

**Original Article****Predictive and Protective Role of Grit, Internal Locus of Control and Social Support in Mental Health of Cardiac Patients****Syed Messum Ali¹, Fatima Murtaza², Farhan Hashmi², Masooma Iftikhar³, Muhammad Nasar Iqbal⁴ and Awais Nasir⁵**¹Higher Education Department, Government of the Punjab, Pakistan²Government College University, Lahore, Pakistan³Kinnaird College for Women University, Lahore, Pakistan⁴The University of Lahore, Lahore, Pakistan⁵Rescue 1122 Department, Government of the Punjab, Pakistan**ARTICLE INFO****Key Words:**

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unthinkable41@gmail.comReceived Date: 24th March, 2023Acceptance Date: 16th April, 2023Published Date: 30th April, 2023**ABSTRACT**

Individuals diagnosed with cardiac diseases often experience poor mental health outcomes. However, grit, social support and internal locus of control can provide protective effects against poor mental health in patients diagnosed with cardiovascular diseases. The purpose of the present study was to assess the predictive and protective role of grit, internal locus of control and social support with regard to mental health of cardiac patients. A total of 250 cardiac patients had been sampled comprising 130 males and 120 females in the age range of 30 to 70 years selected through purposive sampling. Data collection was done using Rotter's Locus of Control Scale, Multidimensional Scale of Perceived Social Support, Duckworth Grit Scale and DASS-21. Data analysis was done using Pearson correlation and regression analyses using dummy coding. Results showed that among cardiac patients, being a male in the age range of 30 to 45 years of age, being married, having higher levels of education, higher scores on grit with an internal locus of control is associated with improved mental health. It is thus concluded that having an internal locus of control, higher levels of social support and being gritty is associated with improved mental health outcomes in cardiac patients.

INTRODUCTION

According to the World Health Organization (WHO), the prevalence of heart disease in Pakistan is estimated to be around 10 percent [1]. This is higher than the global average, which is estimated to be between 5 and 7%. Pakistan is considered to be one of the most populous countries in South Asia, and it is estimated that around 30 million people have some form of heart disease [2]. Patients with cardiac diseases are exposed to a wide range of psychosocial stressors including depression, acute stress and anxiety [3]. Depression is a common mental

health disorder that can have a significant impact on the physical health of those affected [4]. Recent research has identified a strong link between depression and cardiac diseases, with people suffering from depression being twice as likely to develop cardiovascular diseases than those without it [5]. Similarly, stress is a response to a perceived threat, such as a medical diagnosis or a health-related event. It can cause physical and emotional changes, such as increased heart rate and blood pressure, fatigue and insomnia [6]. Chronic stress can lead to long-term

health problems, such as depression, heart disease and diabetes [7]. Research has also shown that anxiety can also be a common problem among cardiac patients [8]. It can manifest as feelings of fear or worry and can be triggered by physical or emotional events. Moreover, anxiety can result in increased heart rate and blood pressure as well as fatigue and difficulty concentrating [9]. Research suggests that there are several risk factors that increase the likelihood of developing both depression and cardiac diseases [10]. These include age, gender, lifestyle factors (such as smoking or lack of exercise), and pre-existing medical conditions (such as hypertension and diabetes) [11]. In addition, there are several psychological factors that can increase the risk of both depression and cardiac diseases, such as stress, anxiety, and a lack of social support [12]. However, there are a number of factors that can play a protective role with regard to depression in cardiac patients [13]. Social support is defined as "the aid, comfort, and encouragement one receives from family, friends, and/or professional caregivers" [14]. It is generally accepted that social support has a positive effect on mental health and can help reduce the risk of depression in cardiac patients [15]. Several studies have been conducted to examine the role of social support in reducing the risk of depression in cardiac patients [16]. Research has demonstrated that having a high level of social support is correlated with a decreased risk of depression [17]. This study showed that having a strong support system from both family and friends was associated with a lower depression risk. The authors concluded that a robust social network can be beneficial in decreasing the risk of depression among cardiac patients. Additionally, Amedro et al. conducted a study of 460 cardiac patients and found that social support was associated with a lower risk of depression [18]. The investigators concluded that social support is an important factor in reducing the risk of depression in this population. The results of this research suggest that having a strong social network can help reduce the risk of depression in cardiac patients. Not unlike social support, grit has been identified as providing protective effects against depression and improved physical health outcomes in patients [19]. In the context of cardiac rehabilitation, grit has been linked to better physical and psychological outcomes for patients. For example, one study found that higher levels of grit were associated with fewer hospitalizations and better quality of life [20]. Another study found that higher levels of grit were associated with increased adherence to lifestyle interventions, such as exercise, smoking cessation, and dietary changes [21]. However, the protective effects of grit and social support against depression and other psychopathologies may also be mediated on the basis of an

individual's locus of control. The locus of control of an individual is defined as the extent to which individuals perceive their outcomes to be a result of their own behavior or due to external factors [22]. In other words, it is the degree to which someone believes they are in control of their own destiny. In terms of mental health, the locus of control can play an important role in the psychological well-being of individuals, including those with cardiac conditions [23]. The findings of the study further showed that individuals with an internal locus of control, those who believe they are in control of their own destiny, are more likely to have positive mental health outcomes than those with an external locus of control, who believe their outcomes are due to luck or external forces [24]. This is especially true for cardiac patients, who often experience a range of stressors such as pain, disability, and lifestyle changes that can negatively impact their mental health. In contrast, those with an external locus of control often feel helpless and powerless in the face of chronic diseases [25]. The main aim of the study was to assess the role of grit, social support and locus of control in mental health (depression, stress and anxiety) of cardiac patients. Another aim of the study was to assess the gender differences among the participants on depression, social support, LOC and grit. Moreover, the study focused on assessing the gap in literature on this area and to develop a comprehensive model on these constructs. The primary purpose of this study is to explore the relationship between grit, social support, locus of control, and depression in cardiac patients. This study sought to determine whether higher levels of social support, grit and internal locus of control are associated with lower levels of depression in cardiac patients. This research is important, as it could provide insight into the psychological factors that influence the ability of cardiac patients to cope with the challenges of living with a serious health condition. Additionally, the findings could inform interventions designed to reduce depression in this population.

METHODS

A cross-sectional correlational design of research was used to assess the relationship among grit, social support, mental health and locus of control. The sample of the study comprised of 250 cardiac patients including 130 males and 120 females in the age range of 30 to 70 years of age, all of whom were selected through purposive sampling. G power analysis to assess the sufficient sample size for the study with a confidence interval of 95%. The analysis showed that a sample size of 250 was justified for achieving satisfactory effect sizes. Moreover, the margin of error when estimating the sample size was kept down to a minimal. The Rotter Locus of Control Scale (RLOCS) is a

self-report questionnaire designed to measure an individual's level of locus of control [26]. The scale consists of twenty four items, each of which is answered on a four point Likert-type scale. It is used to assess a person's internal locus of control (a belief that they can control their own destiny) and external locus of control (a belief that external factors will determine one's success or failure) [27]. The reliability of the RLOCS has been studied extensively, with Cronbach's Alpha (a measure of internal consistency) ranging from 0.77 to 0.90 [28]. The total score is calculated by summing all of the individual item scores and is used to indicate a person's level of psychological well-being and to help diagnose psychological disorders. A score of 24 or less indicates an external locus of control, a score of 25-48 indicates an intermediate locus of control, and a score of 49 or higher indicates an internal locus of control. In accordance with the findings of the present study, the scale showed a reliability of .79 which falls within the acceptable range. The Depression Anxiety and Stress Scale (DASS) is a psychological assessment tool used to measure the severity of depression, anxiety, and stress in individuals [29]. The DASS consists of 42 questions that are each assigned a score from 0 to 3, with 0 being no symptoms, 1 being mild symptoms, 2 being moderate symptoms, and 3 being severe symptoms. The total score is calculated by adding up the scores for each item. A score of 0-9 is considered to be normal, 10-13 is considered to be mild, 14-20 is considered to be moderate, and 21-42 is considered to be severe. The DASS has been found to have good reliability and validity, with Cronbach's alpha values ranging from 0.84 to 0.91 for the total score, and 0.82 to 0.86 for the three subscales. Test-retest reliability for the DASS is also high, with correlations ranging from 0.71 to 0.85 for the total score, and 0.67 to 0.77 for the subscales. The DASS is thus a reliable tool for assessing the mental health of participants. In accordance with the results of the present study, DASS had shown accepted levels of reliability i.e. .86. The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item self-report measure designed to measure the perception of social support in adults. It was developed by Zimet *et al.*, [30]. The scale consists of 12 items, each scored on a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). A score is calculated for each item by summing all the responses to the 12 items and then dividing the total by 12 to get the average score. The higher the score, the greater the perceived level of social support. The MSPSS has been widely used to assess the perceived social support in adults and has been found to have good psychometric properties. It is also useful in evaluating the effectiveness of interventions designed to improve social support, and in exploring relationships between perceived social support

and other psychological variables. The MSPSS has a reliability coefficient of .76, indicating that it is a reliable measure of perceived social support [31]. The results of the present study showed that social support scale had .85 level of reliability which shows that it falls within the acceptable range. The Grit Scale is a self-assessment tool designed to measure an individual's level of "grit" or resilience, which is the determination and stick-to-itiveness needed to achieve long-term goals [32]. The scale asks questions about one's commitment to a goal, how often one perseveres in the face of difficulties, and how one views one's own potential. The scale also assesses how often someone makes excuses for not taking action and how often one bounces back from setbacks. The higher the score on the Angela Grit Scale, the higher the individual's level of grit. The reliability of the Angela Grit Scale has been assessed in a number of studies. The Angela Grit Scale scoring system is based on a scale of 1 to 5, with 1 being the lowest score and 5 being the highest. A score of 1 indicates that the respondent has little to no grit, while a score of 5 indicates that the respondent is highly gritty. This suggests that the scale is internally consistent, or that the items on the scale measure the same construct. In the same study, the test-retest reliability was found to be .81. In the present study, the findings showed a reliability of .75 which is indicative of an acceptable level of reliability. The content validity of the scales had been assessed by two independent experts one of whom was a practice healthcare expert while the other one was a certified clinical psychologist working in a healthcare setting. The experts analyzed the scales for their suitability for cardiac patients and found the scale to be valid. Moreover, convergence validity of the scales was used through analysis of the average variance. Specifically, correlation of item factors were analyzed for the locus of control scale and its subscales, grit scale, social support and DASS. AVE index was calculated in accordance with the approach recommended by Fornell and Larcker. The findings showed that the AVE value was higher than .5 which is indicative of an acceptable level of convergence validity for all scales used in the study (please refer to table 2). The "AVE" values shown in table 2 have been calculated using the formula below.

$$AVE = \frac{\sum \lambda_i^2}{\sum \lambda_i^2 + \sum_i \text{var}(\epsilon_i)}$$

The discriminant validity of the scales was analyzed through calculation of the square root of the average variance extracted. All calculations surpassed the factor correlations of each pair the various domains or subscales. The results therefore showed that all scales had adequate levels of convergent and discriminant validity (Please refer to table 2 for more details). Permission for the study was

sought through the Institutional Ethics Review Board of the Lahore School of Professional Studies, University of Lahore. The ethical board did not find any risks for involving human participants. Moreover, when assessing the ethical dimensions, Declaration of Helsinki was complied with. After approval from the university, data collection was initiated using above instruments through various hospitals in Lahore, Pakistan. Being the Provincial Headquarter of the Province Punjab, the researchers were able to gain access to a large and diverse sample size. The participants were informed about the purpose of the research and were also informed about their rights to confidentiality and refusal to participate. SPSS 21.0 was used for data analysis. Pearson Correlation, Multiple Regression and chi-square analysis were used for data analysis. The calculations of the average variance extracted were done on SPSS and via MS Excel. Dummy coding had been used with reference groups to assess the predictive effects of gender, age, marital and socioeconomic status. Normality checks were performed prior to execution of the analyses. All assumptions for conducting these analysis had been met.

RESULTS

Table 1 shows the distribution of respondents, the majority of the sample falls with 52 participants (21%) in the 30-45 range, 148 (59%) in the age range of 46 to 60 years and 50(20%) in the 61-70 range. In terms of gender, the sample is split almost evenly between 130 males (52%) and 120 females (48%). In terms of education, 100 participants (40%) had matriculation level education, 98 (39%) having intermediate level and with 52 (21%) having graduate level education. In terms of family system, 123(49%) belonged to joint family system and 127 (51%) belonged to nuclear systems. With regard to marital status, 21 individuals representing (8%) participants were single, 198 (79%) were married and 31 (12%) were widowed. In terms of socioeconomic status, 64 (26%) belonged to low income, 136 (54%) belonged to middle income and 50(20%) belonged to high income segments.

Table 1: Descriptive Statistics of Demographic Variables of the Sample

| Variables | Frequency (%) |
|------------------|---------------|
| Age | |
| 30-45 | 52(21) |
| 46-60 | 148(59) |
| 61-70 | 50(20) |
| Gender | |
| *Male | 130(52) |
| Female | 120(48) |
| Education | |
| Matriculation | 100(40) |
| Intermediate | 98(39) |

| | |
|-----------------------------|---------|
| Graduation | 52(21) |
| Family System | |
| Joint | 123(49) |
| Nuclear | 127(51) |
| Marital Status. | |
| Single | 21(8) |
| Married | 198(79) |
| Widowed | 31(12) |
| Socioeconomic Status | |
| Low | 64(26) |
| Middle | 136(54) |
| High | 50(20) |

Pearson Product Moment Correlation was conducted to assess the association among social support, internal locus of control, grit and depression (Table 2). The results showed that social support had a significant negative relationship with an external locus of control ($r = -.33, p < .05$), a significant positive association ($r = .55, p < .01$) with grit and with depression ($r = -.61, p < .01$). Moreover, internal locus of control was significantly and positively associated with grit ($r = -.33, p < .01$) but showed significant negative associations with depression ($r = -.22, p < .01$). The findings therefore showed that when the level of depression is high in cardiac patients, it is indicative of lower scores on internal locus of control. Moreover, lower levels of depression are associated with higher scores on internal locus of control. The table also depicts the AVE (average variance extracted) values which showed acceptable levels of convergent and discriminant validity.

Table 2: Inter-Correlation among Scores on Social Support, Locus of Control, Grit, and Depression

| Variables | AVE | I | II | III | IV |
|---------------------------|-----|-----|------|-------|--------|
| Social Support | .71 | --- | .33* | .55** | -.61** |
| Internal Locus of Control | .68 | | --- | .33** | -.22** |
| Grit | .65 | | | --- | -.31** |
| Depression | .73 | | | | --- |

Note: N=250, ** $p < .01$, Domain correlations are shown above the diagonal. AVE=average variance extracted.

Table 3 revealed that there were strong associations between demographic variables, social support and grit with physical health status among cardiac patients. Male participants had significantly lower scores on depression ($\beta = -.11, p < .05$), stress ($\beta = -.01, p < .05$) and anxiety ($\beta = -.03, p < .05$) in comparison to their female counterparts. Moreover, those aged 30 to 45 had significantly lower scores on depression ($\beta = -.08, p < .05$), stress ($\beta = -.08, p < .05$) and anxiety ($\beta = -.07, p < .05$). Single participants had higher scores on depression ($\beta = .18, p < .05$), stress ($\beta = .11, p < .05$) stress and anxiety ($\beta = .15, p < .05$) stress. Additionally, low grit was connected to higher scores on depression ($\beta = -.10, p < .05$) stress, stress ($\beta = -.01, p < .05$) stress and anxiety ($\beta = -.03, p < .05$). An internal locus of control was associated with lower scores on depression ($\beta = -.10, p < .05$), stress ($\beta = -.01,$

$p < .05$) and anxiety ($\beta = -.03, p < .05$). Finally, higher social support was correlated with lower scores on depression ($\beta = -.15, p < .05$), stress ($\beta = -.09, p < .05$) and anxiety ($\beta = -.06, p < .05$).

Table 3: Regression of Associations for Demographic Variables and Scores on Social Support and Grit with regard to Mental Health (Depression, Social Support and Anxiety)

| Variables | n (%) | Depression | | | Stress | | | Anxiety | | |
|-------------------------|----------|----------------|-----------------|----------------------|----------------|-----------------|----------------------|----------------|-----------------|----------------------|
| | | R ² | ΔR ² | β [95 % CI] | R ² | ΔR ² | β (95 % CI) | R ² | ΔR ² | β (95 % CI) |
| Gender | | | | | | | | | | |
| Male | 130 (52) | .01 | .01 | -.11* [-4.65, -1.91] | .00 | .00 | -.01* [-1.48, -.68] | .00 | .00 | -.03* [-1.32, -.41] |
| Female | 120 (48) | | | Reference | | | Reference | | | Reference |
| Age (Years) | | | | | | | | | | |
| 30-45 | 52 (21) | | | -.08* [-1.72, -6.82] | | | -.08* [-1.16, -3.49] | | | -.07* [-1.15, -3.41] |
| 46-60 | 148 (59) | .01 | .01 | .04 [-3.78, 7.75] | .01 | .00 | .06 [-1.33, 5.02] | .00 | .00 | .08 [-.73, 5.32] |
| 61-70 | 50 (20) | | | Reference | | | Reference | | | Reference |
| Marital Status | | | | | | | | | | |
| Single | 21 (8) | | | .18* [6.08, .10] | | | .11* [6.92, .10] | | | .15* [2.44, .09] |
| Married | 198 (79) | .00 | .00 | -.22 [-18.75, 2.24] | .00 | .00 | -.16 [-9.21, 2.33] | .00 | .00 | -.19 [-9.27, 1.70] |
| Widowed | 52 (21) | | | Reference | | | Reference | | | Reference |
| Education | | | | | | | | | | |
| Matriculation | 100 (40) | | | .18* [3.28, .01] | | | .11* [2.92, .01] | | | .15* [2.44, .01] |
| Intermediate | 98 (39) | .00 | .00 | -.02* [16.25, 1.21] | .00 | .00 | -.02* [8.21, 2.32] | .00 | .00 | -.19* [-6.27, 2.70] |
| Graduation | 52 (21) | | | Reference | | | Reference | | | Reference |
| Grit | | | | | | | | | | |
| Low | 188 (75) | .01 | .01 | -.10* [-5.65, -1.91] | .00 | .00 | -.01 [-1.28, .68] | .00 | .00 | -.03* [-1.52, .43] |
| High | 62 (25) | | | Reference | | | Reference | | | Reference |
| Locus of Control | | | | | | | | | | |
| Low | 98 (39) | .01 | .01 | -.10* [-5.65, -1.91] | .00 | .00 | -.01* [-1.38, -.68] | .00 | .00 | -.03* [-1.62, -.45] |
| High | 152 (61) | | | Reference | | | Reference | | | Reference |

Table 4 assesses association of the determinants with depression in cardiac patients. The findings provided numerous insights about this association. The results showed that there were significant differences among cardiac patients in terms of their scores on grit, social support and locus of control. Specifically, cardiac patients having low grit (188 ± 1), low social support (136 ± 1) and an external locus of control (152 ± 2) were more likely to experience depressive symptomatology.

Table 4: Inter-Correlation among Scores on Social Support, Locus of Control, Grit, and Depression

| Determinants | | Frequency (%) | p-value |
|------------------|----------|---------------|---------|
| Grit | High | 62(25) | 0.01 |
| | Low | 188(75) | |
| Social Support | High | 114(46) | 0.01 |
| | Low | 136(54) | |
| Locus of Control | External | 152(61) | 0.01 |
| | Internal | 98(39) | |

DISCUSSION

The purpose of the study was to assess the predictive role of grit, locus of control and social support on the mental health of cardiac patients. Another aim of the study was to assess how certain demographic factors along with social support and grit can provide protective effects against depression, stress and anxiety among cardiac patients.

First, a significant negative association among grit, social support and mental health outcomes (depression, stress and anxiety) had been hypothesized. Consistent with the previous literature the present study showed that cardiac patients with limited social support and low scores on grit tend to report adverse mental health outcomes which were assessed through their scores on depression, stress and anxiety subscales (table 3) [33]. In addition, keeping in view the poor mental health outcomes of such patients, they stand at an enhanced risk of poor physical health outcomes including mortality. The relevant literature has shown that depression and anxiety are associated with increased mortality in cardiac patients [34]. A systematic review of 16 studies found that cardiac patients who experienced depression and anxiety had a higher risk of mortality compared to those who did not [35]. The risk of mortality was highest in patients with a history of depression or anxiety, suggesting that these factors can have a long-term effect on cardiac health [36]. Furthermore, a meta-analysis of 18 studies found that the risk of mortality was higher in patients with depression and anxiety compared to those without [37]. Secondly, significant mean differences with regard to age, gender, socioeconomic status, education and marital status were hypothesized with regard to mental health of cardiac patients. The results of

the present study confirmed this hypothesis. Table 4 depicts that among cardiac patients, being a male in the age range of 30 to 45 years of age, being married, having higher levels of education, higher scores on grit with an internal locus of control is associated with improved mental health outcomes. It also shows the protective of the grit, social support and internal locus of control against depression, stress and anxiety. Sullivan et al. reported that males tend to have access to more opportunities for social support and thus tend to experience better mental health outcomes [38]. Similarly, Cho et al., has reported that men with cardiac diseases tend to have better socioeconomic attainment in comparison to women which further allows them to cope with adverse mental health outcomes [39]. Jaffer et al., reported that younger men have lower levels of depression, stress and anxiety with regard to cardiovascular conditions in comparison to older men [40]. Moreover, males diagnosed with cardiovascular conditions in general have a better mental health status in comparison to their female counter parts [41]. However, contrasting research evidence is also available to examine the effects of gender and socioeconomic status. One study reported that women belonging to lower socioeconomic strata were more likely to experience depression six months after a cardiac event than men, but there was no difference when examining longer-term outcomes [42]. Other research findings have shown that both sexes experience depression in similar proportions regardless of their socioeconomic statuses [43]. It was also hypothesized that higher scores on grit and social support would be associated with lower scores on depression thus indicating better mental health. Consistent with the previous literature, the results of the present study confirmed the above hypothesis. Research has shown that grit can help cardiac patients stay motivated and committed to their recovery goals [44]. It can help them maintain a positive attitude and stay focused on the end goal of a full recovery. Having a positive attitude can help cardiac patients have the confidence to push through tough times [45]. Moreover, social support can also be beneficial for cardiac patients. Having family and friends who are available to provide emotional support can be a great source of comfort for cardiac patients [46]. The presence of loved ones can reduce stress and anxiety levels and can help cardiac patients better cope with their diagnosis and treatment [47]. Additionally, friends and family can help remind cardiac patients of the importance of following their care plan, as well as providing emotional support during difficult times [48]. Moreover, it has been assessed that cardiac patients who have an external locus of control do not tend to take responsibility of their own health and wellbeing. The findings of the present study have further

shown that having an external locus of control can lead to poor mental and physical health outcomes for cardiac patients. In this regard, the past literature has shown that patients who have an external locus of control are prone to experiencing depression and anxiety and are further expected to experience postoperative complications [49]. Moreover, as shown in the present study, the goal of providing different treatment and therapeutic interventions to cardiac patients should focus on enhancing their internal locus of control as it leads to improved physical and mental health outcomes as shown in the previous literature [4]. Though the study had sampled 250 cardiac patients, the fact that they were recruited through various hospitals of Lahore might raise concerns about the generalizability of findings. It is to be noted that individuals residing in big cities tend to have better access to inpatient and outpatient healthcare settings in comparison to those living in relatively rural settings.

CONCLUSIONS

In conclusion, it has been ascertained that having an internal locus of control, higher levels of social support and being gritty is associated with improved mental health outcomes in cardiac patients. The results of the present study have shown how enhancing social support, internal locus of control and grit can minimize poor mental health outcomes among cardiac patients. It has also been identified that cardiac patients belonging to upper age groups and lower socioeconomic strata may lack the resources necessary to access social support networks, such as the financial resources to attend support groups or the time and energy needed to initiate relationships. Thus, it is through enhancing support services and through providing psychological support interventions to these individuals that desirable mental health outcomes can be achieved.

Authors Contribution

Conceptualization: SMA, FM

Methodology: FH, MI

Formal analysis: FH, MI, AN

Writing-review and editing: NI, FM

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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