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Perceived Social Support and Psychological Well-Being in Patients with Chronic Diseases

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ABSTRACT

Objective: In the literature reported that perceived social support may have a positive impact on psychological well-being of patients with chronic diseases. However, a brief review of the literature also shows that the number of studies on the relationship between perceived social support and psychological well-being in patients with chronic diseases is limited. This study aims to determine the relationship between perceived social support and psychological well-being in patients with chronic diseases. **Materials and Methods**: This descriptive and correlational study was conducted on 203 inpatients with at least one chronic disease, who received treatment at a community health center between November 2020 and May 2021 in İstanbul. **Results:** Psychological well-being of the participants was positively correlated with perceived social support. Duration of chronic disease and age of participants were negatively correlated with perceived social support and psychological well-being. Simple linear regression model that analyzed the effects of perceived social support on psychological well-being of the participants was statistically significant ($p<0.001$) and showed that perceived social support explained about 18% of the change in the psychological well-being of participants with chronic diseases (straight, $R^2 = 0.175$). The determination coefficient of the model was 0.161. A positive correlation was determined between MSPSS and FS scores. **Conclusions:** The findings implied that perceived social supported improved psychological well-being of patients with chronic diseases. Therefore, health professionals, primarily the nurses, may evaluate the levels of perceived social support and psychological well-being of patients with chronic diseases and incorporate spiritual care interventions and social support systems into nursing care plans.

Keywords: Chronic Disease, Social Support, Psychology, Health, Care, Nursing Care.

Kronik Hastalığı Olan Bireylerin Algıladıkları Sosyal Destek ve Psikolojik İyi Oluş Düzeylerinin Belirlenmesi

ÖZ

Amaç: Bu çalışmanın amacı kronik hastalığı olan hastalarda algılanan sosyal destek ile psikolojik iyi oluş arasındaki ilişkiyi belirlemektir. **Gereç ve Yöntem:** Tanımlayıcı ve korelasyonel tipteki bu çalışma, Kasım 2020-Mayıs 2021 tarihleri arasında İstanbul'da bulunan bir toplum sağlığı merkezinde en az bir kronik hastalığı olan 203 hasta üzerinde yürütüldü. **Bulgular:** Katılımcıların psikolojik iyi oluşluk durumları ile algılanan sosyal destek düzeyleri arasında pozitif yönlü anlamlı bir ilişki vardı. Kronik hastalık süresi ve katılımcıların yaşı, algılanan sosyal destek ve psikolojik iyi oluşluk ile negatif ilişkiliydi. Algılanan sosyal desteğin katılımcıların psikolojik iyi oluşluk üzerindeki etkilerini analiz eden basit doğrusal regresyon modeli istatistiksel olarak anlamlıydı ($p<0.001$) ve algılanan sosyal desteğin kronik hastalığı olan katılımcıların psikolojik iyi olma halindeki değişimin yaklaşık %18'ini açıkladığını gösterdi (straight, $R^2=0.175$). Modelin belirleme katsayısı 0.161'dir. MSPSS ve FS puanları arasında istatistiksel olarak anlamlı pozitif yönlü bir ilişki belirlendi. **Sonuç:** Bu çalışmanın sonuçları algılanan sosyal desteğin kronik hastalığı olan hastaların psikolojik iyi oluşluğu iyileştirdiğini göstermektedir. Bu nedenle, başta hemşireler olmak üzere sağlık profesyonelleri, kronik hastalığı olan hastaların algılanan sosyal destek ve psikolojik iyi oluşluk düzeylerini değerlendirebilir ve hemşirelik bakım planlarına manevi bakım müdahalelerini ve sosyal destek sistemlerini dahil edebilirler.

Anahtar Kelimeler: Kronik Hastalık, Sosyal Destek, Psikoloji, Sağlık, Bakım, Hemşirelik Bakımı.

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INTRODUCTION

World Health Organization (WHO) defines chronic diseases as "conditions that last one year or more and require ongoing attention or limit activities of daily living or both" (WHO, 2017). These health problems may not only cause mortality or morbidity but also have negative social, psychological and economic effects on daily life of patients. Despite the variance in their causes, all chronic diseases require long-term healthcare and follow-up (Richardson et al., 2019). Dependence on continuous care and monitoring restricts the autonomy of patients with chronic disease. Patients may suffer from various problems, including, depression, adaptation, social interaction and economic problems, sleep disorder, decrease in physical power, unemployment, sexual dysfunction, social isolation and the stress caused by fluid intake. These problems may have negative impacts on treatment adherence, and consequently, on the quality of life (Dai et al., 2019; Maresova et al., 2019).

Social support refers to the attachment of an individual to a social source that provides care and protection and the satisfaction with the help provided. It is a positive factor for the adaptation of the patient to chronic diseases. Studies reported that social support had positive impacts on personal health, adaptation and the ability to cope with stress (Karataş & Bostanoğlu, 2017; Wang et al., 2018). Family members, health professionals, friends and neighbors are the primary sources of social support for patients with chronic diseases (Ocsovszky et al., 2020). The study of Xiao et al., (2017) reported that the increase in perceived social support was associated with higher life satisfaction and lower depression and burden of disease. Similarly, Von Cheong et al. (2017) found that family support reduced the level of depression and protected patients from depression. Additionally, people with high levels of social support had lower psychological problems and traumatic stress (Liu et al., 2017).

Social support is a key factor that improves the quality of life. Existing studies reported that social support was negatively associated with depression and stress and positively with life satisfaction and well-being (Bryson & Bogart 2020). People as social beings need social support and feel happy and satisfied when this need is met. Forming close relationship and relying on these relations help the people to adapt to the social network and increase their psychological well-being, life satisfaction and happiness (Harasemiw et al., 2019).

As one of the most important factors influencing psychological well-being and social support perception, the concept of spirituality is associated with establishing a link with God, searching for the meaning and aim of life, praying, medication, non-physical way of healing, inner peace or well-being (Borges et al., 2021). Spirituality and spiritual interventions are closely related with the values, practices of philosophies that have impacts on feelings and behaviors of the patients. Consequently, personal spirituality may influence adaptation, stress, losses and coping skills of the patients. Spirituality may also influence the decisions of patients on health behaviors and services (Borges et al., 2021). Spiritual and religious values may contribute to the meaning about life and well-being. Existing studies reported a positive relationship between spirituality, religiosity and psychological well-being (Borges et al., 2021; Vitorino et al., 2018).

The findings in the literature reported that perceived social support may have a positive impact on psychological well-being of patients with chronic diseases. However, a brief review of the literature also shows that the number of studies on the relationship between perceived social support and psychological well-being in patients with chronic diseases is limited. Due to this reason, we believe that the findings of our study on the relationship between these two variables may contribute to the literature. This study aims to determine the relationship between perceived social support and psychological well-being in patients with chronic diseases.

MATERIALS AND METHODS

Study type

This study aimed to analyze the relationship between perceived social support and psychological well-being in patients with chronic diseases.

Study sample and setting

This descriptive and correlational study was conducted on 203 inpatients with at least one chronic disease, who received treatment at a community health center between November 2020 and May 2021 in İstanbul, Turkey. Sample size was calculated using Cochran formula for unknown population. The minimum sample was calculated at 157 people for p=0.50 and q=0.50, with 5% error (d=0.05) in the confidence interval range of 95% (α=0.05) (Cochran 1997). The study included all inpatients above the age of 18 years, who received treatment during the period of study, agreed to participate, could communicate and were diagnosed with at least one chronic disease at least six months before the research. Patients that could not communicate or had mental disorders were excluded from the study. 31 patients that did not meet the inclusion criteria and 12 participants that did not agree to participate were excluded from the study. The study was finalized with 203 inpatients diagnosed with at least one chronic disease. Response and refusal rate were 94.4% and 5.6%, respectively.

Data collection

Descriptive characteristics form, multidimensional scale of perceived social support (MSPSS) and flourishing scale (FS) were used for data collection. MSPSS and FS were used in this study as the most appropriate, valid and reliable measurement tools for the sample since these scales had clear and subjective concise statements. Patients were informed about the aim and scope of the research and were asked to

complete the data collection tools after receiving their informed consent. Data were collected by face-to-face interviews in approximately 20 minutes.

Descriptive Characteristics Form: This form was developed by the researchers by using the relevant studies in the literature (Ekşi & Kardaş 2017). The form included 15 questions on sociodemographic (age, gender, education, income and marital status) and clinical characteristics (chronic diseases, treatment process, medication, treatment adherence).

Multidimensional Scale of Perceived Social Support (MSPSS): MSPSS was developed by Zimet et al. (1988) to measure the social support perceived by individuals in the USA. It was comprised of 12 items, which covered three dimensions, namely family (4 items), friends (4 items) and significant others (4 items). Each item was scored on a 7-point Likert scale, ranging from 1 (very strongly disagree) to 7 (very strongly agree). Possible scored ranged between 12 and 84, with higher scores indicating higher perceived social support. Reliability and validity of the local version of MSPSS was tested by Doğan et al. (2001). Cronbach's alpha of the reliability and validity of the Turkish version of MSPSS and our study were 0.86 and 0.99, respectively.

Flourishing scale (FS): FS was developed by Diener et al. (2010) to evaluate subjective well-being. Psychometric features of the local version of the scale were studied by Telef (2013). FS was composed of 8 items that were scored on a 7-point Likert scale, ranging from 1 (strong disagreement) to 7 (strong agreement). Possible scores ranged between 8 and 56, with higher scores indicating that the respondents view themselves positively. Cronbach's alpha of the Turkish version of FS and our study were 0.80 and 0.98, respectively.

Statistical analysis

Collected data were analyzed by SPSS 26.0 statistical software. Mean, standard deviation, median, frequency, percentage and minimum-maximum values were used for descriptive analysis. Distribution of data was analyzed by Shapiro-Wilk test. For the quantitative variables that did not meet normal distribution, Mann-Whitney U test was used to compare two groups whereas Kruskal-Wallis test was used to compare three or more groups. Relationship between quantitative variables was analyzed by Spearman's correlation. Statistical significance was set at $p<0.01$ and $p<0.05$.

Ethical consideration

Permission was obtained from the Istanbul Sabahattin Zaim University Ethics Committee (Number; 2020/10). Participants were informed about the aim of the study and told that they were free to withdraw from the study at any stage without any explanation. Informed consent of the participants was obtained. The study was conducted in accordance with the Declaration of Helsinki.

RESULTS

Table 1 showed the sociodemographic and clinical characteristics. Mean age of the participants was 60.17±20.44 years, 65% were female, 87.2% were married, 24.1% were literate, 49.3% earned moderate income and 87.7% did not smoke. Primary diseases of the participants were diabetes (32.5%), hypertension (23.2%), heart failure (19.7%), chronic obstructive lung disease (14.3%) and rheumatic and musculoskeletal diseases (3.4%), respectively. 5.5% of the participants had 1 chronic disease. 95.1% of the participants adhered to medication regimen and 94.1% adhered to follow-up appointments.

Table 2 presented the findings on the comparison of mean MSPSS and FS scores according to some of the sociodemographic and clinical characteristics. Mean FS scores of the females, university graduates and the participants with high perceived income level were statistically significantly higher ($p<0.05$). Besides, mean MSPSS and FS scores were statistically significantly higher for the participants, who worked, adhered to follow-up appointments and could meet their daily needs independently ($p<0.05$). We did not find any statistically significant relationship between marital status, medication adherence and mean MSPSS and FS scores ($p>0.05$).

Table 3 presented the mean scores obtained from the FS, MSPSS and the subscales of MSPSS. Mean FS and MSPSS scores were 41.03±13.34 and 74.91±13.46, respectively. Mean scores obtained from the family, friends and significant other subscales of the MSPSS were 24.98±4.57, 25.02±4.56, and 24.91±4.52, respectively. These scores indicated that psychological well-being and perceived social support levels of the participants were higher than the average.

Analysis of the relationship between the MSPSS and FS scores revealed a positive and statistically significant relation ($r=0.346$, $p<0.001$). The finding indicated that psychological well-being of the participants increased parallel to the increase in perceived social support. Besides, there was a negative and statistically significant relationship between age, duration of chronic disease and the mean MSPSS and FS scores, indicating that the psychological well-being and perceived social support decreased as the age of the participants and duration of chronic disease increased (Table 4).

Table 5 presented the findings of the simple linear regression model that analyzed the effects of perceived social support on psychological well-being. The model was statistically significant ($p<0.001$) and showed that perceived social support explained about 18% of the change in psychological well-being of participants with chronic diseases (straight, $R^2=0.175$). The determination coefficient of the model was calculated at 0.161. The increase in the MSPSS score correlated to an increase in the FS score (Table 5).

Table 1. Sociodemographic and clinical characteristics (n=203).

Characteristics	Min.	Max.
Age (60.17±20.44)	22	79
	n	**%**
Gender		
Female	132	65.0
Male	71	35.0
Marital status		
Married	177	87.2
Single	26	12.8
Perceived income levels		
Very high	7	3.4
High	70	34.5
Moderate	100	49.3
Low	25	12.3
Very low	1	0.5
Education Status		
Illiterate	19	9.4
Literate	49	24.1
Primary school	22	10.8
Secondary school	22	10.8
High school	46	22.7
University and above	45	22.2
Primary chronic disease		
Heart failure	40	19.7
Hypertension	47	23.2
Diabetes	66	32.5
Chronic obstructive lung disease	29	14.3
Rheumatic and musculoskeletal diseases	7	3.4
Liver failure	4	2.0
Cancer	2	1.0
Allergy and immune system disorders	4	2.0
Thyroid function disorders	2	1.0
Kidney diseases	2	1.0
Secondary chronic disease		
Yes	12	5.5
No	191	94.5
Duration of chronic disease		
10 years or below	118	58.1
More than 10 years	85	41.9
Medication adherence		
Yes	193	95.1
No	10	4.9
Smoking behavior		
Yes	25	12.3
No	178	87.7
Follow-up adherence		
Yes	191	94.1
No	12	5.9
Number of hospitalizations per year		
Less than 2 times	194	95.6
2 times or more	9	4.4
Can meet daily needs independently		
Yes	136	67.0
No	6	3.0
Partially	61	30.0

Table 2. Comparison of MSPSS and FS scores according to some of the sociodemographic and clinical characteristics (n=203).

Characteristics	MSPSS	FS
	Mean±SD	Mean±SD
Gender		
Female	76.15±11.12	42.42±12.87
Male	72.45±17.26	37.97±14.03
Test value	Z=0.798	Z=4.559
p	0.372	**0.033***
Marital status		
Married	75.53±12.36	41.17±13.26
Single	70.69±19.16	40.08±14.07
Test value	Z= 1.479	Z=0.098
p	0.224	0.755
Education Status		
Illiterate	78.00±7.36	37.63±15.34
Literate	74.63±12.65	37.59±13.30
Primary school	72.95±14.16	40.73±13.59
Secondary school	70.23±18.19	39.45±12.98
High school	74.13±13.23	41.11±12.49
University and above	77.93±13.24	47.04±11.96
Test value	KW=10.232	KW=15.292
p	0.069	**0.009****
Currently working		
Yes	76.17±15.10	44.81±12.62
No	74.47±12.87	39.73±13.37
Test value	Z=3.946	Z=5.976
P value	**0.047***	**0.014***
Perceived income		
Very high	70.43±16.54	48.71±15.53
High	74.89±14.57	44.69±11.61
Moderate	76.09±11.20	41.56±13.23
Low	71.12±17.28	29.12±11.70
Very low	84.05±11.02	46.02±10.46
Test value	KW=3.486	KW=23.595
p	0.480	**0.001****
Secondary chronic disease		
Yes	63.91±22.64	40.36±10.61
No	75.57±12.61	40.99±13.55
Test value	Z=4.916	Z=0.367
P value	**0.027***	0.545
Medication adherence		
Yes	75.08±13.36	41.52±13.06
No	69.14±18.84	36.00±18.08
Test value	Z=1.025	Z=0.681
p	0.311	0.409
Follow-up adherence		
Yes	75.34±13.27	41.58±13.10
No	66.82±15.72	29.45±13.06
Test value	Z= 5.394	Z= 6.898
p	**0.020***	**0.009****
Can meet daily needs independently		
Yes	77.55±10.11	43.24±12.58
No	74.33±8.98	25.00±9.17
Partially	69.07±17.96	37.67±13.7
Test value	KW=16.296	KW=15.937
p	**0.001****	**0.001****

*p<0.05, **p<0.01 **Z**=Mann-Whitney U Test, **KW**=Kruskal-Wallis Test, **SD**=Standard deviation.

Table 3. Mean scores obtained from FS, MSPSS and its subscales (n=203).

	Mean±SD	Min-Max (Median)
FS	41.03±13.34	8-56 (45)
MSPSS	74.91±13.46	12-84 (82)
Family	24.98±4.57	4-28 (28)
Friends	25.02±4.56	4-28 (28)
Significant other	24.91±4.52	4-28 (26)

Table 4. Correlation analysis (n=203).

		1	2	3	4	5	6
Age	**r**	1					
	p	.					
Duration of chronic disease	**r**	0.445**	1				
	p	0.000	.				
FS Total Scores	**r**	-0.163*	-0.074	1			
	p	0.020	0.323	.			
Family subscale	**r**	-0.184**	-0.192**	0.351**	1.000		
	p	0.008	0.010	0.000	.		
Friends subscale	**r**	-0.187**	-0.170*	0.359**	0.980**	1	
	p	0.008	0.022	0.000	0.000	.	
Significant other subscale	**r**	-0.192**	-0.166*	0.329**	0.922**	0.930**	1
	p	0.006	0.025	0.000	0.000	0.000	.
MSPSS Total Scores	**r**	-0.172*	-0.171*	0.346**	0.976**	0.973**	0.964**
	p	0.014	0.021	0.000	0.000	0.000	0.000

Spearman's *p<0.05 **p<0.01

Table 5. Effects of perceived social support on psychological well-being (n=203).

					95.0% Confidence interval	
					Lower bound	Upper bound
	Beta	Standard error	t	p		
Intercept (Bo)	14.830	6.544	2.468	0.014	2.412	21.578
Perceived social support	0.394	0.064	6.071	<0.0001	0.261	0.514

FS total score (the dependent variable)
R^2=0.175, p<0.001, Adjusted R^2=0.161, Durbin-Watson=1.56 (1.5-2.5)

DISCUSSION

This study was carried out to determine the relationship between perceived social support and psychological well-being in patients with chronic diseases. Chronic diseases are progressive conditions that may result with functional loss, rehospitalization and consequent socioeconomic burden. The process of coping with chronic diseases is hard to manage for the patients and healthcare providers. Adaptation to the disease is crucial for the effective management of the problems that may occur during the process. Adaptation is influenced by not only emotional physical and psychological well-being of the patients but also perceived social support. Our study found a positive relationship between perceived social support and psychological well-being of patients with chronic diseases.

Similar to the findings of the previous study, perceived social support levels of our participants was relatively high (Fernández-Peña et al., 2020). The study of Fernández-Peña et al. (2020) on the relationship between satisfaction and social support in patients with chronic pain also found that the level of perceived social support was high. Encouraging patients to increase their social interactions and helping them develop strategies to cope with problems in daily life ensures high perceived social support.

Parallel to the studies in the literature, psychological well-being of the participants in our study was high (Aşiret & Okatan, 2019; Kütmeç Yilmaz & Kara, 2020). Social factors, such as religiosity and spirituality, have been considered as relevant factors to influence health and treatment and to explain health behaviors (Ransome, 2020). Psychological well-being is defined as a concept that analyzes the relationship between the individual, his/her social environment and the God. Chronic diseases, such as cancer, heart diseases and multiple sclerosis, result

with significant psychological changes and show the importance of the need to cope with spiritual distress caused by the disease the risk of death. Empowering spirituality may increase hope and treatment adherence, which, in turn, may contribute to psychological well-being. Religion may have important contributions to spiritual well-being of patients, when it meets their demands to find the meaning of life and when the patients are satisfied and happy to live in accordance to religious values (Kütmeç Yilmaz & Kara, 2020). From this perspective, high levels of psychological well-being in our study may be explained with reference of the fact that the participants were all Muslim, who considered the chronic disease as a part of their destiny.

Perceived social support and psychological well-being depends on various factors. Perceived social support and psychological well-being of the participants that had a job were higher than the unemployment participants, which was consistent with the findings in the literature. Dane and Olgun (2016) found that psychological endurance levels of the hemodialysis patients with a job were higher. Since the patients with a job have an occupation to spend time other than the routine treatment process, they are less likely to suffer from the negative ideas that occur during the process. This, in turn, may have resulted with a higher level of perceived social support and psychological well-being among the participants that had a job.

Analysis of the relationship between educational status and psychological well-being showed that the participants, who had university degree or above, had higher levels of psychological well-being. Similarly, other studies reported higher levels of psychological well-being for the chronic disease patients with higher level of educational status (Kütmeç Yılmaz & Kara 2020). Higher levels of psychological well-being among the participants with higher education level may be explained with reference to the positive effects of education on patients, such as, improving analytical thinking, socialization and communication skills, helping people to develop new perspectives and facilitating a problem-solving approach. Psychological well-being levels of the participants with high income levels was higher than the participants with moderate and low income. Similarly, the study of Akpınar et al., (2019) found that the level of self-efficacy was higher for the hemodialysis patients with lower income. Kütmeç Yılmaz & Kara (2020) also reported a negative relationship between spiritual well-being and income levels of patients with chronic disease. The relationship between income levels and psychological well-being may be explained with reference to the fact that sufficient income constitutes a source of power and contributes to economic independence and self-efficacy, which, in turn, may result with higher levels of psychological well-being. Perceived social support and psychological well-being levels were higher for the participants that adhered to follow-up appointments. This finding may be related to the development of a communication between the regularly attending patients and the health professionals so that the patients may believe that they have taken the disease under control.

We also found that perceived social support and psychological well-being were higher for the participants that could meet their daily needs independently. Studies in the literature reported that the ability to meet basic needs was negatively correlated with psychological problems, including depression, and positively correlated with well-being and satisfaction (Leow et al., 2021). Our findings were parallel to the literature and implied that the ability to meet daily needs independently had a positive impact on mental health and well-being. Another important finding of our study was the positive relationship between perceived social support and psychological well-being. The study of Ji et al. (2020) on breast cancer patients reported a positive relationship between perceived social support, psychological well-being, life satisfaction and the ability to cope with health problems. Similarly, the study of Park & Lee (2020) on patients living with congestive heart failure found that psychological well-being was higher for the patients with higher levels of perceived social support. Based on our findings, we may suggest that psychological well-being of the chronic disease patients may be higher as the level of perceived support increases.

Finally, we found that the levels of perceived social support and psychological well-being decreased as the age of participants and duration of chronic disease increased. As patients grow older, they may lose their autonomy and the intra-family relations may deteriorate, which may result with the feeling of loneliness and the inability to adhere to treatment. This, in turn, may lead to lower levels of perceived social support and psychological well-being. Additionally, this study was conducted during the COVID-19 pandemic. High infection rates and the risk posed to older adults might have the potential to influence psychological well-being (López et al., 2020). Traumatic events, such as the loss of a family member or a friend due to COVID-19 might have had a negative impact on the psychological well-being of the participants.

Limitations of study

There are three main limitations in this study. First, the study population was limited to one community health center in a city in Turkey, limiting the generalizability of findings in other populations. Second, the data in this study cannot be generalized, as the participants were all Muslim. The wide age range is another limitation of this study. Finally, there was a failure to evaluate adaptation to illness according to the type of chronic diseases. Evaluating

the effects of different types of chronic disease on the perceived social support and psychological well-being would strengthen this study.

CONCLUSION

This study found that psychological well-being of chronic disease patients increased parallel to the increase in the levels of perceived social support. Perceived social support and psychological well-being was negatively correlated with age and duration of disease. Besides, perceived social support and psychological well-being levels were statistically significantly higher for the participants, who were working, had higher education and income levels, adhered to follow-up and could meet their daily needs independently.Social support is vital to increase the level of psychological well-being in patients with chronic diseases. Our study found that social support perceived by the chronic disease patients is crucial to increase psychological well-being. Therefore, health professionals, primarily the nurses, may evaluate the levels of perceived social support and psychological well-being of chronic disease patients and incorporate spiritual care interventions and social support systems into nursing care plans. Spiritual care is an integral part of holistic care. The review of the literature suggests that sufficient knowledge and skills is essential to provide high-quality spiritual care (Aşiret and Okatan 2019; Kütmeç Yılmaz and Kara 2020). Based on our findings, we may suggest that seminars and training on the importance of social support to increase psychological well-being may be arranged. Further qualitative studies to provide an in-depth understanding of the psychological well-being of chronic disease patients may be conducted. While providing healthcare, nurses may take the levels of perceived social support and psychological well-being into consideration.

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Conflict of Interest

The authors have indicated that they have no potential conflicts of interest.

Author Contributions

Plan, design: DY, OA; **Material, Methods, and data collection:** DY, OA, DD; **Data analysis and comments:** DY, OA, DD; **Writing and corrections:** DY, OA, DD.

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