ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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Investigation of the Visually Impaired Individuals' Brain Domination, Problem-solving Skills, and Hopelessness

Görme Engelli Bireylerin Beyin Baskınlık Durumu, Problem Çözme Becerileri ve Umutsuzluk Düzeylerinin İncelenmesi

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ABSTRACT Objective: This study was conducted to investigate the impact of brain dominance on problem-solving skills and hopelessness in individuals with visual impairment as a special group. **Material and Methods:** This descriptive study was conducted on 100 visually impaired individuals who were members of a private association in Turkey and met the inclusion criteria. The study data were collected using a Personal Information Form, Brain Dominance Inventory, Problem Solving Inventory and Beck Hopelessness Scale. In analysing the data, the study used percentage, mean, and the Mann-Whitney U and Kruskal-Wallis tests. **Results:** The analysis of the study results indicated that 48% of the participants used their right brain, 50% used their left brain, and 2% of the participants used both. It was found that visually impaired individuals who used their left brain more actively had lower mean scores on feelings and expectations about the future, hopelessness and loss of motivation, which are the subscales of the Beck Hopelessness Scale, whereas the mean score of their problem-solving skills was higher (p>0.05). **Conclusion:** The results of the study revealed that visually impaired individuals used one of the brain hemispheres predominantly and the used hemisphere actively affected problem solving and hopelessness. Visually impaired individuals can be trained according to the brain hemispheres they are dominant to use both brain regions. If so, problem solving skills will also increase.It is important to recognise that identifying visually impaired individuals' dominant learning styles is a significant factor in enhancing their problem-solving, decision making, analytical thinking and systematic planning skills.

Keywords: Visually impaired individuals; brain dominance; problem-solving; hopelessness

ÖZET Amaç: Bu çalışma, özel bir grup olan görme engelli bireylerin beyin baskınlık durumlarının problem çözme becerileri ve umutsuzluk düzeylerine etkisinin incelenmesi amacıyla yapılmıştır. **Gereç ve Yöntemler:** Tanımlayıcı tipte yapılan araştırma Türkiye'de özel bir derneğe üye olan, çalışma ölçütlerine uyan 100 görme engelli bireyle yürütülmüştür. Verilerin toplanmasında Kişisel Bilgi Formu, Beyin Baskınlığı Envanteri, Problem Çözme Envanteri ve Beck Umutsuzluk Ölçeği kullanılmıştır. Verilerin değerlendirilmesinde, yüzdelik, ortanca, Mann-Whitney U ve Kruskal-Wallis testleri kullanılmıştır. **Bulgular:** Araştırma sonuçları incelendiğinde, sağ beynini kullananların oranı %48, sol beynini kullananların %50, hem sağ hem de sol beynini kullananların oranı ise %2 olarak tespit edilmiştir. Görme engelli bireylerde sol beynini daha aktif kullanan görme engelli bireylerin Beck Umutsuzluk Ölçeği'nin alt boyutları olan gelecekle ilgili duygu ve beklentiler, umutsuzluk düzeyleriyle motivasyon kaybı ortanca değerlerinin daha düşük, problem çözme becerileri ortanca değerinin ise daha yüksek olduğu belirlendi (p>0,05). **Sonuç:** Araştırma sonuçlarına göre görme engelli bireylerin, beyin yarı kürelerinden yalnızca birini kullandıkları, aktif kullanılan beyin bölgesinin problem çözme ve umutsuzluk düzeyi üzerine etkili olduğu belirlendi. Görme engelli bireylere, her 2 beyin bölgesini de kullanmak için beyin hemisferlerine göre eğitim verilebilir. Böyle bir durumda, problem çözme becerileri de artacaktır. Görme engelli bireylerin beyin bölümlerini baskın kullanma hususunda problem çözme, karar verme, analitik düşünme ve sistematik planlama becerilerini geliştirmede önemli bir faktör olduğunu kabul etmek önemlidir.

Anahtar Kelimeler: Görme engelli bireyler; beyin baskınlığı; problem çözme; umutsuzluk

The World Health Organization defines disability as "a disadvantaged condition that occurs in a person as a result of an impairment or deficiency, and prevents and limits the ability to carry out everyday activities which can be considered normal in terms of this person's age, sex, social and cultural status".[1]

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Being one of the care groups for nurses, disabled or visually impaired people are in need of health care professionals for receiving care and meeting their social and mental needs. While providing healthcare for disabled individuals, nurses make use of their knowledge, communication and leadership skills, autonomy, and professional skills such as critical thinking and decision-making. Nursing care offered in light of such knowledge and skills helps to maximise the functions of disabled individuals, hinder the progression of the current course (of disability), improve their self-care, enhance the quality of their life, maintain the continuity of care and enable them to develop positive coping behaviours and problem-solving skills.[2] Visually impaired individuals can be affected negatively in cases like personality development, social relationships and benefiting from education.[3] Training or appropriate learning experiences to be offered to the visually impaired can be enhanced through education in cognitive skills and conceptual ideas.[3] Thus, it is possible to contribute to brain development in visually impaired individuals by increasing their brain activity with appropriate training to be provided as part of the instructive role of the nurse.

Learning environments to be provided for individuals can increase the functional capacity of the brain hemispheres. Nurses should have the knowledge of the ideal functioning of brain, and be able to maximise the functional capacity of both hemispheres using a brain-based learning method. Increased dependency, difficulty in carrying out basic activities in daily life, and the perception of frustration and not being understood in disabled people can cause a decrease in problem-solving skills as well as a increase in hopelessness.[4]

Hopelessness refers to a condition in which the individual defines himself with negative characteristics, has negative expectations about the future and accepts negative experiences as constant and general.[5]

It is believed that nursing care provided for physical, psychological, emotional and social needs in accordance with the level of dependency in disabled individuals will result in a lessened feeling of frustration, decreased hopelessness and enhanced problems-solving skills. To play an active role and become successful in this process, nurses need to understand conditions that affect problem-solving and hopelessness which is likely to be experienced by disabled people.

Therefore, continuity is very important for the care of the disabled individual. The treatment and rehabilitation initiated for the individual's disability should be continued and re-evaluated in the light of new developments. Nurses should support and assist the training of these individuals with appropriate communication tools by determining the points where disabled individuals have learning difficulties and their coping strategies within the scope of their educational roles. It is very important to reveal the existing potentials of disabled individuals and to provide nursing care that supports their independence and autonomy by determining their strengths. Individualized nursing interventions can also be performed by determining the level at which visually impaired individuals use their right or left hemispheres. Ensuring continuity of the care of the disabled individuals by the nurse, providing care by activating the individual's existing abilities in cooperation with the patient will also increase the quality and safety of care. Increasing the quality of care will provide disease management, aiming to increase the problem-solving skills and hope levels of disabled individuals. It is thought that determining the more actively functioning part of the brain hemispheres, planning interventions for learning skills and problem-solving skills will increase the problem-solving skills and hope levels of individuals.[2,3]

Literature review demonstrated that taking into consideration brain dominance in individual care plan will influence care planning and goals.

From this point of view, this study aimed to explore the relationship between problem-solving skills and hopelessness in individuals with visual impairment based on brain dominance, with the belief that it will contribute to the literature, members of nursing profession and other healthcare professionals.

MATERIAL AND METHODS

STUDY DESIGN

This is a descriptive study.

STUDY LOCATION

The study was carried out on visually impaired individuals who were members of a private association for the visually impaired in a southern city in Turkey.

SETTING AND SAMPLE

The study population consisted of 150 visually impaired individuals who were registered at the association. Researchers did not select a sample out of the population since the purpose of the study was to reach all visually impaired individuals who were members of the association and met the inclusion criteria. The study was conducted on 100 visually impaired individuals who met the inclusion criteria and agreed to participate in the study.

INCLUSION AND EXCLUSION CRITERIA

The study recruited visually impaired individuals who were willing to participate in the study, had no mental disorder, mental deficiency and difficulty in understanding. The study excluded individuals [with visual impairment] who had a mental disability or difficulty in communicating, and were diagnosed with a psychiatric disorder.

MEASUREMENTS/INSTRUMENTS

The study data were collected using a personal information form, Brain Dominance Inventory, Problem Solving Inventory and Beck Hopelessness Scale (BHS).

1. Personal Information Form

This form was created by the researchers based on the literature. The form includes 18 questions about the socio-demographic characteristics of visually impaired individuals.

2. Brain Dominance Inventory

The study used the 39-item Brain Dominance Inventory which was re-arranged by Davis, Nur and Ruru and translated into Turkish by Kök to determine brain dominance in the participants.[6,7]

3. Problem Solving Inventory

This inventory developed by Heppner and Peterson is a six-point (ranging from 1 to 6) Likert type scale comprising 35 items to measure the perceptions of adolescents and adults regarding their problem-solving abilities.[8] Higher scores on the scale indicate that individual perceives himself to be incapable in terms of problem-solving skill. The scale was adapted into Turkish by Şahin et al. and its Cronbach's alpha was found to be 0.88.[9]

4. Beck Hopelessness Scale

The validity and reliability of the BHS developed by Beck, Lester and Trexler were tested by Seber and Durak. The Cronbach's alpha reliability coefficient of the scale was 0.75-0.85.[10,11] The possible range of scores for the 20-item scale is between 0-20. Higher scores show hopelessness while lower scores indicate the opposite. A score of 0-3 refers to no or minimum hopelessness, 4-8 show a lower level of hopelessness and 9-14 indicates moderate hopelessness while scores of 15 and above refer to a high level of hopelessness.[12]

DATA COLLECTION

The visually impaired individuals were invited to the association to fill out the questionnaires. They were invited to a separate room to complete the questionnaire, and data were collected by the researchers with face-to-face interviews. The questionnaires of those who could not come to the association were completed during phone interviews. It took approximately 10-15 minutes to complete each questionnaire.

ETHICAL CONSIDERATION

The researchers obtained the approval of Osmaniye Korkut Ata University Ethics Committee before the study (Approval no.59754796-050.99/). The institutional permission was received from the Altınokta Association of the Blind, Osmaniye Branch of the association. In addition, the researchers informed the participants about the study, and obtained their written consent. This study was conducted in accordance with the principles of the Helsinki Declaration.

STATISTICAL ANALYSIS

The research data were analyzed using the IBM SPSS, V23 software program. The Shapiro-Wilk test

TABLE 1: Socio-demographic characteristics of visually impaired individuals and data on their visual impairment.

	n	X±SS
Age	100	39.9±10.5 (Minimum-Maximum)
	n	**%**
Gender		
Female	22	22.0
Male	78	78.0
Marital status		
Married	66	66.0
Single	29	29.0
Divorced	5	5.0
Level of education		
Primary school	47	47.0
High school	43	43.0
College or university	10	10.0
Special education		
Yes	23	23.0
No	77	77.0
Theme of special education		
Computer course	18	78.3
Sign language	5	21.7
Number of children		
0	45	45.0
1	16	16.0
2	11	11.0
4 and more	28	28.0
Visual impairment in children		
One child has visual acuity	7	12.7
Two children have visual acuity	3	5.5
All children have visual acuity	45	81.8
Visual impairment in spouse		
Yes	56	84.8
No	10	15.2
Employment status		
Yes	44	44.0
No	56	56.0
Employment		
Private sector	9	20.5
Public sector	35	79.5
Suffering from a chronic disease		
Yes	25	25.00
No	75	75.00
Type of chronic disease		
DM	13	52.0
CVD	6	24.0
COPD	6	24.0
		devamı→

TABLE 1: Socio-demographic characteristics of visually impaired individuals and data on their visual impairment. *(devamı)*

	n	%
Social support from family		
Yes	59	59.0
No	41	41.0
Social support outside the family		
Yes	29	29.0
No	71	71.0
How many years with visual impairment		
1-10 years	10	10.0
11 years and more	51	
Congenital Visual Impairment	39	39.0
Cause of visual impairment		
Pregnancy, birth and postnatal complications	18	18.0
Hereditary	30	30.0
Accidental	25	25.0
Complications of chronic diseases	27	27.0
Visual impairment rate (%)		
20-40	10	10.0
40-60	18	18.0
60-80	20	20.0
80-100	52	52.0

SS: Standard deviation; DM: Diabetes mellitus; CVD: Cardiovascular disease; COPD: Chronic obstructive pulmonary disease.

was used to determine the data normality. The Kruskal-Wallis and Mann-Whitney U test were performed to compare the data that did not have normal distribution. Spearman's rank correlation was used to assess the relationship between the variables. Non-normally distributed data were presented as mean values (minimum-maximum). Categorical data were presented in frequency form (percentage). The level of significance was set at $p<0.05$.

RESULTS

The findings of the study are given below.

General descriptive characteristics and information about their impairment are given in Table 1.

When brain dominance was analyzed in the visually impaired individuals, it was found that 48% of the participants were right-brain dominant and 50% were left-brain dominant. Only 2% of the participants were found to be using both right and left hemispheres, and they were excluded from assessment.

TABLE 2: Percentage of brain dominance of visually impaired individuals.

Brain dominance	Frequency	Percentage
Right brain	48	48.0
Left brain	50	50.0
Equal	2	2.0

The BHS consists of 3 subscales. The mean values of all subscales and total score of the BHS and problem solving inventory (PSI) did not show a statistically significant difference according to brain dominance ($p>0.05$) (Table 3). The mean values of the scales and subscales based on brain dominance are presented in Table 3.

There was a statistical significance between the mean scores of the subscales of marital status and feelings about the future ($p<0.05$). The score on the PSI varied by marital status ($p<0.05$). There was also a statistical significance between the mean scores of chronic disease and the subscale of feelings about the future ($p<0.05$). The mean scores of the scales and subscales are given in Table 4.

The difference between the subscales of feelings about the future and loss of motivation in individuals who received social support from their families was statistically significant ($p<0.05$). There was also a statistically significant difference between the subscales feelings about the future and loss of motivation in individuals who obtained social support outside the family ($p<0.05$). There was a statistically significant difference between those who received support outside the family and those who did not in the mean scores of problem solving ($p<0.05$).

According to the results of Table 5, in visually impaired individuals with dominant right brain hemisphere, there were positive, statistically significant moderate, strong, and strong correlations between thoughts about the future and loss of motivation, future expectation, and total hopelessness, respectively ($p<0.05$). As the scores of thoughts about the future increase, the scores of motivation loss, future expectation, and total hopelessness will also increase. There were positive, statistically significant strong, strong, and weak correlations between loss of motivation and future expectation, total hopelessness, and problem-solving scores ($p<0.05$). As the score of motivation loss increases, the scores of future expectation, total hopelessness, and problem-solving will also increase. There were positive, statistically significant strong and weak correlations between the scores of future expectation and total hopelessness, and problem-solving, respectively ($p<0.05$). As the score of future expectation increases, the scores of total hopelessness and problem-solving will also increase. There was a positive and statistically significant moderate correlation between the scores of total hopelessness and problem-solving ($p<0.05$). As the score of total hopelessness increases, the score of problem-solving will increase. There was a positive and statistically significant moderate correlation between age and the problem-solving score ($p<0.05$). As age increases, the problem-solving score will increase.

In visually impaired individuals with dominant left brain hemisphere, there were positive, statistically significant moderate, moderate, strong, and weak correlations between the scores of thoughts about the future and loss of motivation, future expectation, total hopelessness, and problem-solving, respectively ($p<0.05$). As the score of thoughts about

TABLE 3: Comparison of the problem solving and hopelessness scale scores based on brain dominance.

	Left brain	Right brain	Test statistics	p value
Feelings about the future	1 (0-5)	2 (0-5)	U=1039.5	0.23
Loss of motivation	0 (0-8)	2 (0-8)	U=963	0.07
Future expectations	1 (0-5)	2 (0-5)	U=1042.5	0.24
Total score on the BHS	3 (0-19)	6 (1-19)	U=954.5	0.07
Problem solving	92 (52 - 164)	93 (56-150)	U=1041	0.25

BHS: Beck hopelessness scale.

TABLO 4: Comparison of problem solving and hopelessness scores based on demographic characteristics.

	Feelings about the future	Loss of motivation	Future expectations	Total score on the BHS	Problem solving
Gender					
Male (n=78)	1 (0-5)	1 (0-8)	1 (0-5)	4.5 (0-19)	93 (52-160)
Female (n=22)	1 (0-5)	0.5 (0-8)	2 (0-5)	3.5 (1-19)	91.5 (56-164)
Test statistics	U=747	U=731.5	U=823	U=771.5	U=854.5
p value	0.337	0.268	0.761	0.468	0.977
Marital status					
Married	2 (0-5)	1 (0-8)	2 (0-5)	4.5 (0-19)	93 (70-164)
Single	1 (0-5)	1 (0-7)	1 (0-5)	3.5 (1-18)	85.5 (52-150)
Test statistics	U=736.5	U=954.5	U=880	U=921	U=812.5
p value	**0.004**	0.200	0.066	0.141	**0 .024**
Education level					
Primary school	1 (0-5)	1 (0-8)	2 (0-5)	4,5 (1-19)	93 (52-164)
High school	1 (0-5)	1 (0-8)	1 (0-5)	4 (1-19)	93 (60-147)
College or university	1 (0-5)	0 (0-8)	1 (0-5)	3 (0-19)	92 (71-160)
Test statistics	χ^2=1.8	χ^2=1.9	χ^2=1.1	χ^2=2.1	χ^2=0.6
p value	0.416	0.395	0.586	0.349	0.729
Income (per month)					
TRL 500-1,000	1 (0-5)	0.5 (0-8)	1.5 (0-5)	3.5 (1-19)	93 (52-150)
TRL 1,000-1,500	1 (0-5)	1 (0-8)	1 (0-5)	3 (1-19)	93 (78-164)
TRL 2,000 and above	3 (0-5)	1 (0-8)	2 (0-5)	6 (0-19)	92 (67-160)
Test statistics	χ^2=0.1	χ^2=2.6	χ^2=1.7	χ^2=0.9	χ^2=0.9
p value	0.934	0.272	0.435	0.610	0.617
Working status					
Yes	2.5 (0-5)	1 (0-8)	2 (0-5)	5 (0-19)	93 (67-160)
No	1 (0-5)	1 (0-8)	1 (0-5)	3.5 (1-19)	93 (52-164)
Test statistics	U=1150.5	U=1032.5	U=1070.5	U=1120	U=1183
p value	0.556	0.145	0.242	0.433	0.733
Chronic disease					
Yes	4 (0-5)	3 (0-8)	3 (0-5)	12 (1-19)	93 (76-147)
No	1 (0-5)	1 (0-8)	1 (0-5)	3 (0-19)	93 (52-164)
Test statistics	U=699.5	U=748.5	U=705	U=770	U=839
p value	0.049	0.114	0.053	0.179	0.433
Social support from family members					
Yes	1 (0-5)	0 (0-8)	1 (0-5)	3 (0-19)	92 (60-151)
No	2 (0-5)	3 (0-8)	3 (0-5)	6 (0-19)	93 (52-164)
Test statistics	U=916	U=933.5	U=964.5	U=917	U=1095
p value	**0.032**	**0 .042**	**0.073**	**0.039**	0.422
Social support outside the family					
Yes	0 (0 - 5)	0 (0-8)	1 (0-5)	3 (0-19)	88 (67-146)
No	2 (0 - 5)	2 (0-8)	2 (0-5)	5 (0-19)	94 (52-164)
Test statistics	U= 671	U=699	U=846	U=685.5	U=668.5
p value	**0.005**	**0.008**	0.145	**0.008**	**0.006**

BHS: Beck hopelessness scale; U: Mann-Whitney U test statistics; χ^2: Kruskal-Wallis test statistics.

the future increases, the scores of loss of motivation, future expectation, total hopelessness, and problem-solving will increase. There were positive, statistically significant strong, strong, and very weak correlations between the scores of loss of motivation and future expectation, total hopelessness, and problem-solving, respectively ($p<0.05$). As the score of loss of motivation increases, the scores of loss of mo-

TABLE 5: Relationship between problem solving skills, hopelessness and the levels of visual impairment and age based on right or left brain dominance.

		Feelings about the future	Loss of motivation	Future expectations	Total score on the BHS	Problem solving	Age	Level of visual loss
Right brain								
Feelings about the future	r value	1.00	0.68	0.77	0.83	0.30	0.34	-0.33
	p value	-	**0.00**	**0.00**	**0.00**	0.22	0.16	0.17
Loss of motivation	r value	0.68	1.00	0.86	0.94	0.49	0.27	-0.13
	p value	0.00	-	**0.00**	**0.00**	**0.03**	0.27	0.61
Future expectations	r value	0.77	0.86	1.00	0.91	0.43	0.23	-0.20
	p value	0.00	0.00	-	**0.00**	**0.07**	0.34	0.40
Total score on the BHS	r value	0.83	0.94	0.91	1.00	0.52	0.37	-0.17
	p value	0.00	0.00	0.00	-	**0.02**	0.12	0.50
Problem solving	r value	0.30	0.49	0.43	0.52	1.00	0.61	0.07
	p value	0.22	0.03	0.07	0.02	-	**0.01**	0.76
Age	r value	0.34	0.27	0.23	0.37	0.62	1.00	-0.05
	p value	0.16	0.27	0.34	0.12	0.01	-	0.85
Level of visual loss	r value	-0.33	-0.13	-0.20	-0.17	0.07	-0.05	1.00
	p value	0.17	0.61	0.40	0.50	0.76	0.85	-
Left brain								
Feelings about the future	r value	1.00	0.74	0.69	0.89	0.37	0.13	0.02
	p value	-	**0.00**	**0.00**	**0.00**	**0.00**	0.29	0.89
Loss of motivation	r value	0.74	1.00	0.74	0.86	0.22	0.12	-0.17
	p value	0.00	-	**0.00**	**0.00**	**0.06**	0.30	0.14
Future expectations	r value	0.69	0.74	1.00	0.86	0.13	0.29	-0.03
	p value	0.00	0.00	-	**0.00**	0.27	**0.01**	0.79
Total score on the BHS	r value	0.89	0.86	0.86	1.00	0.21	0.18	-0.05
	p	0.00	0.00	0.00	-	0.08	0.12	0.65
Problem solving	r value	0.37	0.22	0.13	0.21	1.00	0.15	0.03
	p value	0.00	0.06	0.27	0.08	-	0.20	0.82
Age	r value	0.13	0.12	0.29	0.18	0.15	1.00	0.11
	p value	0.29	0.30	0.01	0.12	0.20	-	0.34
Level of Visual Loss	r value	0.07	-0.17	-0.03	-0.05	0.03	0.11	1.00
	p value	0.89	0.14	0.79	0.65	0.824	0.34	-

BHS: Beck hopelessness scale; r: Spearman rank correlation.

tivation, future expectation, total hopelessness, and problem-solving will also increase. There were positive, statistically significant very strong, and weak correlations between future expectation and total hopelessness and age, respectively ($p<0.05$). As the score of future expectation increases, the score of total hopelessness will also increase. According to our results, as age increases, the score of future expectation will also increase.

DISCUSSION

According to the findings of the study, 48.0% of the visually impaired individuals used right hemisphere, 50.0% used left hemisphere and 2.0% used both equally (Table 2). A review of the literature showed there were no studies on brain dominance in individuals with visual impairment. In his study on 216 students, Piaw reported that 54.6% of the participants were right hemisphere dominant and preferred to use only one hemisphere in learning and thinking.[13] He, also found that 36.6% of the students used left hemisphere and 8.8% used both hemispheres equally. While literature students were right hemisphere dominants and showed more creative thinking skills, science students were left hemisphere dominants and had more critical thinking skills.[14] Another study ex-

amining brain dominance in teacher candidates showed that participants used both hemispheres equally, with a slight inclination for dominance in the right brain.[15]

Although there was no statistically significant difference between feelings about the future, future expectations and loss of motivation subscales of the BHS in visually impaired individuals who used their right hemisphere more actively than the left hemisphere, their mean scores were found to be lower (Table 3). This finding demonstrates that the level of hopelessness in the left-brainers was lower than the right brainers. A study by Miller points out the significance of the right hemisphere of the brain in the ability to process and act on visual information. The researchers also state that the right frontal lobe plays a particular role in developing a flexible approach to visual problem-solving.[15]

However, visually impaired individuals use right hemisphere, which is particularly important in problem-solving, less due to impairment in their vision. In this case, it is an expected result that those using right hemisphere less are more hopeless and have lower problem-solving skills. Accordingly, left hemisphere dominants learn things through reading while right hemisphere dominants learn by seeing, experience and touching.

The findings of the study revealed that individuals with visual impairment use their left hemisphere more actively, which is considered to be related to the impairment in vision. On the other hand, it was found that visually impaired people were who right hemisphere dominants had less problem-solving skills (Table 3). It was identified that in problem solving, left-brain dominant participants preferred to solve problems by breaking them down, and right-brained individuals solved them by seeing the whole picture.[16] According to the results of our study, the level of hopelessness in individuals who used their left brain more actively was lower than the right-brained individuals while problem-solving skills were higher in the left brain dominant participants (Table 3). This result is compatible with the relevant literature. Studies in literature indicate that people's problem-solving skills increase as their hopelessness declines. Ağır reported that university students' self-confidence in problem solving declined as their level of hopelessness increased.[17] In his study on the parents of disabled children to analyse the relationship between the level of hopelessness and problem-solving skill in parents, Konukbay demonstrated that their problem-solving skills decreased with greater hopelessness.[18]

In the study, there was a statistical significance between the levels of future concern, loss of motivation and hopelessness in individuals who could not obtain social support from their family ($p<0.05$) (Table 4). It was found that the level of hopelessness increased in individuals who did not receive social support.

Another study on the visually impaired concluded that parental support is the primary factor in emotional problems.[19] This study found that 41.0% of the visually impaired people did not receive social support from family and 71.0% did not receive support outside the family. The lack of social support for the visually impaired can also be considered to have an impact on this result.

Finally, there was a positive, statistically significant relationship between the number of children and the subscale of future expectations, hopelessness score on the BHS and problem solving (Table 5). Studies in literature indicate that having children increases hopelessness score on the BHS in individuals with chronic disorder.[20]

Exploring the structure of the brain and understanding its functions with the advancing technology creates a variety of new opportunities and training methods. It is thought that interdisciplinary studies such as educational neuroscience and cognitive neuroscience will considerably contribute to the field of how an individual learns better and the knowledge learned. As stated by Keles and Cepni, learning the basic stages of brain functioning and knowing the models and ideas aiming to identify the structure and functioning of the brain will provide a better understanding of the primary factors that affect learning.[21] In conclusion, it is believed that knowing the characteristics of the brain in any cognitive state will be one of the major factors in achieving the goal of the performed activity and will enable the individual to re-

alize his/her own brain potential. It is thought that knowing which parts are the activity states of the brain regions in determining the cognitive ability of individuals will be the most helpful source for how to provide training to them. Moreover, it is believed that knowing the activities of the brain regions suitable for the task can ensure more qualified learning and teaching processes by taking into account the individual differences. It is assumed that knowing the activity mechanism of the brain and the activity state of the brain regions in which cognitive activities according to individual differences will involve a more effective learning-teaching process.[22]

In conclusion, it is indispensable for the nurse to undertake the role of educator in the rehabilitation and training of disabled individuals. Today, the advancement of educational technologies along with the development of brain-based learning strategies also support individual care for disabled individuals. It is believed that determining the appropriate training and problem-solving strategies within the scope of holistic and individual care will increase the individuals' hope levels and increase their quality of life.

CONCLUSION

This study investigating brain dominance, problem-solving and hopelessness in people with visual impairment revealed that visually impaired individuals used only one of their brain hemispheres actively, were left hemisphere dominant, had high problem-solving skills and a low level of hopelessness.

Individual care for disabled people will ensure that both the individual and their family receive appropriate and sufficient care, easing the burden on the family. It is important to recognise that identifying visually impaired individuals' dominant learning styles is a significant factor in enhancing their problem-solving, decision making, analytical thinking and systematic planning skills. Thus, it is seen that learning becomes more efficient and effective in individuals whose dominant learning style has been determined. In addition, visually impaired people's undertaking practical work in learning process will develop the skill to approach problems and issues from different viewpoints and increase success in the organisation of educational activities.

In conclusion, the extent of the relationship of problem-solving skill and hopelessness with brain dominance has not been adequately investigated in Turkey yet. Hence, further extensive studies can be recommended on the subject, by also considering socio-cultural differences.

LIMITATIONS OF THE STUDY

This study provides information only about a small sample of persons with visual impairment since it was conducted only with the visually impaired individuals who were registered members of the X branch of a private association for the visually disabled, which operates across Turkey. Hence, the study results cannot be generalized to the whole society. Therefore, larger-scale studies are needed at the national level for better results.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Kevser Sevgi Ünal Aslan, Ebru Gözüyeşil;* ***Design:*** *Derya Atik, Edanur Tar;* ***Control/Supervision:*** *Kevser Sevgi Ünal Aslan;* ***Data Collection and/or Processing:*** *Edanur Tar, Kevser Sevgi Ünal Aslan;* ***Analysis and/or Interpretation:*** *Kevser . Sevgi Ünal Aslan, Ebru Gözüyeşil;* ***Literature Review:*** *Kevser Sevgi Ünal Aslan, Ebru Gözüyeşil; Edanur TAR, Derya Atik;* ***Writing the Article:*** *Kevser Sevgi Ünal Aslan, Ebru Gözüyeşil;* ***Critical Review:*** *Kevser Sevgi Ünal Aslan;* ***References and Fundings:*** *Derya Atik, Edanur Tar.*

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