ascertain that if any logical relationships exist in between stress and other factors of study besides finding influential individuals of these variables. Hence this could only be an attempt to describe certain characteristics of a phenomenon, rather than finding an opportunity, nor finding cause and effects among factors of study.

Due to certain operative constraints the data is restricted to be secondary. Apart from its limitations, the secondary data also has certain strengths. Two of the potential advantages of secondary data are its economy and time.[13] In stead of using research resources in this very phase (data collection); they might perhaps be employed efficiently in other important phases of research process. The data is obtained from statistics Canada; a member of the United Nations Statistical Commission and Industry Portfolio of Canada.

There are four variables that were taken to the study, viz., perceived life stress, heavy drinking, perceived health and life satisfaction. The data set is organized by showing variables as columns; age and gender as row-wise individuals, by keeping the whole data set as 4X15 order matrix.

Rcmdr is used as statistical software for analysis. R is regarded as one of the efficient software's in academics and industry for statistical analysis.[14] At very outset the analysis is linear modeling, which further extended to be M (ANOVA) with giving priority to test of normality and leverage analysis. Since, the analysis multivariate, the following is the underlying linear model to the analysis:

**ANALYSIS AND DISCUSSION**

The study was done on health data of individuals that are grouped in 5 categories in terms of age and gender. There are five age groups namely; 15 to 19 years, 20 to 34 years, 35 to 44 years, 45 to 64 years and more than 65 years respectively in the dataset. These categories are again segregated in terms of male and female. The below table shows the summary of dataset:

| Age and Gender | Perceived Life Stress | Heavy Drinking | Perceived Health | Life Satisfaction |
|---|---|---|---|---|
| 15 to 19 years | 14.20279 | 23.14609 | 49.05717 | 124.5221 |
| Males | 5.38073 | 14.22287 | 25.58851 | 64.10982 |
| Females | 8.82206 | 8.92321 | 23.46866 | 60.41232 |
| 20 to 34 years | 61.85805 | 98.08602 | 99.95336 | 245.5136 |
| Males | 28.70309 | 66.3883 | 50.75036 | 122.9862 |
| Females | 33.15496 | 31.69774 | 49.20299 | 122.5274 |
| 35 to 44 years | 56.56169 | 41.49664 | 70.44681 | 175.0482 |
| Males | 27.35909 | 31.15958 | 34.64086 | 87.15947 |
| Females | 29.20261 | 10.33706 | 35.80596 | 87.88873 |
| 45 to 64 years | 95.58564 | 65.58711 | 128.1213 | 325.2061 |
| Males | 45.2948 | 49.51727 | 62.45136 | 160.4888 |
| Females | 50.29082 | 16.06985 | 65.6699 | 164.7173 |
| 65 years and older | 19.2188 | 9.28648 | 55.78105 | 144.0355 |
| Males | 8.05141 | 7.6707 | 25.22971 | 64.02301 |
| Females | 11.16738 | 1.61577 | 30.55135 | 80.0125 |
| Minimum | 5.381 | 1.616 | 23.47 | 60.41 |
| 1st Quartile | 12.685 | 9.812 | 32.60 | 83.59 |
| Median | 28.703 | 23.146 | 49.20 | 122.99 |
| Mean | 32.990 | 31.680 | 53.78 | 135.24 |
| 3rd Quartile | 47.793 | 45.507 | 64.06 | 162.60 |
| Maximum | 95.586 | 98.086 | 128.12 | 325.21 |
| Source: Statistics Canada | | | | |

There are interesting finding from correlation analysis. Basically the correlation analysis is all about contribution to the variables which can be assessed by variance. There are strict relationships among variables of study. There is high level of relationship in between perceived health and life satisfaction, the correlation coefficient is observed to be 0.999. There is also strong relationship in between perceived life stress and perceived health. The correlation coefficient is observed as 0.941. Does it mean that individuals who feel stress tend to feel better about their health? More inquiry is necessary to know about the relationship in between these two variables. Although the relationship in between perceived life stress and heavy drinking is fair, it is observed to be 0.709, which is the least observed among all pairs. It might be that stress leads to heavy drinking but might not be much important compared to other two variables. The model can better be explained in terms of contributions rather than relationships, significance of individual responses to one variable might be high towards other variable. The following table gives the summary of correlation (matrix) analysis:

| Variable | Perceived life satisfaction | Heavy drinking | Perceived health | Life satisfaction |
|---|---|---|---|---|
| Perceived life satisfaction | 1.0000000000 | 0.7099653785 | 0.9418687127 | 0.9391121185 |
| Heavy drinking | 0.7099653785 | 1.0000000000 | 0.7553249222 | 0.7372740615 |
| Perceived health | 0.9418687127 | 0.7553249222 | 1.0000000000 | 0.9992416240 |
| Life satisfaction | 0.9391121185 | 0.7372740615 | 0.9992416240 | 1.0000000000 |

Source: statistical analysis on dataset

Does gender a significant factor?

The correlation test was carried out to see if there exists any significant difference in between genders of the samples. Under Pearson's product movement correlation coefficient method; the alternative hypothesis for all pairs were proved true. The following is the table of significance test for influence of gender on stress and associated variables.

| Variables under test | t-value | p-value | Confidence interval | Estimate (r) | Hypothesis (true) |
|---|---|---|---|---|---|
| Perceived Life Stress | 27.3454 | 0.0001073 | 0.9684981- 0.9998748 | 0.9980001 | Alternative |
| Heavy Drinking | 5.0344 | 0.01511 | 0.3821661- 0.9965084 | 0.9456018 | Alternative |
| Perceived Health | 9.0415 | 0.002857 | 0.7481813- 0.9988735 | 0.9821411 | Alternative |
| Life Satisfaction | 9.321 | 0.002614 | 0.7610624- 0.9989389 | 0.9831698 | Alternative |

Source: from statistical analysis on dataset

Consequently MANOVA is carried out in order to assess and aware the stamina and influence of these variables. ANOVA might not be a right technique, since; it is sensitive to linear variations, which in turn depends on predictability and response. MANOVA might be effective due to the reason that the variables under study can be interactive and the effect produced can be integrative in nature. The F statistic of the output is 2.5721 at p-value being 0.01008 at one percent confidence (0.01). Hence, the null hypothesis is accepted. The following is the summary of MANOVA in Rcmdr:

| Levels | DF | F Statistic (Pillai) | Approx. F | p-value | |
|---|---|---|---|---|---|
| Age and Sex | 6 | 2.5791 | 2.4201 | 0.01008 | |
| **Summary of MANOVA** | | | | | |
| Response | DF | Sum of Squires | Mean Squires | F value | P-value |
| Perceived life stress | 6 | 6561.8 | 1093.64 | 3.8925 | 0.04037 |

| | | | | | |
|---|---|---|---|---|---|
| | 8 | 2247.7 | 280.96 | | |
| Heavy drinking | 6 | 7863.7 | 1310.61 | 3.6259 | 0.04844 |
| | 8 | 2891.7 | 361.46 | | |
| Perceived health | 6 | 9773.8 | 1628.96 | 5.9418 | 0.01234 |
| | 8 | 2193.2 | 274.15 | | |
| Life satisfaction | 6 | 61482 | 10247.0 | 5.9858 | 0.01207 |
| | 8 | 13695 | 1711.9 | | |

All p-values are at 1% confidence level. All the values are more than 0.01, hence significance is very low. But a very close observation could bring more interesting findings that, in spite of clear indication of global p-value that the difference is not so significant, this insignificance is not so strong with respect to last two variables i.e., perceived health and life satisfaction. Perhaps the there might be little variation in means. Hence, it is conspicuous that there is further possibility of grouping of these variables, viz., perceived life stress and heavy drinking are close together in terms of their p-values; perceived health and life satisfaction might be grouped together in terms of their respective p-values. Perhaps the variables are subjected to cohort-effect.

**CONCLUSIONS & SUMMARY**

The analysis on stress vs. its effects revealed that there are perfect relationships among the variables; all variables are so strong in association. The Karl Pearson coefficient of correlation is fair with maximum of 0.99 and minimum of 0.73. Even in significance test it was observed that the all null hypothesis were rejected (the null hypothesis is being that there is no correlation in between the variables under study). As far as the age and gender (levels) are concerned; there is no significant difference across different age levels and gender with respect to variables under study (although the difference is not so significant). More interestingly there are certain sub-groups among the variables (cohort effect). It needs further research to explore why certain variables are behaving as cohorts.

**REFERENCES**


[1] Castro, F. G. *Et al.* (1989). "A multivariate model of the determinants of cigarette smoking among adolescents". *Journal of health and social behavior*. Vol. 28 (September). P. 273-289.

[2] Jacob, G. D. (2001). "The physiology of mind-body interactions: the stress response and the relaxation response". *The journal of alternative and complementary medicine.* Vol. 7, Sup., 1. pp. s-83-s-92.

[3] *The body-mind connections of stress*. Retrieved from http://www.bam.gov/teachers/activities/stress_body_mind.pdf

[4] Ursin, H. Eriksen, H. R. (2003). *The cognitive activation theory of stress*. Retrieved from http://meagherlab.tamu.edu/M-Meagher/%20Health%20Psyc%20630/Readings%20630/Stress%20readings/cog%20stress%2004.pdf

[5] Mathews, A. Mackintosh, B. (1998). "A cognitive model of selective processing in anxiety". *Cognitive therapy and research.* Vol. 22. No. 6. pp. 539-560.

[6] *Coping with stress*, Canadian mental association, Retrieved from http://www.cmha.ca/data/1/rec_docs 403_CMHA_coping_with_stress_ EN.pdf

[7] ibid

[8] Yoshitaka, I. (2006). "Stress coping among aboriginal individuals with Diabetes in an Urban Candian City: From Woundedness to Resilience." *Journal of Aboriginal Health*. Sep'2006. p. 15

[9] Burton, J. (2008). *The business case for healthy workplace. Industrial Accident Prevention Association.* Retrieved from http://www.iapa.ca/pdf fd_business_case_healthy_ workplace.pdf

[10] Pearlin, L. I. (1989). "The sociological study of stress". Journal of health and social behavior. Vol. 30. p. 241-256.

[11] McDonough, P. Walters, V. Strohschein, L. (2002). "Chronic stress and the social patterning of women's health in Canada." *Social science and medicine*, vol. 54 (spl.). p. 767-782

[12] Zikmund, W. G. (2002), Business Research Methods, 7 ed. Tata McGraHill:Delhi. ISBN: 0030350840

[13] Boslaugh, S. (2007). *Secondary data sources for public health: A practical guide*. Cambridge University Press. P. 3

[14] Fox, J. (2005). "The R Commander: A Basic Statistics Graphical User Interface to R." *Journal of Statistical Software*, 14(9): 1—42.