

# Relationship Between Resilience and Quality of Life in Diabetics

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## ABSTRACT

**Objective:** To determine the relationship between resilience and quality of life of diabetes patients controlling the effect of personal level (i.e., gender, age, and income) and disease-specific (i.e., duration of disease, and current glucose level) demographics.

**Study Design:** Analytical study.

**Place and Duration of Study:** Outpatient Departments of various hospitals in Islamabad and Rawalpindi, from October to November 2012.

**Methodology:** Patients diagnosed with diabetes taking treatment in an outdoor patients' facility were included. Patients with a major diabetes complications causing or coexistent with a physical disability, medical condition or psychiatric comorbidity were excluded. Informed consent was taken from patients before administration of questionnaires. The patients were asked to respond to a demographic sheet, State-Trait resilience inventory, and WHO-Quality of Life BREF. Statistical testing was conducting using bivariate correlation, Mann-Whitney U-test, and multiple linear regression analysis for moderation testing.

**Results:** There were 242 patients including (n=108, 44% females; and n=134, 56% males) aged 17 - 85 years with mean of  $44.56 \pm 16.56$  years. Trait resilience predicted all aspects of quality of life of diabetic patients ( $\beta$  range = 0.30 to 0.42,  $p < .01$ ) and explained 17% variance in physical functioning, 29% in psychological functioning, 17% in environmental functioning, 30% in social dimension, and 29% in overall quality of life. Duration of diabetes moderated effect of state resilience on all aspects of quality of life ( $\beta$  interaction range = 0.20 to 0.26,  $p < .05$ ) and explained an additional 4% variance in physical functioning, 5% in psychological functioning, 3% in environmental functioning, 5% in social dimension, and 4% in overall quality of life of diabetics.

**Conclusion:** Trait resilience has unconditional positive effect on all aspect of quality of life. Long standing diabetics may benefit from intervention addressing state resilience.

**Key Words:** Diabetes. Resilience. Quality of life. Moderation. Relationship.

## INTRODUCTION

Diabetes is a chronic illness in which the body is partially or completely unable to produce and appropriately use insulin.<sup>1,2</sup> National Institute of Diabetes and Endocrinology reported 7.6% prevalence of diabetes at present.<sup>3,4</sup> Diabetes mellitus influences almost all area of psychosomatic performance, from cognitive development, schooling and family life to mood and interpersonal relationships.<sup>5</sup> The management regimen requires lifelong self regulation of behavior having a serious impact on quality of life of the sufferer.<sup>6,7</sup>

Earlier diabetes literature suggests a negative relationship between diabetes and quality of life.<sup>7</sup> The importance of quality of life lies in one's health because it can precisely foretell an individual's competence to handle his ailment and sustain enduring health pattern.<sup>8</sup> It is, therefore, important to promote factors improving

quality of life of patients who are already at risk for diminished quality of life due to the burden of management requirement of their disease. Research also suggests the role of personal and diabetes specific factors in quality of life of diabetes patients, pertinently socio-economic status of the patient and duration of the disease.<sup>9-11</sup> Resilience is referred as an individual's propensity to deal with stressful and adverse events like chronic diseases. Resilience is "dynamic process where individuals display positive adaptation despite experiences of significant adversity or trauma".<sup>12</sup> Links between resilience and quality of life can be rationalized by two alternate scenarios. One is that higher quality of life leads to better coping and adapting strategies ultimately resulting in better resilience within individual. The other is in reverse direction, i.e., better resilience of an individual may lead to improved coping, resulting in better quality of life of the sufferer.<sup>13</sup> In case of former scenario, quality of life shall have more association with state resilience as state resilience is situational and less stable compare to trait resilience. Contrary to this, more associations with trait resilience may evidence later scenario i.e., resilience improving quality of life rather the vice versa. Keeping in view the stability factor, it was assumed that trait resilience may affect quality of life of diabetes patients.

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The objective of the present research was to investigate the moderating effect of personal level (i.e., age, year of formal education, and family income), and disease specific factors i.e., (duration of disease, and latest glucose level) on the relationship between resilience and quality of life.

## METHODOLOGY

The data was collected from different hospitals of Rawalpindi and Islamabad, between October to November 2012. Permission for data collection was taken from the authorities of concerned hospitals. Inclusion criteria were patients diagnosed with diabetes taking treatment in an outdoor patients' facility. Patients with a major diabetes complications i.e., retinopathy, nephropathy, neuropathy, and diabetic foot and with a major physical disability, medical condition or psychiatric comorbidity were excluded from the study. After taking informed consent from patients, questionnaires were individually administered. It took around 10 - 15 minutes of the patients to complete the questionnaires.

Resilience was assessed using the State-Trait Resilience Inventory, originally developed by Hiew and colleagues.<sup>14</sup> It comprise of 2 subscales Trait Resilience (18 items), i.e., resilience by birth as a personality factor, and State Resilience (15 items) i.e., current or situational resilience which is adaptive according to demand of the environment. Total score on both subscales is computed by adding responses of individuals on respective items, high score indicating high resilience on respective component. Urdu version of the instrument translated by Sawar, was used for the present study which has well established psychometric properties.<sup>15</sup>

Quality of life was assessed using the WHO Quality of Life BREF developed by Murphy and colleagues.<sup>16</sup> It measures quality of life in four dimensions i.e., physical functioning, psychological functioning, environmental and social dimension. Total score on all four subscales is computed by adding responses of individuals on respective items, high score on a subscale indicating better quality of life of an individual on the respective component. For the present study, Urdu version of scale was used, translated and adapted by Khan and colleagues with well established psychometrics.<sup>17</sup>

Analysis were conducted using Statistical Package for Social Sciences (SPSS) version 20. Statistical testing was conducted using bivariate correlation, Mann-Whitney U-test, and multiple linear regression analysis for moderation testing.

## RESULTS

A total of 250 patients, age ranged 17 - 85 years with mean  $44.56 \pm 16.56$  years were approached at outpatient services. With a high response rate (i.e., 96.8%), a total of 242 patients including 43% females

completed questionnaires were returned and further processed for data analysis. The sample consisted  $n=108$ , 44% females; and  $n=134$ , 56% males with a mean diabetes duration of 7.62 years. Reliability of measures was accessed with Cronbach's alpha. The results showed that both subscales of resilience i.e., state resilience (Alpha = 0.84), and trait resilience (Alpha = 0.93) are reliable for the study sample. Cronbach's alpha of quality of life instrument suggested good reliability of psychological functioning (Alpha = 0.71), and environment (Alpha = 0.80) domains along with the QOL total (Alpha = 0.90). Alpha reliability of the two subscales i.e., physical functioning (Alpha = 0.67), and social dimension (Alpha = 0.64) were below that criteria.

Preliminary analysis presented no significant difference across gender on study variables (i.e., resilience, and quality of life), and disease related demographics (i.e., duration of disease, and latest glucose level) yet the sample differed on all three personal level demographics i.e., age, years of formal education and income. Results presented in Table I suggest that on average male patients were older (i.e., mean difference = 4.21 years,  $p=0.046$ ), more educated (i.e., mean difference = 1.6 years of formal education,  $p=0.005$ ), and have higher family income (i.e., mean difference = 10.6 thousand rupees,  $p=0.014$ ) compared to female patients.

Bivariate correlations presented in Table II also suggested similar results. Though low yet significantly negative correlation appeared between gender and all three personal level demographic ( $r$  range = -0.13 to -0.19,  $p < 0.05$ ). Age had a significantly high positive correlation with duration of diabetes ( $r_s = 0.61$ ,  $p = 0.01$ ), and a low yet significantly positive relation with current glucose level ( $r_s = 0.21$ ,  $p = 0.01$ ). Education had a negative relationship with duration of diabetes ( $r_s = -0.17$ ,  $p = 0.01$ ) and current glucose level ( $r_s = -0.19$ ,  $p = 0.01$ ) suggesting an early diagnosis and a better control of diabetes for more educated patients. Duration of disease had a low yet significantly positive relationship with current glucose level ( $r_s = 0.24$ ,  $p = 0.01$ ), and negative relationship with psychological functioning ( $r_s = -0.16$ ,  $p = 0.05$ ), physical functioning ( $r_s = -0.23$ ,  $p = 0.01$ ), and overall quality of life ( $r_s = -0.19$ ,  $p = 0.01$ ). Similarly, current glucose level also negatively related to all dimension of quality of life ( $r_s$  range = -0.14 to -0.17,  $p < 0.05$ ) except social dimension. All aspects of quality of life had positive medium to high relationship with both state ( $r$  range = 0.43 to 0.55,  $p = 0.01$ ), and trait ( $r$  range = 0.50 to 0.60,  $p = 0.01$ ) resilience suggesting that both state as well as trait resilience improves all aspects of quality of life.

As presented in Table III, the effect of family income only on environmental functioning ( $\beta = 0.18$ ,  $p = 0.04$ ) aspect of quality of life and explained a total of 12% variance.

**Table I:** Mean differences in study variables across gender.

Variables	Number of items	Chronbach's alpha	Males (n=134)		Females (n=108)		t/U	p
			Mean	SD	Mean	SD		
Age	-	-	46.52	16.39	42.31	16.19	2.000	.047
Formal education (in years)	-	-	13.36	3.36	11.76	4.75	2.86	.005
Income (in 10000)	-	-	2.94	2.94	1.88	2.55	2600.0	.000
Duration (in years)	-	-	7.72	7.20	7.51	7.61	7126.0	.936
Current glucose level	-	-	227.20	117.14	243.56	131.26	6522.5	.357
State resilience	15	0.84	51.39	12.88	50.97	12.03	.260	.795
Trait resilience	18	0.93	59.61	14.71	59.49	15.35	.062	.951
Physical functioning	7	0.67	22.12	4.98	22.17	4.78	.075	.940
Psychological functioning	6	0.71	19.78	4.26	19.72	4.27	.111	.912
Environment	8	0.80	28.98	7.31	29.69	7.14	.756	.450
Social dimension	3	0.64	10.37	2.58	10.08	2.67	.833	.405
Quality of life	26	0.90	81.51	16.34	82.12	15.24	.300	.765

Shaded rows = Mean differences are calculated with non-parametric equivalence of t-test (i.e., Mann-Whitney U-test) due to non-normal distribution of these variables.

**Table II:** Bivariate correlations between study variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
Gender												
Age	-.128*											
Formal education (in years)	-.195**	-.137*										
Income (in 10000)	-.290**	.054	.471**									
Duration (in years)	-.005	.611**	-.170*	.019								
Current glucose level	.060	.213**	-.194**	-.047	.241**							
State resilience	-.017	.018	.176*	.039	-.074	-.058						
Trait resilience	-.004	.066	.228**	.094	-.053	-.080	.845**					
Physical functioning	.005	-.071	.118	.074	-.162*	-.150*	.419**	.437**				
Psychological functioning	-.007	-.074	.181**	.081	-.234**	-.137*	.548**	.577**	.676**			
Environment	.049	-.035	.206**	.093	-.118	-.157*	.434**	.499**	.564**	.650**		
Social dimension	-.054	.024	.064	.038	-.116	-.092	.509**	.510**	.613**	.610**	.548**	
Quality of life	.019	-.056	.191**	.074	-.187**	-.152*	.551**	.592**	.846**	.859**	.861**	.755**

\* Correlation is significant at the 0.05 level (2-tailed); \*\* Correlation is significant at the 0.01 level (2-tailed).

Shaded area: Spearman correlation coefficient for variables with non-normal distribution; Un-shaded area: Pearson correlation coefficient for variables with normal distribution.

**Table III:** Regression analysis predicting quality of life.

	Physical functioning		Psychological functioning		Environment		Social dimension		Quality of life	
	β	p	β	p	β	p	β	p	β	p
Gender	.01	.94	.08	.28	.12	.13	-.03	.69	.08	.29
Age	.09	.31	.05	.57	.03	.76	.12	.20	.08	.40
Education (in years)	.04	.67	.13	.12	.11	.21	.02	.81	.11	.20
Income (10000)	.02	.81	.05	.52	.18	.04	.01	.91	.09	.28
Duration (years)	-.36	.00	-.32	.00	-.18	.06	-.28	.00	-.32	.00
Current glucose level	-.17	.02	-.13	.09	-.12	.12	.00	.96	-.12	.11
State resilience	.15	.23	.28	.01	.02	.90	.19	.12	.17	.14
Trait resilience	.30	.02	.30	.01	.42	.00	.40	.00	.41	.00
R <sup>2</sup>	.16		.16		.12		.06		.15	
Δ R <sup>2</sup>	.17		.29		.17		.30		.29	

**Table IV:** Moderating effect of duration and gender for the relation between resilience and QoL.

DV	IV (Src)		Mod (dd)		Interaction		R <sup>2</sup>	Δ R <sup>2</sup>
	β	p	β	p	β	p		
Physical functioning	0.27	0.21	-0.31	0.00	0.26	0.01	0.27	0.04
Psychological functioning	0.33	0.09	-0.29	0.00	0.20	0.02	0.38	0.05
Environment	0.13	0.57	-0.17	0.07	0.20	0.04	0.22	0.03
Social dimension	0.42	0.04	-0.28	0.00	0.20	0.03	0.31	0.05
Quality of life	0.36	0.07	-0.30	0.00	0.24	0.01	0.35	0.04
DV	IV (Trc)		Mod (gen)		Interaction		R <sup>2</sup>	Δ R <sup>2</sup>
	β	p	β	p	β	p		
Psychological functioning	0.25	0.22	-0.02	0.75	0.33	0.01	0.37	0.04

\*p < .05, \*\*p < .01

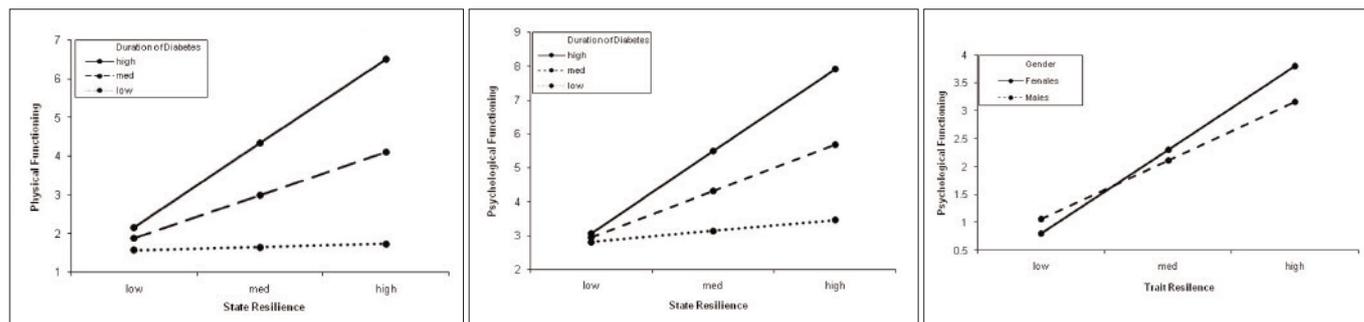


Figure 1a: Moderation by duration of diabetes.

Figure 1b: Moderation by duration of diabetes.

Figure 1c: Moderation by gender.

Each ten thousand increase in family income improved 0.18 of one standard deviation unit of environmental functioning aspect of quality of life. None of the other personal level demographic predicted any aspects of quality of life. In diabetes specific demographic variables, duration of disease significantly negatively predicted all aspects of quality of life except environmental functioning (i.e.,  $\beta$  range = -0.28 to -0.36,  $p < 0.05$ ) whereas current glucose level predicted only physical functioning ( $\beta = -0.13$ ,  $p = 0.04$ ) explaining 16% variance. Each year of increase in duration of disease negatively affected all dimension of quality of life except social dimension whereas one standard deviation unit increase in current glucose level caused a decrease of 0.17 standard deviation units of physical function. Finally, controlling for the effect of all the personal level and disease-specific demographics, state resilience positively predicted only psychological functioning ( $\beta = 0.32$ ,  $p < 0.01$ ). One standard deviation unit increase in state resilience increased 0.28 standard deviation units of psychological functioning. Whereas trait resilience positively predicted all aspects of quality of life ( $\beta$  range = 0.27 to 0.42,  $p < 0.05$ ) explaining an additional 17% variance in physical functioning, 29% in psychological functioning, 17% in environmental functioning, 30% in social dimension, and 29% in overall quality of life. Increase in trait resilience was more decisive i.e., one standard deviation increase in trait resilience caused an increase of 0.30, 0.30, 0.42, 0.40, and 0.41 standard deviation units of physical functioning, psychological functioning, environmental functioning, social dimension, and overall quality of life respectively.

Finally, interaction terms of mean centered variables were generated to investigate moderating effect of all personal level and disease specific demographics on the relationship between resilience and quality of life. The results presented in Table IV suggested that gender moderated only effect of trait resilience ( $\beta$  interaction = 0.33,  $p < 0.01$ ) and explained 4% additional variance whereas duration of diabetes moderated the effect of state resilience on all aspects of quality of life ( $\beta$  interaction range = 0.20 to 0.26,  $p < 0.05$ ) and explained an additional 4% variance in physical functioning, 5% in psychological functioning, 3% in

environmental functioning, 5% in social dimension, and 4% in overall quality of life of diabetes patients. To elaborate these moderations modgraphs were generated. As presented in Figure 1a and 1b, moderation by duration of diabetes had similar pattern of relationship between state resilience and all aspects of quality of life. The graph showed that most chronic patients benefit a maximum from an increase in state resilience to improve all aspects of quality of life. As the duration of disease decreases state resilience appear to have low influence in maintaining quality of life of diabetes patients. In other words, for chronic diabetes patients, improvement in state resilience may incredibly improve their quality of life. Figure 1c illustrates moderating effect of gender for the relationship between trait resilience and psychological functioning aspect of quality of life. As the figure depict, for patients with low levels of trait resilience, male appear to have better psychological functioning whereas for patients with high level of trait resilience male appear to have a decrease in psychological functioning aspect of quality of life compared to female patients.

## DISCUSSION

The core objective of the study was to test relationship between resilience and quality of life in addition to effect of personal level and disease specific factors on both resilience and quality of life. A low yet significantly positive relation appear between family income and environment aspect of quality of life suggesting that increase in income may improve quality of life of diabetes patients yet only the environmental aspect.<sup>18</sup> The sufferer may not only afford better treatment facilities yet also may have access to more accessories of life hence there is a positive relationship between income and environment aspect of diabetes. Though this impact is so small that when looking at overall quality of life, this positive contribution seems meaningless as income does not have a significant relationship with overall quality of life. Age and duration of diabetes appeared to have a positive relation with current glucose levels.

Results indicated a negative relationship between years of formal education and current glucose level, suggesting

that education plays a positive role in diabetes management.<sup>19</sup> Afridi and Khan also suggested that inadequate knowledge is related to poor diabetes management.<sup>20</sup> In other words, more educated people have better control of their blood glucose level and hence better management of their disease.

In confirmation with earlier findings, the study results showed that duration of diabetes has a positive relationship with current glucose level<sup>21</sup> and a negative relationship on psychological functioning aspects of quality of life.<sup>22</sup> These results suggested that chronicity compromises diabetes management which might be due to a decrease in individuals' motivation for compliance to the treatment regime as is indicated by a decrease in physical and psychological functioning aspects of quality of life. Current glucose level appeared to have negative relationship with all aspect of quality of life except social dimension. This might be due to high glucose level of most of our sample. As current glucose level is not a stable factor and hence may not be considered a true representation of long-term diabetes management. These findings should be confirmed using a more stable measure i.e., HbA1C (the gold standard). Finally, the present results confirmed the reciprocity of the relationship between resilience and quality of life. State as well as trait resilience appeared to have significant positive correlations with all aspects of quality of life leaving the researcher clueless for determining a cause and effect relationship.<sup>13</sup>

The reciprocity of relationship between resilience and quality of life was further investigated in hierarchical multiple linear regression analysis while controlling for all personal level and disease specific factors and using both i.e., state and trait resilience as predictor for all aspects of quality of life. The results showed that trait resilience appear to improve all aspect of quality of life,<sup>23</sup> whereas state resilience only contributed in psychological functioning. Theoretically, these results supported the second scenario i.e, better resilience of an individual may lead to improved coping, resulting in better quality of life of the sufferer.<sup>13</sup> The only exception appeared for psychological functioning aspect of quality of life which still suggested reciprocity of the relationship by presetting association with both stable (i.e., trait resilience) and situational (i.e., state resilience). This exception may be rationalized as an outcome of shared feature of both psychological functioning and state resilience as both are sensitive to environment and may vary situation to situation.<sup>24</sup> On the other hand proper counselling may improve both factors by addressing stress caused by regular diabetes management.

A final objective of the study was to investigate moderating effect of personal level and disease specific factors on the relationship between resilience and quality of life.<sup>19</sup> Given that both trait resilience and quality of life

are less flexible we assumed that relationship between trait resilience and quality of life is much stable and may not be influenced with other factors<sup>25</sup> whereas relationship between state resilience and quality of life may differ across different personal level and disease specific factors especially chronicity.<sup>24</sup> The study results presented further evidence regarding our assumption of stability factor determining the causation between resilience and quality of life. Effect of state resilience on all aspects of quality of life appeared to be moderated by duration of diabetes. The results as elucidated in graphs 1a and 1b showed that state resilience improves quality of life of only chronic patients. As the chronicity decreases, the relationship between state resilience and quality of life decreases to an extent that for patients with a diagnosis less than three years, state resilience no more influence quality of life of patients with diabetes. This pattern of relationship appeared for all aspects of quality of life including overall quality of life. These patterns suggest that consistency in state resilience for a longer period of time may improve quality of life, which is according to the rationalization for causation between resilience and quality of life (i.e., resilience predicting quality of life rather than vice versa). No significant moderation for the relationship between trait resilience and quality of life further strengthened our assumption except the only contradiction for the relationship between trait resilience and psychological functioning aspect of quality of life which was moderated by gender.<sup>26</sup> As the Figure 1c depict, for patients with low levels of trait resilience, male appear to have better psychological functioning whereas for patients with high level of trait resilience male appear to have a decrease in psychological functioning aspect of quality of life compared to female patients. The moderation indicated that when trait resilience is low males are enjoying better psychological functioning compare to females whereas when trait resilience is high females are on a more advantageous state compared to their male counterparts. The overall pattern of relationship as presented in Figure 1c between trait resilience and psychological functioning confirmed our assumptions by suggesting a positive linear relationship for both males and females.

## CONCLUSION

The study is helpful in understanding relationship between resilience and quality of life of patients with diabetes. It is suggested that chronic diabetes patients may benefit from intervention addressing state resilience whereas trait resilience has unconditional positive effect on all aspect of quality of life of diabetic patients. Future research shall be on intervention studies investigating effect of different psychological techniques addressing resilience and hence improving quality of life of patients with diabetes.

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