

Living with Stroke in North Cyprus: Which ICF-Based Biopsychosocial Factors are Related to Community Participation?

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Abstract

BACKGROUND/AIMS: Improved treatment and rehabilitation care opportunities are resulting in increasing numbers of stroke survivors. Accordingly, the active community participation of stroke survivors is becoming more important in order to maintain a person's psychological and social status and so to improve their quality of life. This study aimed to investigate the relationships among the sociodemographic characteristics, clinical characteristics, International Classification of Functioning, Disability and Health (ICF)-based biopsychosocial factors, and community participation of stroke survivors living in North Cyprus.

MATERIALS AND METHODS: This cross-sectional study recruited 43 participants. The sociodemographic and clinical characteristics of the participants were recorded. Functional Independence Measure (FIM), Stroke Impact Scale 3.0 (SIS), Fall Efficacy Scale (FES), Fatigue Severity Scale (FSS), Beck Depression Inventory (BDI), Measure of Quality of the Environment-Short Form (MQE-SF), and the Community Integration Questionnaire (CIQ) were used to collect the data.

RESULTS: Those participants who did not use assistive devices had higher community participation ($p < 0.05$). Additionally, gender, lesion type, and the affected body side did not have any relationship with community participation ($p > 0.05$). As the Brunnstrom stages (Upper extremity: $r = 0.455$, $p = 0.002$; Lower extremity: $r = 0.608$, $p = 0.001$) of the participants and their scores in FIM ($r = 0.809$, $p = 0.001$), SIS ($r = 0.766$, $p = 0.001$), and MQE-SF ($r = 0.467$, $p = 0.002$) increased, so did their CIQ scores ($p < 0.05$). However, as the age of the participants ($r = -0.413$, $p = 0.006$) and their FES ($r = -0.752$, $p = 0.001$), FSS ($r = -0.479$, $p = 0.001$), and BDI ($r = -0.783$, $p = 0.001$) scores increased, their CIQ scores decreased ($p < 0.05$).

CONCLUSION: To increase their community participation, stroke survivors need to be assessed holistically by considering all factors of the ICF model and they require multidisciplinary rehabilitation, which will lead to better rehabilitation outcomes. The community participation levels of stroke survivors living in North Cyprus were related to the factors of the ICF base biopsychosocial level.

Keywords: Stroke, community participation, ICF

INTRODUCTION

Disease-related limitations in the biological system affect psychological and social aspects negatively, which in turn limits community participation among stroke survivors. Recently improved treatment and

rehabilitation care opportunities have resulted in increasing numbers of stroke survivors.¹ Therefore, it is important for this population not to be isolated from society, so that they can continue to participate actively in their community, as their activity and participation levels are related to their quality of life.²

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The International Classification of Functioning, Disability and Health (ICF) is a classification system which is based on biopsychosocial factors and it aims to improve health-related issues.³ It examines body structure, functions, activity and participation, the capacity of individuals to perform their functions, and their communication with their environment.⁴ As described by the ICF, environmental factors constitute the physical and social context in which people live and maintain their lives. Personal factors include those in an individual's life which are not a part of their health status. Contextual factors can have positive or negative effects on an individual's bodily functions and physiology, behaviours or capacity to perform tasks, and their community participation.⁵ Therefore, it is important to understand the community participation levels of stroke survivors in order to increase their quality of life.

Studies on community participation in stroke survivors have mostly been conducted in developed countries such as the United States, Northern Ireland, and Australia.⁶⁻⁹ It is also important to identify the ICF-based biopsychosocial factors which are related to the community participation of stroke survivors in socioeconomically diverse countries such as North Cyprus.

Aims

It was aimed to determine the levels of relationships of sociodemographic and ICF-based biopsychosocial factors with the community participation of stroke survivors living in North Cyprus. The results of this study aimed to shed light on the development of appropriate strategies for improved participation and the introduction of mechanisms to facilitate the community participation of this population. This research may also help to understand if the concepts of ICF are relevant for those stroke survivors who live in North Cyprus, namely to understand if culture has any impact on ICF-based biopsychosocial factors related to the community of stroke survivors in North Cyprus.

MATERIALS AND METHODS

Design

This was a cross-sectional analytical study conducted between January, 2020 and May, 2020 with stroke survivors in a private rehabilitation centre in North Cyprus, after obtaining ethical from the Ethics Committee of European University of Lefke (approval number: ÜEK/50/01/02/1920/10, date: 11.02.2020). The population of this study included individuals who presented to the neurology inpatient clinics of a public hospital and a private hospital over the previous five years. Those people who met the inclusion criteria were informed about this study, and written consent was obtained from those who agreed to participate.

Participants

Fifty-three stroke survivors were invited to take part in this study by a systematic sampling method. The registration numbers at hospitals were listed and the sixth person was chosen randomly, followed by every subsequent sixth person. All chosen individuals were invited to enrol (n=53). Some individuals (n=10) were not included because they either did not want to participate (n=8) or could not spare time to be evaluated (n=2). As a result, 43 participants were included (Flowchart 1).

Inclusion/Exclusion Criteria

The inclusion criteria were as follows; living in North Cyprus, being able to speak and write in Turkish, being diagnosed with stroke for the first time by a neurologist, being 45-80 years old, having had a stroke at least three months prior, and being cooperative and agreeing to participate in this study (mini-mental test ≥ 24). The exclusion criteria were determined as having other neurological disorders or other diseases affecting the musculoskeletal system.

Data Collection Tools

The sociodemographic and clinical characteristics of the participants were recorded on personal information and clinical information forms. The sociodemographic data of the participants included their age, sex, smoking status, alcohol intake, and educational status, while the clinical information form included the affected side of the body, the duration since the stroke, their walking aid usage status, and lesion type.

The data collection instruments included the Functional Independence Measure (FIM) to determine functional levels in activities, the Brunnstrom Stage Assessment to assess the stage of recovery, the Stroke Impact Scale (SIS) to assess disease status and limitations in daily activities, the Falls Efficacy Scale (FES) to assess self-efficacy related to falls, the Fatigue Severity Scale (FSS) to determine fatigue levels, the Beck Depression Inventory (BDI) to assess depression, the Measure of Quality of the Environment-Short Form (MQE-SF) to determine environmental factors, and the Community Integration Questionnaire (CIQ) to assess community participation. The previously validated Turkish language versions of all measures were used.

Data collection was performed by the primary investigator, who worked as a physiotherapist and each assessment took 45-50 minutes according to the participant. However, breaks for 10 minutes took place during the assessments if requested by the participant.

Stage of Motor Recovery

The Brunnstrom Stage Assessment was used to assess the stage of recovery for the upper and lower extremities. It is an approach developed by Brunnstrom¹⁰ in the 1960s which has six stages to understand how motor control can be restored to gain functionality after a stroke. Higher scores indicate more improvement. It is a valid, reliable, and responsive stroke-specific and commonly used tool which helps classify the motor levels of stroke survivors.¹¹⁻¹³

Functional Level in Activities

The FIM is an 18-item scale which evaluates both the physical (13 items) and cognitive (5 items) functions of an individual to evaluate them in terms of personal care, sphincter control, transfer, mobility, communication, and social-cognitive status.¹⁴ The validity and reliability study of this scale in Turkish was carried out by Küçükdeveci et al.¹⁵

Community Participation

The CIQ consists of 18 items and evaluates three variables consisting of home participation, community participation, and productivity and work/school activity.¹⁶ The validity and reliability of this scale in Turkish were tested by Akyurek et al.¹⁷

Limitations in Activities of Daily Living

The SIS version 3 was specifically developed for stroke survivors. It is a scale developed by Duncan et al.¹⁸ to evaluate the quality of life of people who experience loss of mental and physical function after a stroke, depending on the extent of the impact of the stroke. In this scale, which consists of eight domains and 59 items, each item is evaluated by scoring difficulties experienced over the prior seven days on a 5-point Likert-type scale. The validity and reliability study of this scale in Turkish stroke survivors was performed by Hantal et al.¹⁹

Self-Efficacy Related to Falls

The FES was developed by Tinetti et al.²⁰ It aims to investigate the self-efficacy of stroke survivors regarding falls they experience while fulfilling the ADL. This scale consists of 10 items which determine their self-efficacy while performing activities, such as how confident they are that they can dress and undress without falling.²⁰ Higher scores indicate higher self-efficacy levels. The Turkish language validity and reliability study of this scale was conducted by Ulus et al.²¹

Level of Fatigue

The FSS was developed by Krupp et al.²² It is a 7-point Likert-type scale (1=strongly disagree, 7=strongly agree) consisting of nine items, and the total score of the scale is found by averaging the scores of all nine items. Getting a score of four or higher indicates the presence of pathologic fatigue. The Turkish validity and reliability study of this scale was conducted by Armutlu et al.²³

Level of Depression

The BDI was developed by Beck et al.²⁴ The purpose of this scale is to objectively measure the level of depression symptoms possessed by an individual. It determines the behavioural pattern which is specific to depression and includes 21 evaluation statements with four options each. The Turkish validity and reliability study of this scale was conducted by Hisli.²⁵

Environmental Factors

The MQE-SF was tested for reliability by Boschen.²⁶ This scale is a modified ICF format measure created specifically for people with different degrees and types of disability. The five dimensions of this scale include 26 items aiming to assess the impact of the environment on the success of a person's daily activities by considering their abilities and limitations. The respondent scores whether their daily activities are facilitated or obstructed by environmental factors. The validity study of MQE-SF in Turkish was conducted by Akyurek and Bumin.²⁷

Statistical Analysis

The SPSS 25.0 program was used for the statistical analyses of the data collected. Percentage, mean and standard deviation values were calculated for the sociodemographic and clinical data. Based on the Shapiro-Wilk test which was conducted in this study, the FIM, CIQ, SIS, FES, FSS, BDI, and MQE-SF scores of the participants were not normally distributed. Accordingly, the Mann-Whitney U test was used to compare the CIQ scores of the participants based on their gender, use of walking aids, affected body side, and lesion type. The relationships between the participants' FIM, SIS, FES, FSS, BDI, and MQE-SF scores and their CIQ scores were examined via Spearman's correlation test. The degree of correlation was defined as low if the coefficient was lower than 0.3,

moderate if it was between 0.3 and 0.5, and strong if it was greater than 0.5. The level of statistical significance was determined as $p < 0.05$. As a result of power analysis, the sample size was determined as being 43 participants in order to provide 80% power with a 95% confidence interval.

RESULTS

Forty-three individuals participated in this study (13 female, 30 male, mean age: 70.67 ± 8.22 years). Table 1 shows the sociodemographic and clinical characteristics of the participants. Descriptive statistics were calculated regarding the stroke-related scores of the participants and their scores on the Brunnstrom Stage Assessment (upper/lower extremity), FIM, SIS, FES, FSS, BDI, MQE-SF, and overall CIQ (Table 2).

A statistically significant difference was determined in the participants' CIQ scores based on their walking aid usage status ($p < 0.05$). However, there was no statistically significant relationship between the CIQ

Table 1. Sociodemographic and clinical characteristics of the participants (n=43)

	Frequency (n)	Mean \pm SD
Age (years)	43	70.67 \pm 8.22
BMI (kg/m ²)	43	25.69 \pm 4.18
Age (years)		Percentage (%)
55-64	11	25.58
65-74	14	32.56
75-84	18	41.86
Gender		
Male	30	69.77
Female	13	30.23
Smoking status		
Smoker	9	20.93
Non-smoker	34	79.07
Alcohol use status		
Non-drinker	43	100.00
Drinker	0	0.00
Educational status		
High school	30	69.77
University	13	30.23
Duration since stroke (\bar{x}=51.19\pm45.54 months)		
36 months or shorter	19	44.18
37-60 months	14	32.56
61 months or longer	10	23.26
Affected body side		
Right	22	51.16
Left	21	48.84
Status of using walking aids		
Using	22	51.16
Not using	21	48.84
Lesion type		
Haemorrhagic stroke	19	44.19
Ischemic stroke	24	55.81

SD: Standard deviation, BMI: Body mass index.

Table 2. Results of the stroke-related tools examining the biopsychosocial dimension of the participants (n=43)

	Mean ± SD	Min.	Max.
Brunnstrom stage (upper extremity)	5.37±0.87	3.00	6.00
Brunnstrom stage (lower extremity)	5.63±0.49	5.00	6.00
CIQ overall score	6.70±4.75	0.00	18.00
Home participation sub-score	1.05±1.46	0.00	7.00
Community participation sub-score	4.77±2.72	0.00	10.00
Work/school sub-score	0.88±1.33	0.00	5.00
FIM	93.30±17.08	45.00	118.00
SIS	195.81±36.23	107.00	281.00
FES	47.72±22.69	10.00	85.00
FSS	5.51±1.02	2.55	6.77
BDI	19.51±9.06	5.00	44.00
MQE-SF	41.12±5.83	30.00	54.00

SD: Standard deviation, Min. Minimum, Max. Maximum, CIQ: Community Integration Questionnaire, FIM: Functional Independence Measure, SIS: Stroke Impact Scale, FES: Falls Efficacy Scale, FSS: Fatigue Severity Scale, BDI: Beck Depression Inventory, MQE-SF: Measure of Quality of the Environment-Short Form.

scores of the participants and their affected body side or lesion type ($p>0.05$). The results of the comparisons between the participants' overall CIQ scores based on their sociodemographic and disease-related characteristics are presented in Table 3.

A statistically significant relationship was found between the participants' age, Brunnstrom stages, and their scores in FIM, SIS, FES, FSS, BDI, and MQE-SF with their CIQ scores ($p<0.05$). Table 4 shows the correlations between the independent variables of the participants and their CIQ scores.

DISCUSSION

Strokes result in physical and psychological impairments which have a negative relationship with the community participation of individuals. The qualifiers for activity and participation components are performance and capacity.⁵ The performance qualifier is the qualitative and quantitative definition of the behaviour or abilities shown for the action performed in the environmental conditions of the individual. Capacity defines how much an individual can perform a task or an action. This construct argues that individuals perform an activity with the maximum efficiency while performing an action.⁵ Therefore, this study aimed to

Table 3. Comparison of the clinical characteristics of the participants and their overall Community Integration Questionnaire scores (n=43)

			Frequency, (n)	Mean ± SD	p-value
Community Integration Questionnaire Overall Score	Lesion type	Haemorrhagic	19	6.47±5.10	0.623
		Ischemic	24	6.88±4.56	
	Walking aid	Using	22	4.09±3.19	0.001*
		Not using	21	9.43±4.63	
	Affected body side	Right	22	6.91±5.14	0.742
		Left	21	6.48±4.43	
	Gender	Male	30	7.33±4.52	0.108
		Female	13	5.23±5.13	

Statistically significant: * $p<0.05$, Mann-Whitney U test.

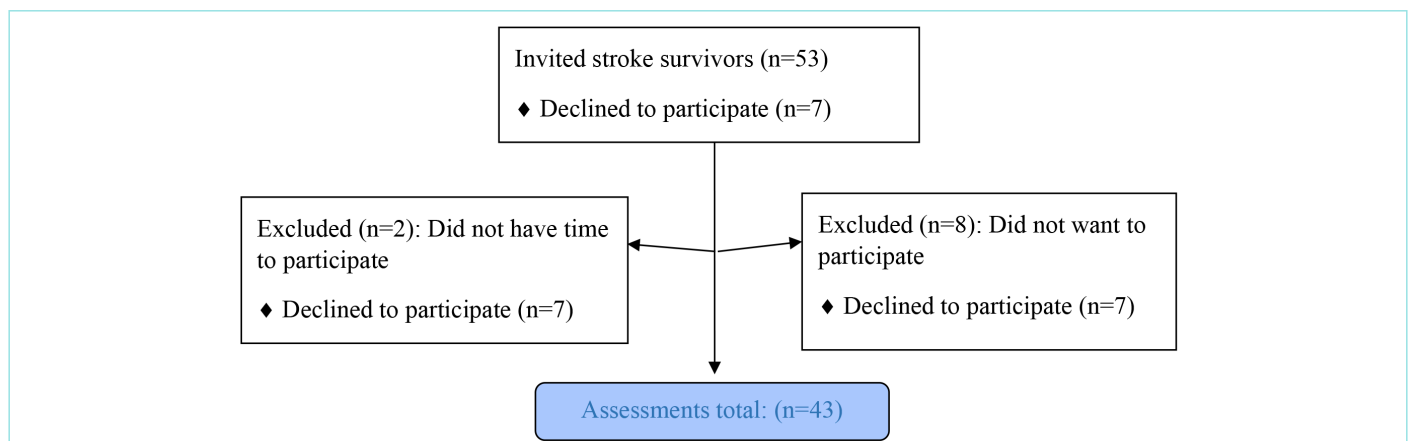
Table 4. Correlations between age, duration since stroke, education status and stroke-related tools and the Community Integration Questionnaire scores of the participants (n=43)

Variables		Community Integration Questionnaire Overall Score	Home participation	Society participation	Work-school
Age	r	-0.413	-0.354	-0.339	-0.317
	p	0.006*	0.020*	0.026*	0.038*
Duration since stroke	r	-0.170	-0.011	-0.175	-0.179
	p	0.275	0.942	0.261	0.251
Education status - (high school)	r	0.456	0.235	0.765	0.645
	p	0.227	0.975	0.199	0.083
Education status - (university)	r	0.346	0.855	0.003	0.217
	p	0.446	0.434	0.256	0.134
Brunnstrom stage (upper extremity)	r	0.455	0.383	0.411	0.452
	p	0.002*	0.011*	0.006*	0.002*
Brunnstrom stage (lower extremity)	R	0.608	0.546	0.527	0.564
	p	0.000*	0.000*	0.000*	0.000*
FIM	r	0.809	0.747	0.743	0.660
	p	0.000*	0.000*	0.000*	0.000*
SIS	r	0.766	0.649	0.744	0.576
	p	0.001*	0.001*	0.001*	0.001*

Table 4. Continued

Variables		Community Integration Questionnaire Overall Score	Home participation	Society participation	Work-school
FES	r	-0.752	-0.643	-0.714	-0.604
	p	0.001*	0.001*	0.001*	0.001*
FSS	r	-0.479	-0.433	-0.490	-0.344
	p	0.001*	0.004*	0.001*	0.024*
BDI	r	-0.783	-0.638	-0.798	-0.543
	p	0.001*	0.001*	0.001*	0.001*
MQE-SF	r	0.467	0.442	0.427	0.287
	p	0.002*	0.003*	0.004*	0.062

Statistically significant: *p<0.05, Spearman's correlation, FIM: Functional Independence Measure, SIS: Stroke Impact Scale, FES: Falls Efficacy Scale, FSS: Fatigue Severity Scale, BDI: Beck Depression Inventory, MQE-SF: Measure of Quality of the Environment-Short Form.



Flowchart 1. Diagram of recruitment of participants.

determine whether ICF-based biopsychosocial factors are related to the community participation levels of stroke survivors living in North Cyprus. It was hypothesised that ICF-based biopsychosocial factors are correlated with the community lives of stroke survivors living in North Cyprus to different degrees, and the results of this study confirmed this hypothesis.

We analysed participation not only as an overall community integration score, but also from the aspects of social, home and work/school participation. The community participation levels of our sample were low, while participation was highest in the social participation subscale. It was expected for the participants to report low in-home participation subscale scores, as they could have support from family members. It was also predicted for the participants to score low in work/school integration as many studies in the literature have supported this expectation.^{28,29}

We found a significant relationship between the sociodemographic characteristics and community participation levels of the stroke survivors. Those participants who used walking aids had lower community participation than those who did not use walking aids. Tyson and Rogerson³⁰ reported that walking aids are an environmental facilitator for stroke survivors, which may increase community participation, suggesting that supportive equipment can be beneficial in increasing the participation of those individuals who have had a stroke. However, the results of our study did not align with the study conducted by Tyson and Rogerson.³⁰ This may be because of

both physical infrastructure and psychological factors. As a physical infrastructure obstacle, the inadequacy of urban design in North Cyprus was identified as a limiting factor for participation.³¹ At the same time, it was reported that depression seen in individuals after a stroke causes individuals to feel as if they were being watched in their environment.³² Therefore, besides urban accessibility barriers, the use of walking aids by the participants who had had a stroke limited their participation, due to their perception of psychological pressure on them.

It is known that getting older restricts community participation due to physiological or biopsychosocial reasons.³³⁻³⁵ Our results were similar to those in the literature because it was found that community participation decreased with increasing age. It was expected for our sample to have low community participation rates as 74.42% of the participants were 65 years or older. On the other hand, the duration of living with a stroke was not found to be related to community participation, which was a parallel result to that reported by D'Alisa et al.²⁹ This may be because stroke survivors may have learnt how to live with their limitations and developed coping strategies. This shows that there is a need for further follow-up of stroke survivors in order to understand the degrees of their limitations over time.

We found that each ICF factor including body structure, functions, activities, participation, environmental factors, and personal factors had a different relationship with the community participation levels of the participants. The functional independence levels of the participants were found to be the most significantly related factor to

their community participation. "Function is a process, and the vector of change in function through time is, in part, determined by the unique interaction of an individual's genome with their environment, diet, and lifestyle".^{36,37} A previous study revealed that functional disability is the most significant variable which explains restriction in the community participation rates of stroke survivors.²⁹ Moreover, it was found that the current levels of the activities of daily living (ADL) of the participants of this study and their mobility stages were moderately correlated with their community participation levels. Mikołajewska³⁷ reported that especially the gait parameters, hand functions, and functional levels of stroke survivors were related to community participation among individuals with limited ADL. Other than ADL limitations, psychological factors and functional status, there are further factors which may have a negative impact on community participation among stroke survivors, such as comorbidities, coordination in exercise, family support, and the physical and social environment.³⁸⁻⁴⁰ Many studies have investigated the factors affecting community participation and return to society after a stroke.^{41,42} In our study, which is in line with the literature, it was found that the community participation levels of stroke survivors were affected by not only physical function, but also by personal and environmental factors. Therefore, it is important to think holistically and consider all aspects which can cause obstacles to participation in order to improve the rehabilitation outcomes of stroke survivors.

Our results also showed that the community integration of our participants was moderately obstructed by environmental factors. Although the relationship of community participation with environmental factors has not been evaluated as much as functionality, activity, or depression in the literature, it is known that environmental factors including the social and attitudinal aspects of one's environment have a high impact on the community participation levels of stroke survivors.⁴³ Due to the diversity of outcome measures in this area, one recent systematic review suggested the need for a core set of outcome measures to assess the long-term participation of stroke survivors in life situations.⁴¹ Although the tools which we used help to measure the quality of the environment in different aspects, we think that the use of a stroke-specific tool to measure the interaction between these variables and changes in community participation could give us a better view of the relationships with environmental factors.

Additionally, personal factors such as fatigue, depression, and self-efficacy related to falls were all found to have moderate relationships with community participation. Stroke survivors with functional limitations develop some compensatory movements while performing activities, and extra energy consumption was found to cause early fatigue and the subsequent development of withdrawal from activities.⁴⁴ Our participants' depression levels were at the borderline of clinical depression. This may be due to the participants having difficulty in performing activities which they found easy before their stroke. It has also been documented that the attitudes of people around hemiplegic people result in anxiety, a lack of respect and they affect the social roles of stroke survivors, which have negative relationships with their community participation.^{44,45} Stroke survivors with a history of falling are afraid of falling and have lower self-efficacy related to falls,⁴⁶ and it has been reported that individuals with poor participation have a greater fear of falling.^{47,48} Our results led to the conclusion that the fear of falling in stroke survivors can be due to their belief that, in the event of a possible fall, their health status may deteriorate, so they avoided community participation. Our

results highlighted that it is important to work with a multidisciplinary team in cases with long-term limitations as they are restricted in terms of different biopsychosocial factors.

Study Limitations

Our study had some limitations. Firstly, most of our participants were living close to the private centre where this study was conducted which is located in the central area of North Cyprus. This factor may affect the ability to generalise our results. Secondly, the assessments were performed by the same physiotherapist who was not blinded to the community integration levels of the participants. Lastly, as this was a cross-sectional study, our results do not indicate a causal relationship. Further studies with different methodologies to explore the causes of community participation are recommended.

CONCLUSION

This study revealed that the community participation levels of stroke survivors living in North Cyprus were related to the factors of the ICF-based biopsychosocial model. Therefore, in order to increase the community participation levels of stroke survivors, these individuals need to be assessed holistically by considering all factors of the ICF model, which will lead to better rehabilitation outcomes, and multidisciplinary rehabilitation approaches in this process are needed.

MAIN POINTS

- Holistic assessment is required in order to increase the community participation levels of stroke survivors.
- All factors of the ICF model had an impact on the community participation of stroke survivors.
- Multidisciplinary rehabilitation will result in better rehabilitation outcomes.

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ETHICS

Ethics Committee Approval: This study was approved by the Ethics Committee of European University of Lefke (approval number: ÜEK/50/01/02/1920/10, date: 11.02.2020).

Informed Consent: Written consent was obtained from those who agreed to participate.

Authorship Contributions

Concept: U.K., B.B.K., F.S.M., Design: U.K., B.B.K., F.S.M., Data Collection and/or Processing: U.K., B.B.K., N.G., F.S.M., Analysis and/or Interpretation: U.K., B.B.K., N.G., Literature Search: U.K., N.G., Writing: U.K., B.B.K., F.S.M.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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