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# Assessment of sleep quality, post-traumatic stress disorder, and locus of control in motor vehicle accident survivors

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## RESEARCH

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## ABSTRACT

**Background**
High incidence of Motor Vehicle Accidents (MVAs) in Saudi Arabia and the established link between MVA and related psychological factors necessitate a survey of the prevalence of MVA and associative factors.

**Aims**
To investigate the relationship between sleep patterns, locus of control, and post-traumatic stress disorder (PTSD) among MVA survivors at King Abdulaziz Medical City (KAMC), Riyadh.

**Methods**
A cross-sectional survey was conducted on 334 patients with MVA admitted cases, and patients who visited outpatient clinics. In addition to basic demographic information and driving history, PTSD severity, sleep quality, and locus of control were assessed using a validated PTSD Checklist – Civilian Version (PCL-C), Rotter's Locus of Control Scale (LCS), and items taken from the Pittsburg Sleep Quality Index. Association between the variables was analysed using the Chi-Square test.

**Results**
Prevalence of moderate to severe PTSD was 39.2 per cent. No association between PTSD severity and involvement in an MVA was found. Women had significantly higher scores PTSD lower internal locus of control scores. The majority of the respondents reported fairly good to very good sleep quality, although 18 per cent admitted to having a driving impairment or hindrance in completing other daily activities due to inadequate sleep in the past month. Regarding trouble staying awake while driving, a significant correlation was found with powerful others (p=0.026) and chance (0.019).

**Conclusion**
No correlation was found between PTSD severity, poor sleep, locus of control and MVA in this study, although high rates of PTSD necessitate valid identification and treatment of patients at risk.

**Key Words**
Post-traumatic stress disorder, motor vehicle accidents, sleep quality, locus of control

## What this study adds:

**1. What is known about this subject?**
Psychological assistance to trauma prone populations (i.e., Saudi Arabia), is not typically given due to associative stigma, misrepresentation, lack of MVA associated stress, and LOC.

**2. What new information is offered in this study?**
Augments the current evidence-based literature with supplementary findings that shall help mitigate the prevalence of MVA in KAMC and Saudi Arabia in general.

**3. What are the implications for research, policy, or practice?**

Shall facilitate the improvement of the design, deployment, monitoring, and evaluation (M&E) of safe and smart city projects in the future.

## Background

Road traffic accidents are a significant global public health issue. Worldwide deaths from motor vehicle accidents increased by 32 per cent, from 1.06 million in 1990 to 1.40 million in 2013, as indicated by the Global Burden of Disease (GBD).[1] Minimizing preventable physical injuries and fatalities on Saudi roads remains one of the prime hurdles in facilitating societal and economic wellbeing.

Psychological impact on survivors is found to be another aspect other than mortality and morbidity in MVAs.[2] A study done in the US estimated that around 24 per cent to 33 per cent of MVA victims suffer from post-traumatic stress disorder (PTSD) one month after the accident.[3] PTSD is broadly defined as the re-experience of a stressful or traumatizing event for a variable time after exposure. MVAs are believed to be the leading cause of PTSD in Western countries.[4] Another study on the prevalence of post-traumatic stress disorder among survivors of road traffic accidents in Ethiopia found higher rates of depression associated with PTSD after road traffic accidents.[5] Furthermore, a study to categorize risk factors and effects of PTSD in older adults after motor vehicle accidents found that PTSD symptoms were significantly associated with adverse health outcomes.[6]

Stressors such as witnessing death, serious injury, or sexual violence may be relived in the form of flashbacks or nightmares accompanied by persistent anxiety, depression, and physical reactivity and may result in severe disabilities in psychological, social, and occupational wellbeing.[7] A diagnosis of PTSD may be made if several specific criteria are met as per the diagnostic criteria set in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition (DSM-IV), and appropriate and timely treatment can significantly improve the patient's prognosis.[7] In particular, a thorough examination of the adverse effects of trauma on the efficiency and quality of sleep, including polysomnography, is essential to manage PTSD effectively.[8] Poor sleep quality is believed to be one of the prominent symptoms that lead to a specialist's referral and should be addressed in the treatment of PTSD.[9]

Another factor that influences PTSD is the locus of control (LOC). LOC is the level of an individual's capacity to control events that may have a detrimental effect on them.[10] The LOC allows a person to assess the extent to which situations are controllable through their actions (internal) or beyond their control (external). Research has found that external LOC is related to a higher level of PTSD-symptoms.[11,12]

Rotter (1966) explained that an internal LOC protects an individual from PTSD, while an external LOC develops PTSD after stressful life events.[10] However, seeking psychological assistance is not typically done, possibly due to the existing socio-cultural barriers and stigma, or due to the lack of awareness of the nature of MVA-associated stress and LOC.[11] Investigating the prevalence and severity of symptoms is, therefore, important considering the magnitude of MVA injuries in Saudi Arabia and the potential severity of preventable psychological complications.

This study aimed to assess the role of sleep patterns and LOC to stress-related symptoms in a random sample of Saudi motorists after road traffic accident. The study was crucial considering the high prevalence of MVAs and the established link between MVA and stressful life events, LOC, and sleep pattern in studies done on other populations. Additionally, the prevalence of symptoms of poor sleep quality and internal and external LOC following MVAs was investigated. The findings of this study highlighted the magnitude of MVA related psychological complications in Saudi Arabia, which could aid efforts to improve the quality of life and add to the existing literature on assessment and management of trauma following MVAs.

## Method

This study was approved by the Institutional Review Board of the University and was conducted in accordance with the Helsinki Declaration. Informed written consent was obtained from all respondents. Participants were informed about their rights of participation.

A cross-sectional study design was used. This particular design was selected due to its ability to analyse data collected from a group of participants at one point in time. Non-probability convenience sampling technique was used. Any patient who met the inclusion criteria and was available during data collection was invited to fill the questionnaires voluntarily.

Admitted cases of MVA from 2018 to 2019 were included. A sample size of 278 participants was required based on the population size of 1000, CI=95 per cent, a margin of error of five per cent, and a response distribution of 50 per cent. However, the study was conducted on 334 patients who fit

the inclusion criteria. The age ranged from 18 and 60 years. Data regarding MVA victims of both genders were obtained from patient medical records. The participants were approached in the surgery ward, orthopaedics, burns, and neurology unit as well as outpatient clinics by one of the research team members.

Data collection was done through the validated questionnaires; Post-Traumatic Stress Disorder (PTSD) Checklist – Civilian version (PCL-C),[13] Items from the Pittsburgh Sleep Quality Index,[14] and the 29-item version of Rotter's Locus of Control Scale (LCS).[10] The questionnaires were translated from English to Arabic by an expert, followed by back translation to ensure translation accuracy.

The data collection tools were composed of two sections. The first section of the questionnaire consisted of demographic information divided into two sub-sections. Part A of demographics included age group, gender, education level, and nationality. Part B was mainly to gather information about the driving experience, which including ownership of a driving license, whether the participants have been engaged in an accident during the past ten years, and whether they were in the driver or the passenger seat. The second section of the questionnaire was a checklist for post-traumatic stress disorder. The checklist consisted of 17 self-report items, which comprised three dimensions that measure re-experiencing, avoidance/numbing, and hyperarousal. The three dimensions correspond to the DSM-IV symptoms criteria for PTSD.[15]

The response options for each item on the PCL-C are rated from 1 (not at all) to 5 (extremely), based on the extent to which the respondent was bothered by specific symptoms in the past ten years. The total possible score was calculated by adding the scores for all items, and it ranges from 17–85 points, with a higher score indicating a higher risk for PTSD symptoms. A total score of ≥50 is indicative of the full PTSD diagnosis.[12] The score of 28–29 indicates some PTSD symptoms. A score of 30–44 indicates moderate PTSD symptoms. A score of 45–85 indicates a high severity of PTSD symptoms.

The PCL-C is a 17-item self-report measure of the DSM-IV symptoms of PTSD and was derived from the PCL-Military Version (PCL-M; Blake et al., 1995).[13] The civilian version is identical to the military version, except that it inquiries about a "stressful experience from the past" as opposed to military trauma. Among Vietnam veterans, the PCL-M has excellent retest reliability after 2–3 days (r=0.96), excellent internal consistency (α=0.97), and good convergent validity as reflected by high correlations with the Civilian Mississippi Scale (CMS) for combat-related PTSD (r=0.93), the PTSD subscale of the MMPI-2 (r=0.77), and the Impact of Events Scale (r=0.90).

Sleep pattern was assessed by using three items from The Pittsburgh Sleep Quality Index (PSQI).[18] It is a self-rated questionnaire that assessed sleep quality and disturbances over a 1-month time interval. The PSQI was developed in 1988 by Buysse and his colleagues to create a standardized measure designed to gather consistent information about the subjective nature of people's sleep habits. In this study, we mainly focused on sleep quality, so we used three items reflecting sleep quality.

LOC was assessed by using Rotter's Locus of Control scale. Each item in the scale is comprised of two sentences; one that represents external LOC and one that represents internal LOC. Participants were asked to select the sentence with which they agreed the most. Based on their responses, the overall internal/external score was computed. The version of the internal/external LOC scale used in this study has acceptable reliability (=0.71).[11]

The data gathered was entered using Microsoft Excel and then exported to SPSS for analysis. The quantitative variables, such as age, will be presented as Mean+SD. Categorical data such as gender, year of the accident, and age categories were presented as frequency and percentages. Chi-square tests were used to assess the factors affecting PTSD. Logistic regression was used to test the confounders. ANOVA was used to compare LOC by PTSD categories. A test with a $p<0.05$ was considered statistically significant.

## Results

The basic demographic characteristics of the study participants are presented in Table 1. A total of 334 individuals completed the survey, and all complete responses were included in the analysis. The majority of respondents were male (n=245, 73.4 per cent), between 20–30 years of age (n=225, 67.4 per cent), and had Bachelor's degree (n=235, 70.4 per cent). Most participants were born in Saudi Arabia, and only 11 participants (per cent3.3) were born overseas. Furthermore, 102 (30 per cent) participants did not hold a driver's license. Altogether, 302 participants (90.4 per cent) had been involved in an MVA in the past decade, the majority of whom (145.48 per cent) had met with an accident in the past five years.

The main findings of the sleep questionnaire are illustrated in Table 2 and Table 3. When asked about their sleep quality in the past month, 75 per cent of participants reported positively. However, 18 per cent admitted to having an impairment of social or driving abilities due to poor sleep. Participants' self-reported sleep quality and impairment of driving and social activities were not found to correlate with increased risk of involvement in an MVA. However, regarding having trouble staying awake while driving, a significant correlation was found in Powerful Others and Chance (p=0.026 and 0.019), respectively.

Table 1 shows the participants' responses to the PCL-C segment of the survey grouped according to three pre-set levels of PTSD severity. The combined prevalence of moderate to severe PTSD symptoms in the surveyed sample was 39.2 per cent. In Table 4, no variable of the participants' basic characteristics was found to correlate with PTSD severity. However, the female gender was found to be significantly associated with higher PTSD severity.

Findings from the three components of the LOC and their correlation with age, gender, and educational level are in Table 5. Female participants were found to have a significantly lower internal LOC score (28.48 for females, 31.29 for males; p-value=0.004), indicating a lower capability to cope with stressful events, and consequently a higher likelihood to develop PTSD. A significant association was found in participants whose Powerful Others and Chance scores, indicating a higher likelihood of in individuals who believe their fate is controlled by chance or powerful others developing severe PTSD symptoms (p-value 0.002 and <0.00 respectively) (Table 6).

## Discussion

Our results showed that most participants were involved in MVA, and 33 per cent of them had an accident during the past year despite the recent implementation of various safety measures to reduce MVAs. According to a retrospective study done in 2017, injury severity measures and mortality improved significantly after the implementation of automated traffic control and management system known as Saher.[16] However, the majority reported that they had reasonably good sleep quality. Similarly, a study done in 2015 found that participants had lower self-reported sleepiness at the wheel.[17]

In the present study, we found that almost 40 per cent of participants presented moderately severe PTSD to severe PTSD symptoms. No local studies on a similar population were found, but a local study done in a trauma-prone population in Jeddah revealed a slightly higher PTSD prevalence of 46 per cent.[18] While the high prevalence of PTSD symptoms does not equate to the prevalence of the condition itself, the alarmingly high prevalence of such symptoms necessitates appropriate screening and treatment approaches for patients at risk.

While previous studies have identified many risk factors associated with the development of PTSD, such as gender, low educational attainment, and exposure to trauma, our findings indicate that only gender was found to be significantly associated with higher PTSD severity.[19-22] Several reasons may explain the discrepancy. First, many participants who were assisted did not feel comfortable admitting to PTSD symptoms or features of a weak personality or external LOC. Additionally, females were less motivated to answer the PTSD and LCS questions accurately.

No correlation between Internal LOC and age, gender, or education was found. This finding could be attributed to existing socio-cultural barriers in expressing emotions.[23] However, a significant correlation was found in Powerful Others and Chance scores, which is indicative of high external LOC and therefore mediates PTSD symptoms similar to a previous study.[24]

The present study has several limitations. First, this study did not assess the severity of the accidents and whether or not they could have had a psychological impact. A previous study found an insignificant difference between the PTSD and non-PTSD groups concerning the seriousness of the event.[25] Second, coping strategies, such as tolerating and imagining, were not assessed in this study. Finally, we had a small sample size due to the short period within which the study was conducted. Therefore, we recommend further research work with larger sample sizes and include multiple centres so the findings can be generalized.

## Conclusion

The results of the study provide valuable information about the contribution of LOC in the management of PTSD symptoms. Although moderate to severe PTSD symptoms are prevalent in the sampled population, no correlation was found between PTSD severity, poor sleep, LOC, and MVA. The high rates of PTSD necessitate effective diagnosis and treatment of patients at risk, improve the internal LOC, as the perception of events occurring by chance and by other powerful individuals correlated with higher PTSD severity.

## References


1. Global Burden of Disease. Motor Vehicle Accidents 2017 [Available from: https://vizhub.healthdata.org/gbd-compare/?utm_source=IHME+Updates&utm_campaign=36e612ff01-Weekly_Email_Sept_17_2015&utm_medium=email&utm_term=0_1790fa6746-36e612ff01-422225677.
2. Nishi D, Noguchi H, Yonemoto N, et al. Incidence and prediction of post-traumatic stress disorder at 6 months after motor vehicle accidents in Japan. Psychosomatics. 2013;54(3):263–71.
3. Beck JG, Coffey SF. Assessment and treatment of posttraumatic stress disorder after a motor vehicle collision: Empirical findings and clinical observations. Prof. Psychol.: Res. Pract. 2007;38(6):629.
4. Baker AS, Litwack SD, Clapp JD, et al. The driving behavior survey as a measure of behavioral stress responses to MVA-related PTSD. Behav ther. 2014;45(3):444–53.
5. Yohannes K, Gebeyehu A, Adera T, et al. Prevalence and correlates of post-traumatic stress disorder among survivors of road traffic accidents in Ethiopia. Int J Ment Health Syst. 2018;12(1):50.
6. Platts-Mills TF, Nebolisa BC, Flannigan SA, et al. Post-traumatic stress disorder among older adults experiencing motor vehicle collision: a multicenter prospective cohort study. Am J Geriat Psychiat. 2017;25(9):953–63.
7. Roque AP. Pharmacotherapy as prophylactic treatment of post-traumatic stress disorder: a review of the literature. Issues Ment Health Nurs. 2015;36(9):740–51.
8. Vermetten E, Westenberg H. Sleep disturbances in post-traumatic stress disorder. An overview of the literature. Tijdschr Psychiatr. 2007;49(9):629–38.
9. Sandahl H, Vindbjerg E, Carlsson J. Treatment of sleep disturbances in refugees suffering from post-traumatic stress disorder. Transcult psychiatr. 2017;54(5-6):806–23.
10. Rotter JB. Generalized expectancies for internal versus external control of reinforcement. Psychol Monogr: Gen Appl. 1966;80(1):1.
11. Zhang W, Liu H, Jiang X, et al. A longitudinal study of posttraumatic stress disorder symptoms and its relationship with coping skill and locus of control in adolescents after an earthquake in China. PLoS One. 2014;9(2):e88263.
12. Karstoft K-I, Armour C, Elklit A, et al. The role of locus of control and coping style in predicting longitudinal PTSD-trajectories after combat exposure. J Anxiety Disord. 2015;32:89–94.
13. Blake DD, Weathers FW, Nagy LM, et al. The development of a clinician-administered PTSD scale. J Trauma Stress. 1995;8(1):75–90.
14. Buysse DJ, Reynolds III CF, Monk TH, et al. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. Psychiat resear. 1989;28(2):193–213.
15. Association AP. Diagnostic and statistical manual of mental disorders. BMC Med. 2013;17:133–7.
16. Alghnam S, Alkelya M, Alfraidy M, et al. Outcomes of road traffic injuries before and after the implementation of a camera ticketing system: a retrospective study from a large trauma center in Saudi Arabia. Ann Saudi Med. 2017;37(1):1–9.
17. Gonçalves M, Peralta A, Monteiro Ferreira J, et al. Sleepiness and motor vehicle crashes in a representative sample of Portuguese drivers: the importance of epidemiological representative surveys. Traffic Inj Prev. 2015;16(7):677–83.
18. Ahmad FF, Abdella A, Osman M. Prevalence of Post-Traumatic Stress Disorders and associated factors among workers attending trauma centers in Jeddah, KSA. Med Sci. 2014;3(2).
19. Cooper S, Lund C, Kakuma R. The measurement of poverty in psychiatric epidemiology in LMICs: critical review and recommendations. Soc Psychiatry Psychiatr Epidemiol. 2012;47(9):1499–516.
20. Priebe S, Grappasonni I, Mari M, et al. Posttraumatic stress disorder six months after an earthquake. Soc Psychiatry Psychiatr Epidemiol. 2009;44(5):393.
21. Neria Y, Nandi A, Galea S. Post-traumatic stress disorder following disasters: a systematic review. Psychol Med. 2008;38(4):467–80.
22. Maes M, Delmeire L, Schotte C, et al. Epidemiologic and phenomenological aspects of post-traumatic stress disorder: DSM-III-R diagnosis and diagnostic criteria not validated. Psychiat Resear. 1998;81(2):179–93.
23. Jackson-Best F, Edwards N. Stigma and intersectionality: a systematic review of systematic reviews across HIV/AIDS, mental illness, and physical disability. BMC Public Health. 2018;18(1):919.
24. Seixas AA, James C, Jean-Louis G, et al. The mediating effects of social support and locus of control on the relationship between post-traumatic stress and depressive symptoms in a Jamaican university sample. J Depress Anxiety. 2015;4(3).
25. Kessler RC, Sonnega A, Bromet E, et al. Posttraumatic stress disorder in the National Comorbidity Survey. Arch Gen Psychiatry. 1995;52(12):1048–60.

## PEER REVIEW

Not commissioned. Externally peer reviewed.

## CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

## ETHICS COMMITTEE APPROVAL

This study was approved by the Institutional Review Board of King Abdullah International Medical Research Centre. Written consent was attained from all respondents. Patients were informed about their rights of participation

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None

**Table 1: Demographic characteristics of the participants**

| Variable | Category | N | % |
|---|---|---|---|
| **Age (years)** | Less than 20 | 65 | 19.5 |
| | 20-30 | 225 | 67.4 |
| | 30-40 | 30 | 9.0 |
| | More than 40 | 14 | 4.2 |
| **Gender** | Male | 245 | 73.4 |
| | Female | 89 | 26.6 |
| **Educational level** | High school or less | 88 | 26.3 |
| | Bachelors | 235 | 70.4 |
| | Masters or higher | 11 | 3.3 |
| **Nationality** | Saudi Arabia | 323 | 96.7 |
| | Other | 11 | 3.3 |
| **Ownership of a driving license** | Yes (Saudi License) | 224 | 67.1 |
| | Yes (Foreign License) | 8 | 2.4 |
| | I do not own a license | 102 | 30.5 |
| **Involvement in a motor vehicle accident in the past ten years** | Yes | 302 | 90.4 |
| | No | 32 | 9.6 |
| **Time since the accident occurred** | During the past year | 102 | 33.8 |
| | 1-5 years ago | 145 | 48.0 |
| | 6-10 years ago | 55 | 18.2 |
| **Position in the vehicle at the accident** | In the front driver seat | 208 | 68.9 |
| | In the front passenger seat | 43 | 14.2 |
| | In the back seat | 51 | 16.9 |
| **Predicted PTSD severity** | Little to no severity | 203 | 60.8 |
| | Moderate to High severity | 103 | 30.8 |
| | High Severity | 28 | 8.4 |

**Table 2: Sleep quality responses**

| Sleep quality items | Category | N | % |
|---|---|---|---|
| During the past month, how would you rate your sleep quality overall? | Very good | 126 | 37.7 |
| | Fairly good | 125 | 37.4 |
| | Fairly bad | 64 | 19.2 |
| | Very bad | 19 | 5.7 |
| During the past month, how often have you taken medicine to help you sleep? (prescribed or over the counter) | Didn't use any medications | 307 | 91.9 |
| | Less than once per week | 14 | 4.2 |
| | 1-2 times per week | 7 | 2.1 |
| | 3 times or more per week | 6 | 1.8 |

| | | | |
|---|---|---|---|
| During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity | Didn't encounter any difficulty falling asleep | 274 | 82.0 |
| | Less than once per week | 41 | 12.3 |
| | 1-2 times per week | 11 | 3.3 |
| | 3 times or more per week | 8 | 2.4 |

**Table 3: Sleep quality correlation with the locus of control components**

| Items of sleep quality | Categories | Internal Locus of Control | Powerful Others | Chance |
|---|---|---|---|---|
| | | Mean±SD | Mean±SD | Mean±SD |
| During the past month, how would you rate your sleep quality overall? | Very good | 31.29±8.09 | 16.67±9.71 | 17.73±8.21 |
| | Fairly good | 30.68±6.74 | 16.91±7.5 | 18.77±7.12 |
| | Fairly bad | 28.7±8.61 | 18.27±10.36 | 19.09±8.74 |
| | Very bad | 30.84±10.17 | 21.89±11.17 | 20.84±7.44 |
| | **P-value** | **0.195** | **0.101** | **0.34** |
| During the past month, how often have you taken medicine to help you sleep? (prescribed or over the counter) | Didn't use any medications | 30.6±8.02 | 17.07±9.19 | 18.38±7.82 |
| | Less than once per week | 30.5±4.91 | 22±8.93 | 20.79±7.59 |
| | 1–2 times per week | 30.14±6.94 | 17.86±8.4 | 20.57±9 |
| | 3 times or more per week | 28.17±8.13 | 21.17±10.76 | 20±11.68 |
| | **P-value** | **0.902** | **0.179** | **0.59** |
| During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity | Didn't encounter any difficulty falling asleep | 30.45±8.23 | 17.01±9.3 | 17.94±8.03 |
| | Less than once per week | 30.37±6.18 | 18.93±7.37 | 21.49±5.98 |
| | 1–2 times per week | 32.27±5.82 | 14.27±9.09 | 19.91±10.03 |
| | 3 times or more per week | 32.13±5.64 | 25.63±11.55 | 22.75±3.73 |
| | **P-value** | **0.824** | **0.026** | **0.019** |

**Table 4: Chi-Square tests of factors against PCL score**

| Demographics of participants | | Little to no severity | | Moderate to High severity | | P-value |
|---|---|---|---|---|---|---|
| | | N | % | N | % | |
| **Age** | Less than 20 | 36 | 55.4 | 29 | 44.6 | **0.7** |
| | 20–30 | 141 | 62.7 | 84 | 37.3 | |
| | 30–40 | 17 | 56.7 | 13 | 43.3 | |
| | More than 40 | 9 | 64.3 | 5 | 35.7 | |
| **Gender** | Male | 158 | 64.5 | 87 | 35.5 | **0.02** |
| | Female | 45 | 50.6 | 44 | 49.4 | |
| **Education level** | High school or less | 59 | 67.0 | 29 | 33.0 | **0.16** |
| | Bachelors or higher | 144 | 58.5 | 102 | 41.5 | |
| **Do you have a driver's license?** | Yes | 149 | 64.2 | 83 | 35.8 | **0.05** |
| | No | 54 | 52.9 | 48 | 47.1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Have you been involved in MVA?** | During the past year | 63 | 61.8 | 39 | 38.2 | **0.44** |
| | 1–5 years ago | 92 | 63.4 | 53 | 36.6 | |
| | Never\long time ago | 48 | 55.2 | 39 | 44.8 | |

**Table 5: Correlation analysis of Age, Gender and Education with LCS components**

| **Demographics of participants** | | **Internal Locus of Control** | **Powerful Others** | **Chance** |
|---|---|---|---|---|
| | | Mean±SD | Mean±SD | Mean±SD |
| **Age** | Less than 20 | 30.26±9.12 | 16.88±9.14 | 17.15±7.18 |
| | 20-30 | 30.36±7.73 | 17.06±9.16 | 18.6±7.95 |
| | 30-40 | 30.87±7.01 | 20.63±9.8 | 19.4±8.15 |
| | More than 40 | 34±5.23 | 17.43±8.86 | 22.57±8.62 |
| | **P-value** | **0.40** | **0.24** | **0.11** |
| **Gender** | Male | 31.29±7.47 | 17.13±8.8 | 18.35±7.69 |
| | Female | 28.48±8.61 | 17.99±10.31 | 19.13±8.43 |
| | **P-value** | **0.004** | **0.46** | **0.42** |
| **Education level** | High school or less | 30.78±7.86 | 17.43±8.89 | 18.06±7.29 |
| | Bachelors or higher | 30.46±7.89 | 17.34±9.35 | 18.74±8.1 |
| | **P-value** | **0.74** | **0.93** | **0.49** |

**Table 6: Association between Locus of control with PTSD severity**

| **Locus of Control** | **Levels** | **Mean±SD** | **P value** |
|---|---|---|---|
| Internal Locus of Control | Little to no severity | 30.9±8.5 | **0.646** |
| | Moderate to Moderately High severity | 30.0±6.9 | |
| | High Severity | 30.3±6.7 | |
| | Total | 30.5±7.9 | |
| Powerful Others | Little to no severity | 15.9±9.2 | **0.002** |
| | Moderate to Moderately High severity | 19.7±8.8 | |
| | High Severity | 19.0±9.4 | |
| | Total | 17.4±9.2 | |
| Chance | Little to no severity | 16.7±8.1 | **<0.00** |
| | Moderate to Moderately High severity | 21.2±6.9 | |
| | High Severity | 22.5±5.6 | |
| | Total | 18.6±7.9 | |