Original Article

Resilience, Pain Self-efficacy and Health-related Quality of Life in Greek Hemodialysis Patients: A Cross-sectional Study

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Abstract

Background: Regardless of the recent advances in Chronic Kidney Disease stage 5 (CKD-5) management people on dialysis face significant changes in their quality of life. The present study aimed to examine the relationship between psychological resilience and quality of life in patients undergoing in-center hemodialysis. **Methods:** An initial sample of 150 adult patients on hemodialysis for more than 6 months was selected from hospitals in a Southern European country. The study used the Connor-Davidson Resilience Scale (CD-RISC), the Pain Self-Efficacy Questionnaire (PSEQ), and the Kidney Disease Quality of Life (KDQOL-36) questionnaires to assess levels of psychological resilience, pain self-efficacy and quality of life. **Results:** The results indicated that higher levels of psychological resilience were associated with higher levels of pain self-efficacy, which in turn led to better quality of life. **Conclusions:** The findings suggest that psychological resilience and pain self-efficacy play important roles in the health-related quality of life of people on hemodialysis, regardless of demographic factors such as age and gender. These have implications for practice in CKD-5 management and highlight the importance of addressing psychological factors in dialysis care.

Keywords: *Chronic Kidney Disease stage 5 (CKD-5), hemodialysis, pain self-efficacy, psychological resilience, quality of life*

Introduction

Despite advances in Chronic Kidney Disease stage 5 (CKD-5) management, people on hemodialysis are obliged to adapt to a new way of life[1] such as four hours therapy, thrice a week, limited fluid intake and diet changes, aiming at improving health status and avoiding life-threatening complications.[2] Furthermore, patients experience pain, discomfort, shortness of breath, dizziness, nausea, itching, weakness and fatigue which negatively affect all areas of their daily life and quality of life. In addition, they face social restrictions, physical difficulties, and decreased sexual mood. Constant fatigue is quite common and has a negative impact on work and leisure, affecting family relationships, friendship, and general enjoyment of life.[3-5] These symptoms contribute to reduced quality of life, suicidal thoughts, and a high risk of non-fulfillment and non-compliance with dialysis.[6]

Resilience, the process of adaptation to adversity, rebound from hardships or significant sources of stress, is considered an adaptive process or personal trait that can be developed.[7] Resilience acts as a protective factor against various effects of a traumatic experience, is considered a component of personality, enhancing individual adaptation and appears to improve stress-related impairments.[8,9] Therefore, resilience, particularly in hemodialysis patients, is considered essential in terms of managing symptoms of depression and anxiety due to the disease thus improving their quality of life.[7,10]

The purpose of the present study was to explore the role of psychological resilience in CKD-5 in-center hemodialysis patients.

Methods

A cross-sectional study in hemodialysis (HD) units in the northern part of a south European country from November 2022 to April 2023 was performed with an initial sample of 150 patients. The main researcher performed a one-to-one semi-structured interview with 112 of them. Participants on HD for more than six months, adults, and

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those speaking/reading the local language were included. Patients with cognitive problems or severe mental disorders were excluded due to difficult communication.

All participants completed the informed consent document, according to the ethical standards of the Helsinki Declaration. Ethical permissions were obtained from the hospitals' scientific committees and the Bioethics Committee of the University. After obtaining permission where necessary, the Kidney Disease Quality of Life Instrument (KDQOL-SF),[11-15] the Connor-Davidson Resilience Scale (CD-RISC),[16,17] and the Pain Self-Efficacy Questionnaire (PSEQ)[18,19] were used.

Statistical Package for Social Science (SPSS) version 26 was utilized to analyze data using Mann–Whitney U or the Kruskal–Wallis test, accordingly. The Bonferroni corrected for multiple comparisons and Spearman's Rho correlation coefficient was also used. To identify independent predictors the linear regression analysis bootstrapping was performed. Durbin–Watson metrics and R, R^2, along with P values were used for the linear models. Statistical significance was defined as a value of $P \leq 0.05$.

For reliability testing, Cronbach's α was used, with CD-RISC reaching 0.873, the PSEQ 0.942, and the total KDQOL scale was also very good at 0.849.

Results

Demographics per questionnaire are presented in Table 1. No statistical difference was evident between genders in any of the scores, while age in groups showed differentiation in scores of CD-RISC ($P = 0.011$) and SF-12 Mental ($P = 0.004$), while borderline in the SF-12 Physical composite of KDQOL ($P = 0.054$) scores. Other demographics such as birthplace, location, family status, and the presence of children did not show statistically significant differences in any scores. Educational groups had significantly different scores for CD-RISC ($P = 0.013$) as well as occupation for both CD-RISC ($P = 0.006$) and SF-12 Mental composite ($P = 0.032$). Income was significant for the SF-12 Physical composite of KDQOL ($P = 0.035$) [Table 2]. No statistical significance was evident for the KSS scale although several were borderline. All other demographic factors were statistically significant with respect to mean CD-RISC, PSEQ, and KDQL SF-12 Physical composite, but not SF-12 Mental composite.

Resilience as per CD-RISC score correlated negatively with age, whereas PSEQ was negatively correlated with income levels. SF-12 Physical composite was weakly correlated negatively with age and income and positively with Education (a higher level of education leads to a higher score). On the contrary, the SF-12 Mental Composite correlated positively with age, presence of children and having a higher-end occupation, and being retired (as per the coding of the factor) [Table 3]. In between scale correlations, resilience (CD-RISC) and pain self-reliance (PSEQ) were positively correlated ($\rho = 0.392$, $P < 0.001$). CD-RISC was also weakly positively correlated with the physical component of the KDQOL ($\rho = 0.217$, $P = 0.021$) and the KSS consolidated score ($\rho = 0.197$, $P = 0.037$), but not the mental component. Pain self-reliance was strongly positively correlated with the physical component of the KDQOL ($\rho = 0.582$, $P < 0.001$), the mental component ($\rho = 0.389$, $P < 0.001$), and the KSS score ($\rho = 0.616$, $P < 0.001$). A positive correlation also existed between the two main components of the KDQOL ($\rho = 0.209$, $P < 0.027$) and very high correlations with the KSS scale [Table 4].

A multivariable regression modeling was performed in order to identify independent factors, such as psychological reliance, that affected pain self-efficacy (CD-RISC) and the symptoms/problems subscale of the KDQOL. A bootstrapped linear regression model for pain self-efficacy PSEQ score ($R = 0.526$, $R^2 = 0.277$, Durbin–Watson 1.685, $P < 0.001$) adjusted for gender, having children, education level, occupation type and salary level, Effects and Burden of Kidney Disease, SF-12 Physical and Mental composites and KSS summary scale showed that age and pain self-efficacy score were independent predictors, with the model predicting up to 27.7% of the variance. The same analysis model for pain self-efficacy score ($R = 0.526$, $R^2 = 0.277$, Durbin–Watson 1.685, $P < 0.001$) adjusted also for the above parameters, showed that age and pain self-efficacy score were independent predictors, with the model predicting up to 27.7% of the variance. Specifically, resilience has a positive effect ($B = 0.561$, $\pm$ 0.087) (95% CIs 0380, 0.741, $P = 0.001$) on pain self-efficacy (PSEQ) [Figure 1a]. In addition Effects and Burden of Kidney Disease, SF-12 Physical and Mental composites, and KSS summary scale were adjusted in the bootstrapped linear regression. A model for the Symptoms/problems list ($R = 0.615$, $R^2 = 0.378$, Durbin–Watson 1.968, $P < 0.001$) showed that the pain self-efficacy score was the sole independent predictor with the model predicting up to 37.8% of the variance. Specifically, pain self-efficacy had a positive effect on minimizing the symptoms ($B = 0.673 \pm 0.116$ (95% CIs 0.453, 0.920, $P = 0.001$) [Figure 1b]. A model for the effects of kidney disease ($R = 0.511$, $R^2 = 0.262$, Durbin–Watson 1.553, $P < 0.001$) showed that pain self-efficacy score was an independent predictor with the model predicting up to 26.2% of the variance, similarly resilience as measured by CD-RISC. Specifically, pain self-efficacy had a positive effect on lowering the effects of kidney disease ($B = 0.368 \pm 0.139$ (95% CIs 0.084, 0.643, $P = 0.014$), similar to resilience ($B = 0.326 \pm 0.145$ (95% CIs 0.001, 0.615, $P = 0.036$) [Figure 1c]. A model for the Burden of Kidney Disease ($R = 0.485$, $R^2 = 0.235$, Durbin–Watson 1.924, $P < 0.001$) showed that pain self-efficacy score was the sole independent predictor, with the model predicting up to 23.5% of the variance. Specifically, pain self-efficacy

Table 1: Sample distribution (%) and mean CD RISC, PSEQ and KDQOL SF-12 scores

	Demographics	*n*	*n* %	CD-RISC	PSEQ	SF-12 Physical Composite	SF-12 Mental Composite	KSS scale
				Mean	Mean	Mean	Mean	Mean
Gender	*P*			0.556	0.421	0.222	0.462	0.071
	M	82	73.21%	65	40	42.99	49.88	53.54
	F	30	26.79%	66	39	39.79	48.69	49.85
Age groups	*P*			0.011	0.619	0.054	0.004	0.073
	≤40 yrs old	12	10.71%	74	37	42.84	39.52	45.98
	40–69 yrs old	59	52.68%	65	41	44.37	50.52	54.34
	≤70 yrs old	41	36.61%	63	39	38.7	51.12	51.9
Birthplace	*P*			0.284	0.45	0.817	0.462	0.442
	Rural	50	44.64%	64	41	42.88	49.14	52.82
	Suburbs	14	12.50%	67	35	40.48	46.13	47.99
	Urban	48	42.86%	67	40	41.83	51	53.6
Residence	*P*			0.775	0.8	0.578	0.934	0.851
	Rural	38	33.93%	64	41	43.78	49.48	53.47
	Suburbs	12	10.71%	68	37	40.28	47.01	49.48
	Urban	62	55.36%	66	40	41.48	50.1	52.58
Family status	*P*			0.161	0.93	0.264	0.208	0.549
	Single	30	26.79%	66	41	45.15	47.53	52.82
	Married	45	40.18%	63	40	42.01	51.43	54.46
	Widowed	23	20.54%	68	39	37.27	50.04	49.58
	Divorced	4	3.57%	58	39	42.92	50.44	50.32
	Separated	3	2.68%	79	44	47.35	54.62	58.25
	In relationship	7	6.25%	71	35	43.3	41.99	47.73
Children	*P*			0.284	0.923	0.484	0.013	0.328
	No	26	23.21%	68	40	43.89	45.31	50.54
	Yes	86	76.79%	65	40	41.6	50.84	53.16
Education	*P*			0.013	0.766	0.872	0.33	0.565
	Primary	40	35.71%	62	40	42.23	51.41	52.07
	Secondary	45	40.18%	65	40	42.24	49.41	54
	Higher	9	8.04%	74	37	39.72	44.56	52.36
	MSc	5	4.46%	68	41	45.47	45.75	47
	PhD	0	0.00%	.	.	.	.	53.88
	No education	13	11.61%	72	43	41.84	49.31	.
Occupation	*P*			0.006	0.576	0.452	0.032	0.122
	Laborer	11	9.82%	73	40	38.15	46.21	47.25
	Tradesman	4	3.57%	69	37	46.28	48.88	55.78
	Self-Employed	7	6.25%	65	41	44.8	43.93	50.32
	Office worker	3	2.68%	82	33	35.57	35.83	39.59
	Senior staff	3	2.68%	72	24	35.14	39.46	40.51
	Retired	75	66.96%	62	40	42.23	51.79	54.22
	Homemaker	2	1.79%	76	47	54.33	46.14	58.07
	Student	4	3.57%	74	46	46.59	43.35	48.41
	None due to health problems	3	2.68%	77	47	41.99	54.5	57.93
Salary	*P*			0.076	0.14	0.035	0.155	0.054
	None	4	3.57%	81	46	35.1	55.85	54.12
	Low	68	60.71%	64	42	44.05	50.36	54.27
	Medium	40	35.71%	67	36	39.57	47.57	49.47
	High	0	0.00%	.	.	.	.	.

CD-RISC: Connor–Davidson Resilience Scale, PSEQ: Pain Self-Efficacy Questionnaire KDQOL: Kidney Disease Quality of Life. KSS: KDQOL-SF Summary Score Scale, and †Bonferonni correction

had a positive effect on minimizing the Burden of Kidney Disease (B = 0.506 ± 0.184 (95% CIs 0.166, 0.876, P = 0.008) [Figure 1d].

The model for SF-12 Physical composite (R = 0.639, R^2 = 0.408, Durbin–Watson 1.955, P < 0.001) showed that pain self-efficacy score was a positive independent

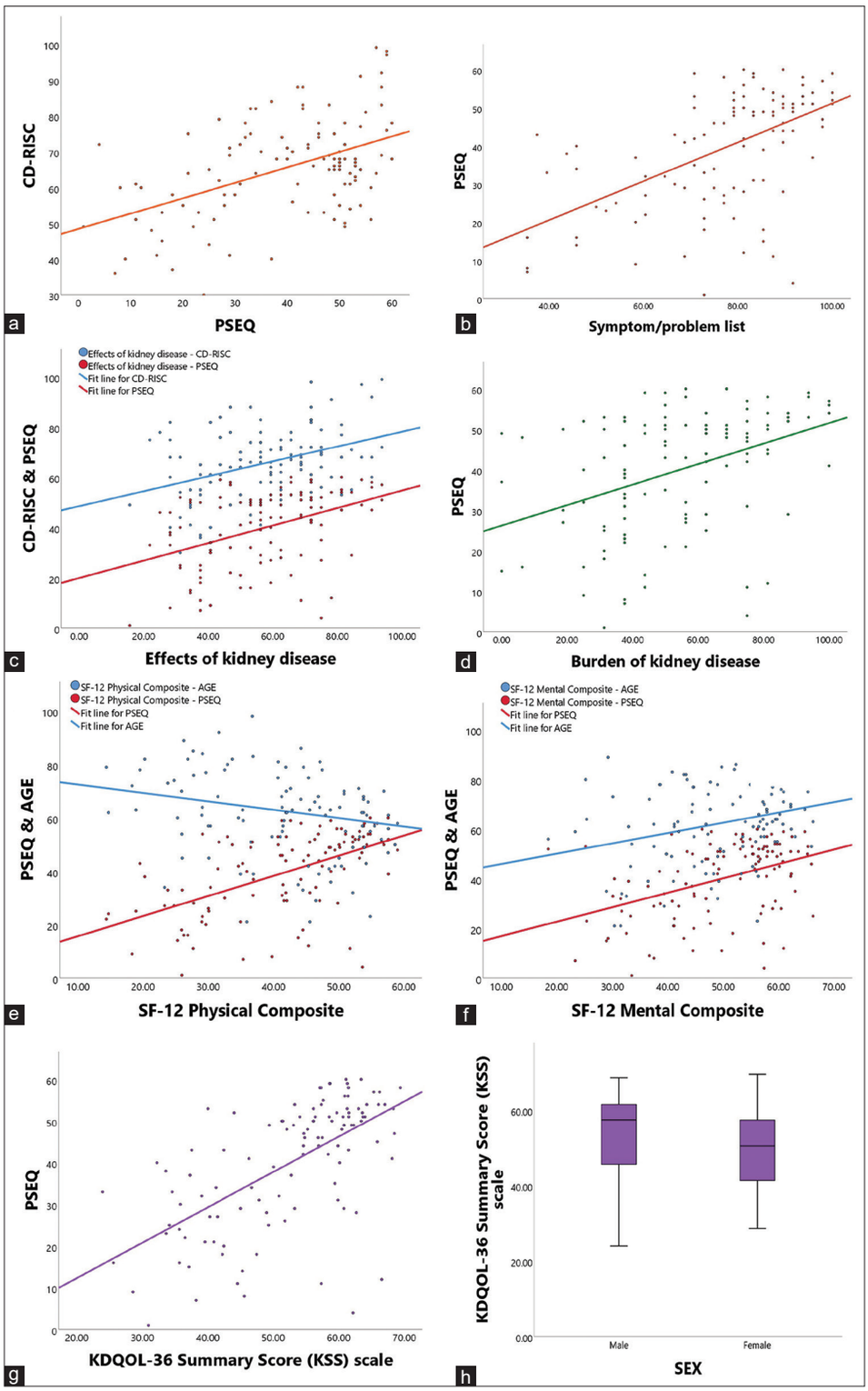

Figure 1: Bootstrapped linear regression. Scatter plots of a) PSEQ with CD-RISC with regression line. b) Symptoms/problems list with PSEQ with regression line. c) Effect of kidney disease with PSEQ and CD-RISC with regression lines. d) Burden of kidney disease with PSEQ with regression lines. e) SF-12 Physical composite disease with PSEQ and Age with regression lines. f) SF-12 Mental composite disease with PSEQ and Age with regression lines. g) KSS Scale with PSEQ with regression line. h) Box plot of KSS score distribution according to gender. CD-RISC: Connor–Davidson Resilience Scale, PSEQ: Pain Self-Efficacy Questionnaire KDQOL: Kidney Disease Quality of Life, and KSS: KDQOL-SF Summary Score Scale

predictor while age was a negative one, with the model predicting up to 40.8% of the variance. In more detail, pain self-efficacy had a positive effect on physical aspects of the quality of life of dialysis patients ($B = 0.444 \pm 0.079$ (95%

CIs 0.290, 0.602, $P = 0.001$), while age had a negative one ($B = -0.253 \pm 0.076$ (95% CIs −0.410, −0.105, $P = 0.001$) [Figure 1e]. In addition, the regression model for SF-12 Mental composite ($R = 0.545$, $R^2 = 0.297$, Durbin–Watson 1.834, $P < 0.001$) showed that pain self-efficacy score was a positive independent predictor as was age, with the model predicting up to 29.7% of the variance. In other words, pain self-efficacy had a positive effect on physical aspects of the quality of life of dialysis patients ($B = 0.234 \pm 0.078$ (95% CIs 0.081, 0.378, $P = 0.029$), while age was also positive ($B = 0.203 \pm 0.003$ (95% CIs 0.026, 0.388, $P = 0.029$) [Figure 1f].

Finally, the regression model for the KSS scale ($R = 0.654$, $R^2 = 0.427$, Durbin–Watson 1.896, $P < 0.001$) showed that pain self-efficacy score was a positive independent predictor while being a female was a negative one, with the model predicting up to 42.7% of the variance. In more detail, gender was a negative independent factor thus being a female lowered the score of the KSS scale significantly ($B = -3.445 \pm 1.623$ (95% CIs −6.514, −0.139, $P = 0.043$). Pain self-efficacy on the other hand had a positive effect ($B = 0.424 \pm 0.079$ (95% CIs 0.272, 0.579, $P = 0.001$) albeit lower [Figure 1g and h, respectively].

Table 2: KDQOL-SF Scales

Scale (number of items in scale)	Mean	Median	SD	*n*
Symptom/problem list (12)	77.94	81.25	16.17	112
Effects of kidney disease (8)	57.48	59.38	18.04	112
Burden of kidney disease (4)	54.07	56.25	23.87	112
Work status (2)	87.95	100.00	21.48	112
Cognitive function (3)	87.56	93.33	16.22	112
Quality of social interaction (3)	79.40	80.00	17.80	112
Sexual function (2)	14.08	0.00	19.97	87
Sleep (4)	34.06	32.50	15.67	112
Social support (2)	61.46	66.67	10.01	112
Dialysis staff encouragement (2)	93.19	100.00	11.61	112
Overall health (1)	63.57	70.00	10.12	112
Patient satisfaction (1)	5.80	0.00	10.18	112
Physical functioning 10)	59.24	65.00	30.23	112
Role limitations--physical (4)	56.92	75.00	45.79	112
Pain (2)	73.37	90.00	31.19	112
General health (5)	41.92	40.00	21.55	112
Emotional well-being (5)	66.75	68.00	20.10	112
Role limitations--emotional (3)	76.49	100.00	36.80	112
Social function (2)	75.78	87.50	28.88	112
Energy/fatigue (4)	57.28	60.00	27.16	112
SF-12 Physical Health Composite	42.13	44.35	11.35	112
SF-12 Mental Health Composite	49.56	52.18	10.92	112
KDQOL-SF Summary Score (KSS) scale	52.55	56.11	10.97	112

Discussion

Patients with CKD-5 need to be on Renal Replacement Therapy (RRT) with hemodialysis or peritoneal dialysis until they undergo a kidney transplant. RRT has a positive effect on the patients' health due to the improvement of biological parameters which affect their health-related quality of life.[20,21] It is well documented that during hemodialysis or peritoneal dialysis, physical, psychological, and health outcomes are adversely affected, such as social and spiritual aspects of quality of life due to the disease itself, the accompanying symptoms and the new lifestyle patients have to adopt upon initiation of RRT.[20,21]

The present study tried to explore whether psychological resilience is related to pain self-efficacy and to

Table 3: Significant scale correlation with demographics

	Spearman's rho	CD-RISC	PSEQ	SF-12 Physical Composite	SF-12 Mental Composite	KSS Scale
Gender	ρ					
	P					
Age	ρ	-0.271**		−0.232*	0.260**	
	P				0.006	
Family status	ρ					
	P					
Children	ρ				0.236*	
	P				0.012	
Education	ρ					
	P					
Occupation	ρ				0.223*	0.212*
	P				0.018	0.025
Salary	ρ		−0.187*	-0.191*		-0.225*
	P		0.049	0.044		0.017
CD-RISC	ρ		0.392**	0.217*		0.197*
	P		<0.001	0.021		0.037
PSEQ	ρ	0.392**	1.000	0.582**	0.389**	0.616**
	P	<0.001	.	<0.001	<0.001	<0.001

CD-RISC: Connor–Davidson Resilience Scale, PSEQ: Pain Self-Efficacy Questionnaire KDQOL: Kidney Disease Quality of Life, and KSS: KDQOL-SF Summary Score Scale. ** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed)

Table 4: Correlation with other scales

	Spearman's rho	CD-RISC	PSEQ	SF-12 Physical Composite	SF-12 Mental Composite
CD-RISC	ρ	1.000	0.392**	0.217*	
	P	.	0.000	0.021	
PSEQ	ρ	0.392**	1.000	0.582**	0.389**
	P	<0.001	.	<0.001	<0.001
SF-12 Physical Composite	ρ	0.217*	0.582**	1.000	0.209*
	P	0.021	<0.001	.	0.027
SF-12 Mental Composite	ρ		0.389**	0.209*	1.000
	P		<0.001	0.027	.
KDQOL-36 Summary Score (KSS) scale	ρ	0.197*	0.616**	0.747**	0.702**
	P	0.037	<0.001	<0.001	<0.001

CD-RISC: Connor–Davidson Resilience Scale, PSEQ: Pain Self-Efficacy Questionnaire KDQOL: Kidney Disease Quality of Life, and KSS: KDQOL-SF Summary Score Scale. **Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2-tailed)

hemodialysis patients' health-related quality of life. Of the 112 participants, 73.2% were male with a mean age of 63.41 years old compared to 59.86 years for females. The sample's mean age was lower than in other European studies[22-25] and closer to USA norms[26,27] rather than Chinese.[28,29]

No gender difference was evident in any of the scores, while age in groups showed differentiation in CD-RISC ($P = 0.011$) and SF-12 Mental composite ($P = 0.004$), and borderline in the SF-12 Physical composite of KDQOL ($P = 0.054$) scores. Other demographic parameters were not significant, except educational level (CD-RISC, $P = 0.013$), occupation (CD-RISC, $P = 0.006$), SF-12 Mental composite ($P = 0.032$), and income (SF-12 Physical composite of KDQOL, $P = 0.035$). The KSS scale did not differentiate in any of the demographical groupings although several were borderline (gender, age, and income).

CD-RISC scores followed closely the Greek results in the CD-RISC validation study[17] with the same negative correlation with age, but not with education. This could be attributed to the fact that our research population was mostly primary and secondary education graduates. Their patient subset had a lower resilience score than the healthy volunteers. No gender score differentiation was evident in our study in contrast to previous results[17] due probably to the gender-biased sample we had. The mean scores for PSEQ were in agreement with the findings of previous studies.[4,30,31] The KDQOL subscale results were in line with the Greek results[14] and were consistent with those of other studies in the USA.[32] Regression analysis showed that psychological resilience as measured by the CD-RISC scale was an independent factor that affected pain self-efficacy positively, i.e., higher resilience led to higher pain self-efficacy, in agreement with other studies on resilience and chronic pain.[33,34]

Regression models of different aspects of the health-related quality of life as measured in the subscales of KDQOL were assessed and found that for Symptoms/problems and Burden of Kidney Disease the pain self-efficacy score was the sole independent predictor with the model predicting up to 37.8% and 23.5% of the variance, respectively. In other words, pain self-efficacy had a positive effect on minimizing the symptoms and burden of CKD. While, effects of CKD pain self-efficacy and resilience were positive independent predictors, with the model predicting up to 26.2% of the variance. For SF-12 Physical composite pain self-efficacy score was a positive independent predictor while age was a negative one, with the model predicting up to 40.8% of the variance. On the contrary, for SF-12 Mental composite age was also a positive independent predictor together with pain self-efficacy with the model predicting up to 29.7% of the variance. Finally, the regression model for the KSS scale showed that pain self-efficacy score was a positive independent predictor while being a female was a negative one, with the model predicting up to 42.7% of the variance. These results were in line with the current understanding of the effect of resilience in CKD-5[1,9,10,25] and pain self-efficacy.[4,30,31]

Resilience was not more important as an independent predictor than pain self-efficacy for KDQOL scores. Taking into account the results indicating a predictive role for resilience in pain self-efficacy, a more pain-focused resilience might be of interest to explore as a better predictor for CKD-5 patients[35,36] especially researching genetic neurobiological predisposition as well.[37,38]

The present study had some limitations, such as the sample size. A major strength of the study was that despite the use of self-reporting scales the responses were all collected on one-to-one interviews with a single researcher, negating missing and incomplete answers, misunderstandings, etc. that would lower the quality of the findings.

Conclusions

In conclusion, it was found that higher psychological resilience led to higher pain self-efficacy and both could lead to higher health-related quality of life in hemodialysis

patients, with limited input of demographical parameters such as age and female gender. The finalized results could help clarify the role of psychological resilience and pain self-efficacy in people on hemodialysis.

Author contributions

MT: Data collection and analysis, manuscript drafting, TK: Study conception and design, DP and MK: study supervision. The manuscript has been read and approved by all the authors, the requirements for authorship as stated earlier in this document have been met, and each author believes that the manuscript represents honest work.

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Ethical Considerations

Nil.

Code of Ethics

In compliance with University and Hospital Bioethics guidelines.

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Conflicts of interest

There are no conflicts of interest.

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