

To Study the Relationship Between Personality Traits and Self-Care Behaviors, with Glycemic Control Among Individuals with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Type 2 Diabetes Mellitus requires continuous self-care and daily attention from the individual. Psychological characteristics may be associated with how people manage these health-related behaviors. The present study examined the relationships between Big Five personality traits, diabetes self-care behaviors, psychological distress, and glycemic control measured by HbA1c.

Method: A cross-sectional correlational study was conducted among 104 adults aged 35–65 years who had been diagnosed with Type 2 Diabetes Mellitus for at least one year. Participants were selected by purposive sampling from Santosh Hospital, Ghaziabad, Uttar Pradesh/Delhi NCR. Personality was assessed using the Big Five Inventory, diabetes self-care using the Summary of Diabetes Self-Care Activities (SDSCA), and psychological distress using the General Health Questionnaire-12 (GHQ-12). HbA1c values were obtained from clinical laboratory records. Descriptive statistics and Spearman's rank-order correlation were used for analysis.

Findings: HbA1c showed significant positive correlations with GHQ-12 ($\rho = .663, p < .001$) and neuroticism ($\rho = .645, p < .001$), and significant negative correlations with openness ($\rho = -.269, p = .006$), conscientiousness ($\rho = -.508, p < .001$), and extraversion ($\rho = -.379, p < .001$). Agreeableness was not significantly related to HbA1c ($\rho = -.171, p = .083$). General diet ($\rho = -.528$), specific diet ($\rho = -.594$), exercise ($\rho = -.516$), blood glucose testing ($\rho = -.553$), and foot care ($\rho = -.519$) were each significantly and negatively correlated with HbA1c (all $p < .001$). Smoking status was also significantly positively associated with HbA1c ($\rho = .604, p < .001$), indicating that higher smoking-status scores were associated with higher HbA1c levels.

Conclusion: In the present sample, psychological distress, four of the five Big Five personality traits, and the core diabetes self-care domains were significantly associated with HbA1c. These findings support a broader, person-centred approach to diabetes management that considers psychological characteristics alongside everyday self-care behaviors.

Keywords: Type 2 Diabetes Mellitus; Personality Traits; Big Five Personality Inventory; Self-Care Behavior; SDSCA; GHQ-12; HbA1c; Glycemic control.

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1. Introduction

Diabetes Mellitus is a chronic metabolic disorder characterised by elevated blood glucose resulting from inadequate insulin production, impaired insulin action, or a combination of both. Type 2 Diabetes Mellitus (T2DM) is the most common form and generally develops through insulin resistance and progressive impairment of pancreatic β -cell function. Persistent hyperglycaemia can contribute to cardiovascular, renal, ocular, neurological, and vascular complications.⁽¹⁾

Diabetes has emerged as a major public health concern in India. The ICMR-INDIAB national cross-sectional study reported an overall weighted diabetes prevalence of 11.4% and a prediabetes prevalence of 15.3%, with substantial regional variation.⁽²⁾ Effective long-term management therefore requires attention not only to pharmacological treatment but also to behavioral factors that support sustained disease control.

People with T2DM are required to make repeated decisions concerning dietary intake, physical

activity, medication adherence, blood-glucose monitoring, and preventive practices such as foot care. Diabetes self-management education and support can facilitate informed decision-making and consistent self-care behaviors.⁽³⁾ Glycated haemoglobin (HbA1c) is widely used to assess longer-term glycemic status because it reflects average blood glucose over approximately the preceding two to three months.^(1,14)

Personality refers to relatively enduring patterns of thoughts, emotions, and behaviors that distinguish individuals from one another. The Big Five model includes openness, conscientiousness, extraversion, agreeableness, and neuroticism. Personality characteristics may influence behavioral regulation, coping, health-related decision-making, and adherence to long-term routines. Research has reported associations between several Big Five traits and diabetes self-care, although

relationships with HbA1c have not been completely consistent across studies. ^(5–11,15)

The present study examines personality traits, diabetes self-care behaviors, psychological distress, and glycemic control together. Understanding these relationships within an Indian clinical sample may contribute to a more contextualised biopsychosocial understanding of diabetes management.

2. Aims and Objectives

Aim: To investigate the relationship between personality traits and self-care behaviors and their relationship with HbA1c levels among individuals with Type 2 Diabetes Mellitus.

Objectives:

- (1) To assess personality traits and self-care behaviors among individuals with Type 2 Diabetes Mellitus.
- (2) To examine the correlation of personality traits and self-care behaviors with glycemic control.

3. Materials and Method

3.1 Study Design and Participants

A cross-sectional correlational design was used. The sample included 104 adults diagnosed with Type 2 Diabetes Mellitus. Participants were between 35 and 65 years of age and had been diagnosed with diabetes for at least one year. Purposive sampling was used to select participants. The study was conducted through the Department of Clinical Psychology in collaboration with the Department of General Medicine at Santosh Hospital, Ghaziabad, Uttar Pradesh/Delhi NCR.

3.2 Sample Size and Eligibility

The minimum required sample size was estimated to be 94 using a population-frequency formula based on a 10% prevalence estimate, 95% confidence level, 5% absolute error, and a design effect of 1. After allowing for a 10% non-response rate, the final sample size was approximately 104 participants. Participants were included when they gave informed consent, were 35–65 years of age, had Type 2 Diabetes Mellitus for at least one year, and were able to understand Hindi or English. Participants were excluded if they had another non-communicable disease comorbidity, Type 1 Diabetes Mellitus, gestational diabetes, another type of diabetes, or a history of psychiatric treatment.

3.3 Measures

1. Personality was assessed using the 44-item Big Five Inventory (BFI-44), a tool developed by Oliver P. John, Eileen M. Donahue, and Robert L. Kentle in 1991, covering openness, conscientiousness, extraversion, agreeableness, and neuroticism. ⁽¹²⁾
2. Diabetes self-care was assessed using the Summary of Diabetes Self-Care Activities (SDSCA), a tool developed by Deborah J. Toobert and Russell E. Glasgow in the year 1994, covering general diet, specific diet, exercise, blood glucose testing, foot care, and smoking status. ⁽⁴⁾
3. The General Health Questionnaire-12 (GHQ-12), a tool developed by David Goldberg in 1972, was

used to assess general psychological distress. HbA1c values obtained from clinical laboratory records were used as the indicator of glycemic control. ⁽¹³⁾

3.4 Statistical Analysis

Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarise demographic and study variables. The normality of the data was assessed using the Shapiro–Wilk test. As the data did not meet the assumptions of normality, Spearman's rank-order correlation was used to examine relationships between personality traits, diabetes self-care behaviors, psychological distress, and HbA1c. Statistical significance was set at $p < 0.05$.

4. Results

DESCRIPTIVE ANALYSIS

1. Demographic Characteristics of the Participants

Table 4.1. Gender-wise distribution of participants (N = 104)

Gender	Frequency	Percentage
Male	54	51.9
Female	50	48.1
Total	104	100.0

Gender Distribution of Participants (N = 104)

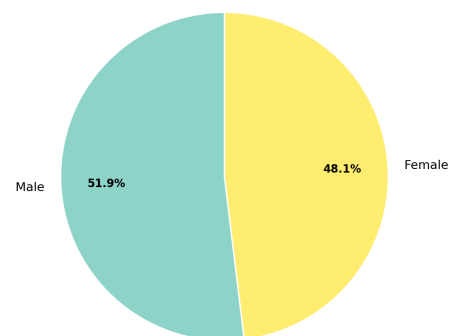


Figure 4.1. Gender distribution of participants (N = 104).

Table 4.2. Age characteristics of participants (N = 104)

Age characteristic	Value
N	104
Minimum age (years)	35
Maximum age (years)	65
Mean age (years)	53.67

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Standard deviation	9.56
Median age (years)	56

Table 4.3. Educational qualification-wise distribution of participants (N = 104)

Educational qualification	Frequency	Percentage
No formal education	23	22.1
Graduate	21	20.2
Primary education	18	17.3
12th grade	15	14.4
Other reported categories*	27	26.0
Total	104	100.0

Educational Qualification of Participants (N = 104)

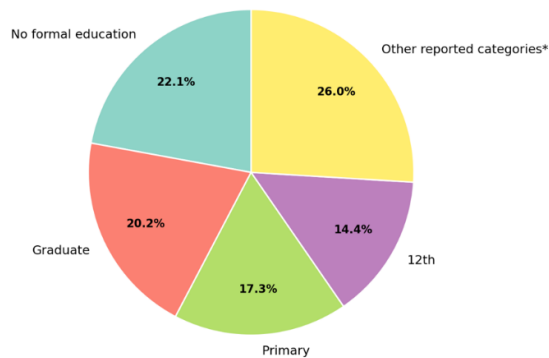


Figure 4.2. Educational qualification of participants (N = 104).

Table 4.4. Occupation-wise distribution of participants (N = 104)

Occupation	Frequency	Percentage
Housewife	29	27.9
Retired	13	12.5
Businessman	11	10.6
Clerk	10	9.6
Farmer	10	9.6

Teacher	7	6.7
Unemployed	6	5.8
Other reported categories*	18	17.3
Total	104	100.0

Occupational Status of Participants (N = 104)

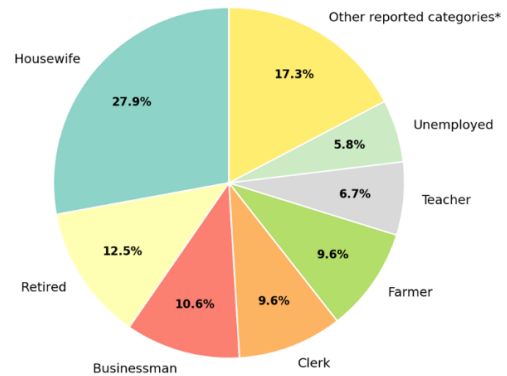


Figure 4.3. Occupational status of participants (N = 104)

Table 4.5. Family history of diabetes among participants (N = 104)

Family history	Frequency	Percentage
No family history	49	47.1
Both parents	21	20.2
Maternal	21	20.2
Paternal	13	12.5
Total	104	100.0

Family History of Diabetes (N = 104)

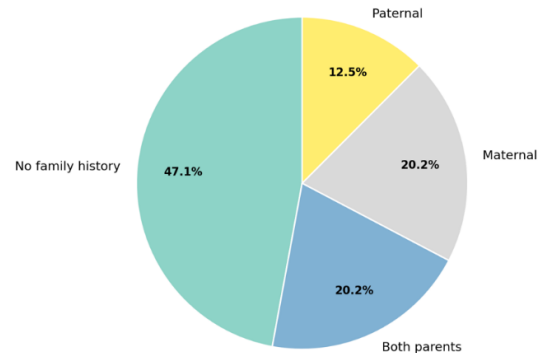


Figure 4.4. Family history of diabetes among participants (N = 104).

2. Descriptive Statistics of the Major Study Variables

Table 4.6. Descriptive statistics of major study variables (N = 104)

Variable	N	Minimum	Maximum	Mean	SD
HbA1c	104	6	9.1	7.201	0.710
GHQ-12	104	2	28	16.370	4.520
Openness	104	11	46	29.960	6.343
Conscientiousness	104	14	43	29.240	6.311
Extraversion	104	8	40	24.470	6.161
Agreeableness	104	9	43	24.710	6.769
Neuroticism	104	11	37	22.150	4.456
General Diet	104	2	7	4.476	1.006
Specific Diet	104	1	7	4.188	1.193

Exercise	104	0	6.5	3.611	1.360
Blood Glucose Testing	104	0.5	6.5	3.221	1.208
Foot Care	104	0.5	6.5	3.750	1.130
Smoking Status	104	0	1	0.327	0.471

Mean Scores on the Big Five Personality Dimensions (N = 104)

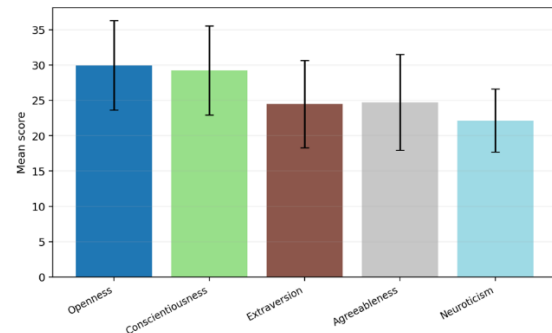


Figure 4.5. Mean scores on the Big Five personality dimensions, with error bars representing ± 1 SD (N = 104).

Mean Scores on Diabetes Self-Care Dimensions (N = 104)

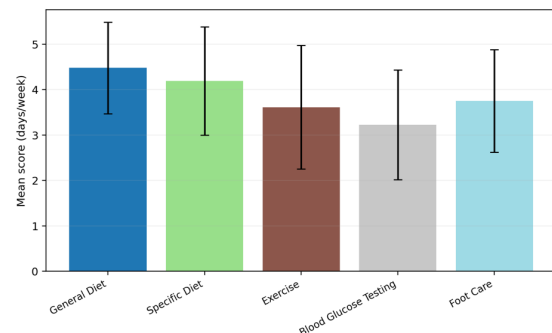


Figure 4.6. Mean scores on diabetes self-care dimensions, with error bars representing ± 1 SD (N = 104).

INFERENCE STATISTICS

1. Spearman's Rank-Order Correlation Analysis

Table 4.8. Spearman correlations between HbA1c and major study variables (N = 104)

Variable	ρ	P-value	Direction	Interpretation
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GHQ-12	.663	<.001	Positive	Significant
Openness	-.269	.006	Negative	Significant
Conscientiousness	-.508	<.001	Negative	Significant
Extraversion	-.379	<.001	Negative	Significant
Agreeableness	-.171	.083	Negative	Not significant
Neuroticism	.645	<.001	Positive	Significant
General Diet	-.528	<.001	Negative	Significant
Specific Diet	-.594	<.001	Negative	Significant
Exercise	-.516	<.001	Negative	Significant
Blood Glucose Testing	-.553	<.001	Negative	Significant
Foot Care	-.519	<.001	Negative	Significant

Smoking Status	.604	<.001	Positive	Significant*
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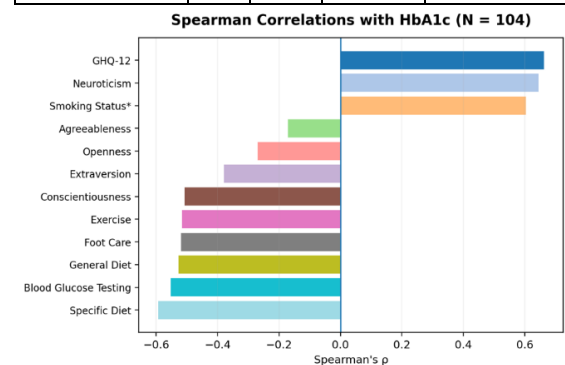


Figure 4.8. Spearman correlation coefficients between HbA1c and major study variables (N = 104)

5. Discussion

Psychological Distress and Glycemic Control

In the present study, psychological distress measured using the GHQ-12 showed a strong positive correlation with HbA1c ($\rho = .663, p < .001$). This indicates that greater psychological distress was associated with poorer glycemic control. The strength of this relationship was greater than that observed for the personality traits and self-care domains, suggesting that psychological well-being may have an important role in diabetes management. This finding is consistent with recent evidence showing that depression and diabetes distress are associated with poorer glycemic control and reduced self-care behaviors among people with diabetes.⁽¹⁶⁾ Although the present study used general psychological distress rather than a diabetes-specific distress scale, the findings support the importance of assessing psychological well-being alongside routine diabetes care.

Personality Traits and Glycemic Control

Four of the five Big Five personality traits showed significant correlations with HbA1c. Openness ($\rho = -.269, p = .006$), conscientiousness ($\rho = -.508, p < .001$), and extraversion ($\rho = -.379, p < .001$) were negatively correlated with HbA1c, whereas neuroticism showed a strong positive correlation ($\rho = .645, p < .001$). Agreeableness showed a weak negative correlation, but this was not statistically significant ($\rho = -.171, p = .083$).

The strongest personality association was observed for neuroticism, while conscientiousness also showed a relatively strong inverse relationship with HbA1c. The finding for conscientiousness is particularly consistent with larger research evidence. Stephan et al., using data from more than 26,000 participants across six samples, found that conscientiousness was the personality trait most consistently associated with lower HbA1c.⁽¹⁷⁾ Previous studies have also suggested that

personality may influence diabetes-related self-management and glycemic outcomes, although the strength and direction of associations can vary across populations.^(3, 8, 11)

The positive association between neuroticism and HbA1c may reflect the relationship between emotional vulnerability, stress and difficulties in maintaining consistent diabetes-management behaviors. However, because the present study was cross-sectional, these findings should be interpreted as associations rather than evidence that personality traits directly cause changes in HbA1c.

Self-Care Behaviors and Glycemic Control

All five assessed self-care domains showed statistically significant negative correlations with HbA1c. General diet ($\rho = -.528, p < .001$), specific diet ($\rho = -.594, p < .001$), exercise ($\rho = -.516, p < .001$), blood glucose testing ($\rho = -.553, p < .001$), and foot care ($\rho = -.519, p < .001$) were each associated with lower HbA1c when self-care behavior was better.

These findings are consistent with evidence that diabetes self-care is an important component of glycemic management. A systematic review and meta-analysis of people with type 2 diabetes in South Asia found variable adherence across self-care behaviors, with particularly limited adherence to diet, physical activity and foot care.⁽¹⁸⁾ The present findings therefore highlight the importance of addressing self-care behaviors as a whole rather than focusing on a single aspect of diabetes management.

The relatively strong association observed for specific diet is also clinically relevant, as dietary behavior is closely linked to daily glucose management. Similarly, the significant relationship of exercise and blood glucose testing with HbA1c supports the value of maintaining regular physical activity and monitoring glucose as part of diabetes self-management. These results do not establish causality, but they suggest that individuals with poorer glycemic control may benefit from closer assessment and support for their day-to-day self-care practices. Smoking status showed a positive correlation with HbA1c ($\rho = .604, p < .001$). The interpretation of this finding depends on how smoking status was coded, and therefore the direction should be interpreted with reference to the coding used in the dataset. Nevertheless, the association is supported by previous evidence linking smoking with higher glycemic measures. A meta-analysis found that current smokers had higher HbA1c levels than never-smokers, even among individuals without known diabetes.⁽¹⁹⁾ This suggests that smoking may be relevant to glycemic control and should be considered alongside other diabetes self-management behaviors.

Overall Interpretation

Overall, the findings indicate that glycemic control in individuals with type 2 diabetes mellitus is related

to both psychological and behavioral factors. Psychological distress showed the strongest observed correlation with HbA1c, while conscientiousness and neuroticism were the most prominent personality-related findings. All five assessed self-care domains were significantly associated with HbA1c, reinforcing the importance of everyday diabetes-management behaviors.

The findings support a more comprehensive approach to diabetes care in which psychological well-being, personality-related characteristics and self-care behaviors are considered together. However, the cross-sectional design prevents conclusions about directionality or causation. Further longitudinal and intervention-based research is needed to determine whether improving psychological well-being and self-care behaviors leads to sustained improvements in glycemic control.

Strengths and Limitations

A major strength of the study is that it examined psychological distress, Big Five personality traits, multiple diabetes self-care behaviors, and an objective indicator of glycemic control within the same study. The use of established measures such as the BFI-44, GHQ-12 and SDSCA, together with HbA1c, allowed psychological, behavioral, and clinical factors to be considered together. The findings are also relevant to the South Asian context, where self-care adherence has been reported to be variable.⁽¹⁸⁾

Limitations

However, the cross-sectional correlational design prevents conclusions regarding causality or direction of relationships. The sample of 104 participants and the specific study setting may limit generalisability. Personality, psychological distress, and self-care were assessed through self-report and may therefore be affected by recall or social-desirability bias. Other factors that may influence HbA1c, including medication adherence, treatment regimen, comorbidities, socioeconomic factors, and diabetes-related knowledge, were not examined as primary correlates. Furthermore, a single HbA1c measurement may not fully represent changes in glycemic control over time.

Future Recommendations

Future research should include larger and more diverse samples and use longitudinal designs to clarify the direction of the observed relationships. Diabetes-specific psychological factors such as diabetes distress, depression, anxiety, coping, and self-efficacy should also be examined. Intervention studies evaluating psychological support, behavioral counselling, motivational approaches, and structured diabetes self-management education are recommended. Culturally appropriate interventions addressing diet, exercise, glucose monitoring, and foot care may be particularly relevant for South Asian populations. Future studies should also

incorporate medication adherence, treatment-related, clinical, and socioeconomic variables to provide a more comprehensive understanding of glycemic control.

6. CONCLUSION

The present study demonstrates that psychological distress, personality traits, and diabetes self-care behaviors are significantly associated with glycemic control among individuals with Type 2 Diabetes Mellitus. Psychological distress showed a strong positive association with HbA1c, while openness, conscientiousness, and extraversion were negatively associated with HbA1c and neuroticism showed a positive association.

All five assessed self-care behaviors - general diet, specific diet, exercise, blood glucose testing, and foot care showed significant negative associations with HbA1c, indicating that better self-care was associated with better glycemic control. Overall, the findings highlight the importance of addressing psychological and behavioral factors alongside routine medical management to support effective diabetes care.

7. References

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