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# Association of psychological well-being and diabetes self-management in patients with type 2 diabetes: A cross-sectional study

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## Abstract

**Background:** Exploring the relationship between psychological well-being and active diabetes self-management in type 2 patients could improve their quality of life through targeted educational interventions. This study aims to evaluate the connection between psychological well-being and diabetes self-management.

**Methods:** This cross-sectional study with 238 type 2 diabetes patients from Shahid Sayyad Shirazi Hospital assessed psychological well-being (Ryff Scale, 18 items) and diabetes self-management (DSMQ, 16 items) via convenience sampling, analyzing data in SPSS 26 with t-tests, ANOVA, and Pearson correlation.

**Results:** This study of 220 type 2 diabetes patients (Mean age 61.54, 51.8% female) found significant associations between education, occupation, income, and RSPWB, as well as marital status and DSMQ. A strong correlation was observed between psychological well-being (Mean score 68.83) and self-management (Mean score 47.36) ($p<0.001$). Age showed no correlation with either measure, but hyperlipidemia was significantly linked to self-management ($p=0.046$).

**Conclusion**: The study found a significant link between marital status and diabetes self-management, highlighting demographic influences on both psychological well-being and self-management practices.

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## Highlights

### What is current knowledge?

Prior research notes bidirectional links between psychological well-being and diabetes self-management, with socioeconomic and marital factors influencing outcomes, though often examined in isolation, particularly in non-Iranian populations.

### What is new here?

This study reveals marital status as a key predictor of self-management and demonstrates a strong holistic association between psychological well-being and self-management. It uniquely ties hyperlipidemia to poorer self-management and provides culturally specific insights for Iranian adults, emphasizing integrated interventions for both psychological and metabolic health in type 2 diabetes.

## Introduction

Diabetes mellitus is a major and escalating issue in global healthcare, affecting approximately 415 million adults worldwide, with projections indicating an increase to 642 million by 2040 (1). This chronic condition is characterized by elevated blood glucose levels due to the body's inability to produce insulin, insulin resistance, or both. Type 2 diabetes constitutes 90 to 95 percent of all diagnosed cases (2). In Iran, epidemiological studies estimate that over 1.5 million individuals have type 2 diabetes (3). This form of diabetes typically begins with insulin resistance, and as the body fails to produce sufficient insulin, the pancreas may reduce or cease insulin production (2). Hemoglobin undergoes glycation to form HbA1c, a marker for average glucose concentration over the preceding 8 to 12 weeks due to the lifespan of red blood cells 4. A HbA1c level of 48 mmol/mol or higher is a diagnostic criterion for diabetes (4). Managing type 2 diabetes is challenging due to the serious complications and premature mortality associated with elevated blood glucose levels. Non-adherence to medical recommendations is common among patients (5). Self-management in diabetes involves dietary regulation, physical activity, medication adherence, self-monitoring of blood glucose or urine levels, and foot care (6). Since patients typically visit healthcare professionals only a few times a year, they must manage these aspects independently. Support for self-management is a fundamental component of the chronic care model, which encourages a collaborative approach between healthcare providers and patients to identify problems, prioritize needs, set goals, create treatment plans, and resolve issues (1). Successful self-management support has been shown to positively influence lifestyle and health outcomes (1). However, international studies indicate that self-management support remains underdeveloped in many countries (1). Historically, the traditional medical model focused on managing specific diseases rather than patient management, which has proven costly and ineffective for chronic illnesses, especially when patients have multiple conditions (7). The increasing demand within healthcare systems necessitates that patients take more active roles in their health management. Effective self-management is associated with improved health outcomes and may correlate with health literacy (8). Disease self-management is distinct from related concepts such as self-care, patient activation, and patient-centered care (9). It involves medical or behavioral disease management, role management, and emotional management (9). The concept of psychological well-being (PWB) has emerged as a focus in recent decades, emphasizing a fulfilling and satisfying life, personal growth, and self-actualization (10). PWB is understood as the pursuit of elevation and enhancement, manifesting in

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the realization of individual potentials and capabilities (11). Indicators of psychological well-being, such as optimism, positive affect, self-efficacy, and gratitude, have been associated with better health outcomes across various medical conditions, independent of social, demographic, and medical factors (12). In diabetes patients, these constructs have been linked to improved glucose control and reduced mortality rates16. However, individuals with type 2 diabetes often face significant challenges related to their psychological well-being (13). Given the increasing prevalence of type 2 diabetes and the limited attention to psychological factors, this study aims to emphasize the importance of recognizing the interplay between psychological factors and health-related behaviors. Moreover, effective diabetes self-management requires not only knowledge and skills but also emotional resilience and a positive mindset. By exploring these factors together, we can gain a more comprehensive understanding of how psychological well-being can enhance self-management behaviors, leading to better health outcomes. This integrated approach may also inform interventions aimed at improving both mental health and diabetes management strategies. Specifically, it seeks to evaluate the relationship between psychological well-being, diabetes self-management, and HbA1c levels among patients with type 2 diabetes attending diabetes clinics at educational hospitals in Gorgan during 2023-2024. By identifying the factors contributing to the success or failure of disease management processes, healthcare teams can devise interventions to assist patients and their families in adhering to specific treatment regimens.

## Methods

This study was a cross-sectional research focusing on patients with type 2 diabetes who attended diabetes clinics at educational hospitals in Gorgan during the years 2023-2024. The sample size for this study was estimated to be 238 patients with type 2 diabetes, using the results from the study by Modarresi et al. in 2020 (Effect size= 0.390) and the G-Power software version 3.0.1. (14). The sampling method employed was convenience sampling. Inclusion criteria required patients to have type 2 diabetes and a medical record at the hospital's diabetes clinic. Patients were included in the study if at least one year had passed since their definitive diagnosis by the treating physician. Exclusion criteria included incomplete questionnaires.

**Demographic Questionnaire**

The demographic form, designed by the researcher, included criteria such as age, gender, education level, occupation, marital status, income level, duration of diabetes, other chronic illnesses, and place of residence.

**The Ryff Scales of Psychological Well-Being (RSPWB) Questionnaire**

The RSPWB questionnaire was developed by Ryff CD et al. in 1995. This questionnaire consists of 18 items, each rated on a 6-point Likert scale from "completely disagree" (Score 1) to "completely agree" (Score 6), resulting in a total score ranging from 18 to 108. The RSPWB measures six subscales: self-acceptance, environmental mastery, positive relations, purpose in life, personal growth, and autonomy, with three questions per component. Higher scores indicate higher psychological well-being. The RSPWB has been validated and its reliability reported with Cronbach's alpha ranging from 0.82 to 0.92 in various studies (15). Shayeghian and colleagues (2019) developed standardized guidelines for the RSPWB within urban populations, using data collected from 715 participants. The study yielded an internal consistency reliability coefficient of 0.72, demonstrating statistical significance (16).

**The Diabetes Self-Management Questionnaire (DSMQ) Questionnaire**

The DSMQ was developed by Schmitt et al. in 2016 to assess diabetes self-care behaviors. It consists of 16 items divided into four subgroups: effective blood glucose measurement and medication intake (Items 10, 6, 4, 1, 12), dietary habits facilitating diabetes control (Items 9, 5, 2, 13), avoidance of physical exercise (Items 11, 8, 15), and avoidance of medical appointments (Items 7, 3, 14). Each item is scored on a 4-point Likert scale from 0 (Never) to 3 (Very often), with a total score range of 0 to 48. In the study by Schmitt et al. (2016), the Cronbach's alpha coefficients were as follows: dietary adherence (0.79), medication adherence (0.75), blood glucose monitoring (0.83), physical activity (0.74), and healthcare utilization (0.72) (17). In the study by Afkhami et al. (2022), the Cronbach's alpha was 0.812, indicating good reliability of the questionnaire (18). Also, in the study by Mehravar et al., forward and backward translation techniques were used to translate and culturally adapt the questionnaire into Persian. The test-retest reliability of the scale was assessed using the intraclass correlation coefficient (19).

The data collection tool was a demographic information form and two questionnaires: the Riff Psychological Well-Being Scale (RSPWB) and the Diabetes Self-Management Questionnaire (DSMQ). Data collection began after obtaining the ethics code from the Ethics Committee of Golestan University of Medical Sciences (IR.GOUMS.REC.1403.073). Informed consent was obtained from all patients to complete the questionnaire and they were informed of the confidentiality of their information, and then the questionnaires were distributed as printed files among patients with diabetes and completed.

Patient data were initially recorded in a checklist and then entered into SPSS software version 26. Quantitative variables were described using mean and standard deviation, while qualitative variables were described using frequency and percentage. The normality of data was assessed using histograms, normal curves, and the Shapiro-Wilk or Kolmogorov-Smirnov tests, confirming the normality of the data in this study. Data analysis was performed using independent t-tests, t-tests, ANOVA, and Pearson correlation tests. A significance level of 0.05 was considered in this study.

## Results

The current study included 238 patients of which 220 people completed the questionnaire (Response rate = 92.43 percent), with a mean age61.54 ±8.46 years. Table 1 presents the demographic information of the participants. The majority of those who took part were female (51.8%) and married (95.5%).

The results shows that there was a significant relationship between education (P = 0.004), Job (P <0.001) and income level (P = 0.026) of the patients and RSPWB. Also, the relationship between marriage (P = 0.021) and DSMQ was significant.

The relationship between the age of the patients and the mean score obtained from the RSPWB questionnaire (P = 0.823, r = -0.015) and DSMQ questionnaire (P = 0.887, r = -0.010) was not significant. The correlation between hyperlipidemia and DSMQ was significant (P = 0.046) due to Table 2.

Table 3 presents correlations between psychological well-being (RSPWB), diabetes self-management (DSMQ), and glycemic indices in type 2 diabetes patients. A significant positive correlation was observed between disease duration and both RSPWB (r = 0.903, p = 0.008) and DSMQ (r = 0.841, p = 0.014). Fasting blood sugar (FBS), glucose tolerance (GTT), and HbA1C levels showed no statistically significant associations with RSPWB or DSMQ (p > 0.05). These findings suggest that longer disease duration may relate to improved psychological well-being and self-management behaviors, while glycemic control parameters did not demonstrate meaningful correlations.

Table 4 displays mean scores for psychological well-being (RSPWB) and diabetes self-management (DSMQ) subscales. The highest RSPWB subscale score was Autonomy (17.79 ± 3.01), while the lowest was Self-Acceptance (10.49 ± 3.60). For DSMQ, avoidance of physical exercise (14.71 ± 2.93) scored highest, and avoidance of medical appointments (8.10 ± 1.40) scored lowest. Total RSPWB (68.83 ± 8.84) and DSMQ (47.36 ± 6.49) scores reflect moderate overall levels of psychological well-being and self-management behaviors, with notable variability in specific domains (e.g., Self-Acceptance SD = 3.60). These patterns highlight areas for targeted interventions in type 2 diabetes care.

Table 5 examines correlations between RSPWB subscales (Psychological well-being domains) and DSMQ subscales (Diabetes self-management behaviors). Significant positive correlations were observed between Personal Growth and Dietary Management (r = 0.754, p < 0.001) and Physical Management (r = 0.458, p < 0.001). Purpose in Life also correlated positively with Dietary Management (r = 0.213, p = 0.001) and Physical Management (r = 0.458, p < 0.001). Notably, Self-Acceptance showed a negative correlation with Physical Management (r = -0.216, p = 0.001). Total RSPWB and DSMQ scores exhibited a moderate positive association (r = 0.378, p < 0.001), suggesting that specific psychological well-being domains are differentially linked to self-management practices in type 2 diabetes.

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**Table 1.** The association between demographic characteristics and responses

| **Variable** | N (%) | **RSPWB**[1] Mean (±SD) | P-value | **DSMQ**[1] Mean (±SD) | P-value |
|---|---|---|---|---|---|
| Gender | | | | | |
| Female | 114 (51.8) | 68.78 (±8.29) | 0.941 | 47.28 (±6.15) | 0.853 |
| Male | 106 (48.2) | 68.87 (±9.43) | | 47.45 (±6.86) | |
| Education | | | | | |
| Under Diploma | 136 (61.8) | 70.29 (±8.50) | 0.004 | 47.76 (±6.53) | 0.265 |
| Diploma | 53 (24.1) | 65.43 (±10.30) | | 45.84 (±6.66) | |
| Bachelor's degree | 28 (12.7) | 67.64 (±5.44) | | 48.28 (±5.99) | |
| Master's degree | 3 (1.4) | 73.66 (±4.04) | | 47.66 (±2.88) | |
| Job | | | | | |
| Self-employment | 75 (34.1) | 72.17 (±8.12) | <0.001 | 48.34 (±6.53) | 0.262 |
| Employee | 52 (23.6) | 65.03 (±8.81) | | 46.63 (±6.81) | |
| Unemployed | 93 (42.3) | 68.25 (±8.50) | | 46.98 (±6.24) | |
| Marriage | | | | | |
| Single | 2 (0.9) | 68.50 (±0.70) | 0.191 | 52.50 (±2.12) | 0.021 |
| Married | 210 (95.5) | 69.04 (±8.63) | | 47.53 (±6.48) | |
| Widowed | 8 (3.6) | 63.25 (±13.58) | | 41.62 (±4.03) | |
| Income | | | | | |
| < 5 million | 58 (26.4) | 71.50 (±5.94) | 0.026 | 48.25 (±5.30) | 0.446 |
| 5-10 million | 152 (69.1) | 67.92 (±9.70) | | 47.09 (±6.83) | |
| > 10 million | 10 (4.5) | 67.20 (±5.90) | | 46.30 (±7.52) | |
| Residence | | | | | |
| City | 133 (60.5) | 68.56 (±8.60) | 0.580 | 46.86 (±6.17) | 0.155 |
| Village | 87 (39.5) | 69.24 (±9.22) | | 48.13 (±6.91) | |

*P-value<0.05 is significant

**Table 2.** The comparison of psychological well-being and self-management based on the history of underlying diseases

| **Variable** | Total (n=220) | **RSPWB** | P-value | **DSMQ** | P-value |
|---|---|---|---|---|---|
| | n (%) | Mean (±SD) | | Mean (±SD) | |
| Hypertension | | | | | |
| No | 173 (78.6) | 69.35 (±8.66) | 0.094 | 47.45 (±6.28) | 0.699 |
| Yes | 47 (21.4) | 66.91 (±9.33) | | 47.04 (±7.27) | |
| Hyperlipidemia | | | | | |
| No | 212 (96.4) | 69.00 (±8.69) | 0.136 | 47.53 (±6.42) | 0.046 |
| Yes | 8 (3.6) | 11.92 (±4.21) | | 42.87 (±7.25) | |
| Coronary Heart Disease | | | | | |
| No | 195 (88.6) | 69.18 (±8.93) | 0.094 | 47.43 (±6.51) | 0.691 |
| Yes | 25 (11.4 | 66.04 (±7.70) | | 46.88 (±6.40) | |
| Kidney disease | | | | | |
| No | 210 (95.5) | 68.92 (±8.97) | 0.458 | 47.31 (±6.56) | 0.608 |
| Yes | 10 (4.5) | 66.80 (±5.13) | | 48.40 (±4.74) | |

**Table 3.** The correlation coefficients of RSPWB, DSMQ and glycemic index in patients with type2 diabetes

| Glycemic index | Mean (±SD) | RSPWB | | DSMQ | |
|---|---|---|---|---|---|
| | | P-value | r | P-value | r |
| Duration of disease | 10.32 (±6.18) years | 0.903 | 0.008 | 0.841 | 0.014 |
| FBS | 184.04 (±69.48) mg/dl | 0.115 | 0.106 | 0.285 | 0.072 |
| GTT | 262.51 (±71.61) mg/dl | 0.076 | -0.120 | 0.870 | 0.011 |
| HbA1C | 7.78 (±1.52) mmol/mol | 0.438 | 0.053 | 0.694 | 0.027 |

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**Table 4.** The mean score of the subscales of RSPWB and DSMQ questionnaires

| | Subscales | Mean (±SD) |
|---|---|---|
| **RSPWB** | RSPWB 1: Autonomy | 17.79 (±3.01) |
| | RSPWB 2: Environmental mastery | 10.81 (±2.48) |
| | RSPWB 3: Personal growth | 13.86 (±3.45) |
| | RSPWB 4: Positive relations | 11.24 (±2.50) |
| | RSPWB 5: Purpose in life | 11.61 (±2.45) |
| | RSPWB 6: Self-acceptance | 10.49 (±3.60) |
| | Total of RSPWB | 68.83 (±8.84) |
| **DSMQ** | DSMQ 1: Effective blood glucose measurement and medication intake | 13.58 (±2.42) |
| | DSMQ 2: Dietary habits facilitating diabetes control | 10.96 (±2.24) |
| | DSMQ 3: Avoidance of physical exercise | 14.71 (±2.93) |
| | DSMQ 4: Avoidance of medical appointments | 8.10 (±1.40) |
| | Total of DSMQ | 47.36 (±6.49) |

**Table 5.** The Correlation Coefficients between RSPWB subscales and DSMQ subscales

| DSMQ / RSPWB | Blood glucose management | | Dietary management | | Physical management | | Medical management | | Total of DSMQ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | P-value | r | P-value | r | P-value | r | P-value | r | P-value | r |
| Autonomy | 0.604 | - 0.035 | 0.411 | 0.056 | < 0.001 | 0.543 | 0.107 | - 0.109 | < 0.001 | 0.228 |
| Environmental mastery | 0.235 | - 0.080 | 0.641 | 0.032 | < 0.001 | 0.234 | 0.192 | - 0.088 | 0.318 | 0.068 |
| Personal growth | 0.326 | 0.067 | < 0.001 | 0.279 | < 0.001 | 0.754 | 0.127 | 0.103 | < 0.001 | 0.485 |
| Positive relations | 0.115 | 0.107 | 0.006 | 0.186 | 0.012 | 0.170 | 0.914 | - 0.007 | 0.008 | 0.179 |
| Purpose in life | 0.005 | - 0.190 | 0.001 | 0.213 | < 0.001 | 0.458 | 0.602 | 0.035 | < 0.001 | 0.360 |
| Self-acceptance | 0.356 | 0.063 | 0.086 | - 0.116 | 0.001 | - 0216 | 0.042 | - 0.137 | 0.032 | - 1.44 |
| Total of RSPWB | 0.140 | 1.00 | 0.003 | 0.202 | < 0.001 | 0.633 | 0.303 | - 0.070 | < 0.001 | 0.378 |

## Discussion

The current study investigated the relationship between demographic factors and psychological well-being and self-management practices in 220 patients with type 2 diabetes. The participants had a mean age of 61.54 ± 8.46 years, with the majority being female (51.8%) and married (95.5%). The study's findings revealed several significant relationships that contribute to our understanding of how demographic factors influence the psychological well-being and self-management of diabetes patients.

Firstly, the study found significant relationships between education, occupation, income level, and psychological well-being (RSPWB). Specifically, higher levels of education, occupation, and income were associated with better psychological well-being scores. This aligns with previous research indicating that socioeconomic status plays a crucial role in mental health and well-being (20). The significant correlation between marital status and diabetes self-management (DSMQ) further supports the notion that social support, often provided by a spouse, can positively impact self-management practices in chronic diseases like diabetes (21).

Interestingly, the study did not find a significant correlation between age and the scores from either the RSPWB or DSMQ questionnaires. This suggests that age alone may not be a determining factor for psychological well-being or self-management in type 2 diabetes patients, which contrasts with some previous studies that have highlighted age-related differences in these areas (22,23).

Additionally, the study identified a significant correlation between hyperlipidemia and DSMQ. This finding is particularly noteworthy as it suggests that comorbid conditions like hyperlipidemia may influence self-management practices in diabetes patients. Managing multiple chronic conditions can be challenging and may require more intensive self-management efforts (24).

The overall mean scores for RSPWB and DSMQ were 68.83 ± 8.84 and 47.36 ± 6.49, respectively. The statistically significant relationship between RSPWB and DSMQ ($P < 0.001$, $r = 0.378$) indicates that better psychological well-being is associated with improved self-management practices. This underscores the importance of addressing both psychological well-being and self-management in the comprehensive care of type 2 diabetes patients. This study highlights the significant influence of demographic factors on psychological well-being and self-management in type 2 diabetes patients. These findings emphasize the need for tailored interventions that consider socioeconomic status, marital support, and comorbid conditions to improve overall health outcomes in this population.

## Conclusion

The study highlights significant relationships between demographic factors such as education, job, income level, and marital status with psychological well-being and diabetes self-management in patients with type 2 diabetes. The findings indicate that higher education and employment status are associated with better psychological well-being, while marital status influences self-management practices. Additionally, a statistically significant correlation was found between psychological well-being and diabetes self-management, suggesting that improving one may positively impact the other. These findings suggest that demographic factors influence both psychological well-being and self-management practices in type 2 diabetes patients. Also, we found that there was a relationship between these two questionaries which means if mean score of DSMQ is high the mean score of RSPWB is also high. This means that if the person is responsible for their health, they are also responsible for their psychological health too. Overall, these results underscore the importance of addressing both psychological and social factors in the management of type 2 diabetes to enhance patient outcomes. longitudinal studies could provide deeper insights into the causal relationships between psychological well-being and diabetes self-management over time. Such studies would allow researchers to track changes in psychological factors and their impact on diabetes management behaviors, potentially revealing patterns and trends that cross-sectional studies may miss. Additionally, intervention-based trials could be instrumental in testing specific strategies aimed at improving psychological well-being as a means to enhance diabetes self-management. By implementing targeted interventions-such as cognitive-behavioral therapy, mindfulness practices, or support groups-we could evaluate their effectiveness in promoting better health outcomes for individuals with diabetes.

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## Ethical statement

The Ethics Committee of Golestan University of Medical Sciences, Gorgan, Iran, approved the study protocol (IR.GOUMS.REC.1403.073). The study presented no more than minimal risk of harm to subjects and involved no procedures for which written consent is generally required outside the research context. Informed verbal consent was obtained from all participants.

## Conflicts of interest

The authors declare no conflict of interest.

## Author contributions

SH and FM conceptualized the study design. All authors were involved in the implementation of the study and conducted the interviews. SP and FM analyzed and interpreted the data. SP and FM drafted the manuscript. AS and SH contributed to revising the manuscript. All authors read and approved the final manuscript.

## Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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