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ORIGINAL REPORT

PERCEIVED PARTICIPATION AND AUTONOMY: ASPECTS OF FUNCTIONING AND CONTEXTUAL FACTORS PREDICTING PARTICIPATION AFTER STROKE

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***Objective:* To describe perceived participation and autonomy among a sample of persons with stroke in Iran and to identify different aspects of functioning and contextual factors predicting participation after stroke.**
***Design:* A cross-sectional study.**
***Subjects:* A total of 102 persons, between 27 and 75 years of age, diagnosed with first-ever stroke.**
***Methods:* Participants were assessed for different aspects of functioning, contextual factors and health conditions. Participation was assessed using the Persian version of the Impact on Participation and Autonomy questionnaire.**
***Results:* This study demonstrated that the majority of the study population perceived their participation and autonomy to be good to fair in the different domains of their participation, but not with respect to the autonomy outdoors domain. In addition, physical function was found to be the most important variable predicting performance-based participation, whereas mood state was the most important variable predicting social-based participation.**
***Conclusion:* The results emphasize the importance of physical function, mood state and access to caregiving services as predictors of participation in everyday life after stroke. Whilst there are two dimensions of participation in this Persian sample of persons with stroke, the factors explaining participation seem to be the same across the cultures.**

Key words: participation; stroke; rehabilitation; ICF; activities of daily living; occupational therapy.

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INTRODUCTION

Stroke is among the most common causes of death and disability worldwide (1, 2). Although more than 85% of strokes occur in low-to-middle-income countries, most research has been performed in high-income countries (2). Stroke can affect the afflicted person's functioning and cause the individual to experience chronic disability (1). Many people with stroke are not able to resume their previous roles in life or engage in various activities as they did in the past (3). Their participation in their everyday lives can be markedly restricted after stroke (3–7).

Participation is defined as "involvement in a life situation" according to the International Classification of Functioning, Disability and Health (ICF). It has been suggested to be an essential part of a global model of health, shifting the focus from impairment and handicap (ICIDH) to positive aspects of functioning and participation in a person's everyday life (8). The concept of functioning in this study refers to the ICF term, used as an umbrella term encompassing body functions, activities and participation. The ICF aims to reflect the dynamic interaction between impairments, activities, participation, contextual factors and health conditions. In particular, the ICF describes participation as being influenced by impairments, activity limitations, environmental factors and personal characteristics (8). The predictors of participation have been explored in previous studies (3–7). Impairments and activity limitations were identified as aspects of functioning predicting post-stroke participation (3–7). Participation might also be affected by contextual factors such as personal and environmental factors (8).

Previous studies have found physical and psychological impairments to be among the best predictors of participation in the domains of social roles and daily activities (3–5). Restrictions in participation were also found to be associated with post-stroke cognitive impairments (4, 5, 7). Age (3–6), gender (9, 10), living environments (9), activity limitations (disabilities) (3, 4, 6, 7) and co-morbidity (3–5) were also found to be important in predicting participation among persons with stroke. Most of the literature regarding participation after stroke relates to studies conducted in western countries, and research about participation after stroke and the predictors in the non-western world is limited. A cross-sectional study comparing participation in Chinese and UK populations suggested that the concept of participation is applicable outside western cultures. One conclusion from the study is that participation seems overall to be a coherent concept used in different cultures and health settings, although variations can still be encountered. Cultural differences identified were that

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the Chinese subjects valued mobility, physical independence and the possibility to occupy themselves to a larger extent than the UK subjects. Significant differences were also found in age, gender and health status subgroups among the Chinese subjects (11). Chau et al. (9) found functional ability, depressive symptoms, self-esteem, gender, age and living status to be predictors of participation restriction in their Asian sample. In a Nigerian sample of persons with stroke, Hamzat & Peters (12) found a clear association between motor function and the level of participation.

Although some studies have shown that stroke affects different aspects of functioning that impact on participation, there is still a lack of studies measuring participation as a comprehensive concept consistent with the ICF framework. Furthermore, participation and performance are not synonymous (13–15). On the contrary, it has been argued that participation is a domain of functioning that encompasses more than the actual performance of activities (14–16). Literature concerning the conceptualization of participation stresses aspects such as the subjective experience and the individual perspective as being important considerations when assessing participation (13–17). Cardol et al. (14) suggested that the concept of autonomy is crucial to the proper operationalization of participation and is the prerequisite for participation and therefore the ultimate goal for rehabilitation. Participation is involvement in life situations that also includes the concept of "autonomy", regarding to what extent individuals are able to control their own lives, even if they are not actually performing activities themselves. Hence, participation assessment must include not only the performance-based indicators, but also the fulfilment of personal goals and societal roles (18). Autonomy can be viewed not only as a key determinant of participation (14, 18), but also as a conceptual basis for distinguishing the boundary between activity and participation (19). Mayer and colleagues found functional level, depression and hemisphere lesion to be the factors associated with participation and autonomy after stroke (10).There is still a shortage of studies focusing concurrently on these two concepts. On the other hand, participation scores should not be compared with the societal norms of the general population, but instead with their own perception of participation (17, 20). Considering all areas mentioned, Cardol et al. (20–23) made a significant contribution by developing an instrument, the Impact on Participation and Autonomy (IPA). The aim was to focus on self-perceived participation as well as perceived problems with participation. The instrument emphasizes personal experiences of participation and autonomy among participants rather than the degree to which they are considered to be restricted in participation compared with societal norms (20). Autonomy was also added to the assessment of participation (14). Autonomy, as Cardol et al. (14) concluded, is based on the concept of respect for thoughts, will, decisions and actions of other persons. In a previous study of a sample of persons with stroke performed using the psychometric evaluation of the Persian version of the Impact on Participation and Autonomy questionnaire (IPA-P), two dimensions for perceived participation and autonomy were revealed. These were performance-based participation and social-based participation (19). This led us to further explore a possible association between different aspects of functioning and contextual factors, and two different dimensions of participation.

In summary, current literature demonstrates that most of the studies focusing on participation have been performed in American/European countries. Exploratory studies in different societal backgrounds, such as that of Iran, are required to establish whether the findings differ from those of the western studies. The results of the psychometric study of IPA in Iran point to some cultural differences in the operationalization of participation in this eastern context (19). Moreover, to our knowledge, no study has been conducted in Iran focusing on participation in different life situations after stroke. The overall aim of this study was to describe perceived participation and autonomy among a sample of persons with stroke in Iran, and also to identify different aspects of functioning and contextual factors predicting participation after stroke.

METHODS

Design and participants

The potential participants in this cross-sectional study were all the people previously admitted between May 2003 and March 2007 to two neurological wards at two university hospitals and two university rehabilitation clinics in Tehran following a stroke. They also had to meet the following inclusion criteria: (*i*) had a confirmed diagnosis of a first-ever stroke; (*ii*) were no older than 75 years of age to prevent participation restrictions resulting from ageing; (*iii*) had their stroke between 5 months and 3 years ago; (*iv*) were able to communicate in Persian when responding to questions; (*v*) had sufficient cognitive function verified by scores greater than 22 on the Mini-Mental State Examination scale (24) similar to previous studies (3, 4, 7) , to prevent any possible diagnosis of dementia and/or to be able to understand and answer the questions; (*vi*) had no evidence of co-existing diagnosed disorders leading to disabling conditions; (*vii*) were not diagnosed with a sub-arachnoid haemorrhage type of stroke; (*viii*) lived in Tehran or surrounding areas; and (*ix*) lived at home (not in an institution). Inclusion items (*iii*) and (*vii*) were selected in order to limit the time period after stroke and to rule out cases with a sub-arachnoid haemorrhage diagnosis to provide a homogenous sample with a variation of different levels in functioning.

All the individuals who met the inclusion criteria were eligible to participate and were asked to take part in the study. In total, 131 persons who met the inclusion criteria were identified from the databases at the 4 centres and 102 persons (age range 27–75 years) agreed and gave their informed consents both orally and in writing to participate in this study. The characteristics of the participants are presented in Table I. This study was approved by the National Ethical Committee of the Ministry of Health and Medical Education, Iran.

Variables and assessment instruments

Impact on Participation and Autonomy questionnaire (IPA). Participation was assessed using the IPA questionnaire (20–23). The IPA is a generic self-report questionnaire (25), which examines perceived participation and autonomy using 32 items in 5 domains addressing different life situations including: (*i*) autonomy indoors (7 items); (*ii*) family role (7 items); (*iii*) autonomy outdoors (5 items); (*iv*) social relations (7 items); and (*v*) work and education (6 items). This questionnaire also provides the possibility to evaluate people's perceived problems with participation, using 9 items covering 9 different aspects of participation and autonomy (sub-domains). The perceived participation and autonomy for each item is graded on a 5-point rating scale, ranging from 0 (very good) to 4 (very poor). Each sub-domain

Table I. *Aspects relating to functioning, contextual factors and health conditions in the study (*n = *102)*

Variable[a]	Total	Variable[b]	Total
Age, years, mean (SD) [range]	58.3 (11.9) [27–75]	MMSE score, mean (SD) [range]	26.3 (2.5) [23–30]
Gender, *n* (%)		HADS score, mean (SD) [range]	7.8 (4.9) [0–20]
Male	60 (58.8)	FMA score, mean (SD) [range]	68.4 (30.6) [8–100]
Female	42 (41.2)	SIS-16 score, mean (SD) [range]	66.2 (21.5) [9.4–100]
Marital status, *n* (%)		BI score, mean (SD) [range]	82.6 (18.9) [20–100]
Single	2 (2)	Mobility, *n* (%)	
Married	85 (83.3)	Using wheelchair	1 (1)
Widowed/divorced	15 (14.7)	Using walking aid	29 (28.4)
Educational status, *n* (%)		No aid	72 (70.6)
Illiterate	27 (26.5)	Type of stroke, *n* (%)	
Primary	35 (34.3)	Ischaemic	88 (86.3)
Secondary	27 (26.5)	Haemorrhagic	14 (13.7)
Academic	13 (12.7)	Hemisphere lesion, *n* (%)	
Employment status, *n* (%)		Left hemisphere	45 (44.1)
Employed	19 (18.6)	Right hemisphere	52 (51.0)
Homemaker	34 (33.3)	Others	5 (4.9)
Retired	25 (24.5)	Time after stroke, months, mean (SD) [range]	17.7 (10.1) [5–36]
Unemployed	24 (23.5)		
Living status, *n* (%)			
Living alone	6 (5.9)		
Living with others (family, relatives, friends)	96 (94.1)		
Access to caregiving services, *n* (%)			
No support is needed	23 (22.5)		
Receiving support	73 (71.6)		
No support, but needed	6 (5.9)		
Access to rehabilitation services, *n* (%)			
Receiving services	82 (80.4)		
No services	20 (19.6)		
Ethnicity, *n* (%)			
Azeri	24 (23.5)		
Baloch	2 (2.0)		
Gillak	11 (10.8)		
Kurd	3 (2.9)		
Persian	62 (60.8)		

[a]Aspects relating to contextual factors.

[b]Aspects relating to functioning and health conditions.

ADL: activities of daily living; SD: standard deviation; MMSE: Mini-Mental State Examination; HADS: Hospital Anxiety and Depression Scale; FMA: Fugl-Meyer Motor Assessment; SIS-16: Stroke Impact Scale – short version; BI: Barthel's ADL index.

is scored on a 3-point rating scale, ranging from 0 (no problem) to 2 (severe problems). A second scale addressing perceived problems with participation also forms a part of the instrument, but was not used as this was not the focus of this study. The psychometric evaluation of the original version of the IPA has demonstrated different aspects of its validity, reliability and responsiveness to change (21–23). Neither the work and education domain nor the IPA second scale have been examined in Dutch validation studies (21, 22); however, the psychometric properties of the IPA, including the aforementioned showed promise in recent studies (26, 27). More detailed information about the IPA questionnaire can be found elsewhere (20–23, 28).

The Persian version of this instrument, the IPA-P was produced in a previous study based on related guidelines (forward-backward translation procedure) (19). The psychometric evaluation of the Persian version of the IPA was then performed using the Rasch measurement model. The objective was: (*i*) to convert the ordinal data into interval measures in logits; (*ii*) to ensure the validity of the IPA scores as valid measures for use in linear regression analyses; and, finally, (*iii*) to evaluate whether the items of the scale could measure a unidimensional construct (19). For this purpose, each domain of the IPA-P scale I, excluding the work and education domain, was firstly separately evaluated to examine whether they could function properly in the Persian version of IPA. In the second step of the analysis, the Rasch-generated person estimates of each domain were used to evaluate the extent of possible correlation between participants' estimates in different domains. According to the results of the Pearson correlation analysis (2-tailed; $p < 0.05$), and the main criterion in the study ($r > 0.60$), 3 domains: autonomy indoors, family role, and autonomy outdoors, were combined and considered as 1 set of items for the participation and autonomy scale (IPA scale I). In contrast, the social relations domain was considered as another set of items for the IPA scale I. The results of this study indicated 2 dimensions for perceived participation and autonomy (IPA scale I), called performance-based and social-based participation. The results supported the psychometric properties of each dimension of perceived participation and autonomy scale in the IPA-P when used for persons with stroke (19).

Aspects relating to body function and activity (see Table I).

The Mini-Mental State Examination scale (MMSE) (24) was used to assess cognitive function. This instrument is used as a screening tool for examining the cognitive level in persons with cognitive impairments. A normal range has been established at 24–30 points. The validity, reliability and sensitivity of the instrument has been supported when used in cognitive diagnosis groups (24). Participants with MMSE scores exceeding 22 were included in this study. The total score range was used for regression analyses in this study.

The Hospital Anxiety and Depression Scale (HADS) (29) was used to assess the mood state. For this purpose, the depression scale, including 7 items, was used to evaluate the mood state. This scale ranges from 0 to 21, with a cut-off score of above 10 indicating a depressed state. This cut-off point is used clinically as a diagnosis criterion. This questionnaire has proved to be valid, reliable and sensitive for use with different populations (30). A total score range of 0–21 was considered for regression analyses in this study.

The Fugl-Meyer Motor Assessment (FMA) (31) was used to assess motor function. The FMA evaluates motor function in the upper and lower extremity by awarding a total maximum score of 100, which defines normal motor function. The maximum score for upper extremity is 66 and for lower extremity 34. A score of less than 50 represents severe motor impairment. Scores between 50 and 84 represent marked motor impairment. A score of 85 to 95 indicates a moderate impairment, and finally a score of 96–99 implies only a slight impairment (32). The reliability, validity and responsiveness of this assessment tool has been supported (33). A total FMA score range between 0 and 100 was considered for regression analyses in this study.

The Short version of Stroke Impact Scale (SIS-16) (34) was used to assess physical function. The SIS-16 is an instrument for assessing physical function in patients with stroke. It is an instrument that is specifically designed to measure a wide range of post-stroke physical limitations. The SIS-16 consists of 16 items investigating 3 dimensions, including hand function, mobility and activities of daily living (ADL). Scores range from 0 to 100 using a 5-point rating scale. It has been proved to be psychometrically sound in terms of reliability, validity and responsiveness over time (34). A total score range between 0 and 100 was used for regression analyses in this study.

Barthel's ADL Index (BI) (35) was used to assess dependence in ADL and was categorized into 3 grades of dependency (36). The BI scores show the level of dependency in ADL, ranging from 0 to 100. Scores less than 60 (0–55) indicate major dependency, 60–90 moderate dependency and greater than 90 (95–100) independency (36). A total score range between 0 and 100 was used for regression analyses in this study.

Mobility was assessed by asking each participant if he/she could transfer themselves using a wheelchair, walking aid, or no aid. For the regression analyses in the study the variable was dichotomized, creating two groups, one being if the person used an aid or wheelchair, the other group being no aid required.

Aspects relating to contextual factors including personal and environmental factors. The personal factors included age, gender, marital status, educational status, employment status and living status. The environmental factors included ethnicity, access to caregiving services and access to rehabilitation services. More detailed information is presented in Table I. Educational status was checked using the medical records and during the personal interview. Access to caregiving services included both physical and emotional support that the person received from formal and/or informal caregivers and/or community resources in order to be able to carry out the daily life activities.

Aspects relating to health conditions included type of stroke, hemisphere lesion, time after stroke (in months) verified by medical documents, such as computed tomography (CT) scan, magnetic resonance imaging (MRI), or medical records available at the hospital or clinic (see Table I).

The assessment protocol also included questions concerning aspects relating to contextual factors and health conditions.

Data collection procedures

The data was collected by the first author who assessed participants specifically for the study in the clinical settings in which they had previously been admitted as a person diagnosed with stroke during the period between May 2003 and March 2007, i.e. the hospitals or rehabilitation clinics. The participants who met the inclusion criteria were informed orally and in writing about the study and the data collection procedure and invited to participate in the study. The evaluation session began by collecting the data regarding contextual factors and health conditions. It then continued by assessing different aspects of functioning and participation. Instead of having to complete the answers by themselves, all the participants were interviewed to acquire their responses to the IPA items as well as the HADS and the SIS-16 items. This decision was made by the research group in order to be able to include the illiterate participants, who made up 26.5% of the study population, in the study. The participants were instructed how to respond and score the items before being assessed by the researcher.

Statistical analysis

Descriptive statistics were used in this study to describe the characteristics of the participants with respect to different aspects of functioning scores, contextual factors and health conditions. Descriptive analysis was also used to show the frequency distribution of perceived level of participation separately for each IPA domain according to the original domain mean score. The mean score for each IPA domain was calculated to provide more description regarding the perceived level of participation and autonomy in each domain. The mean score was calculated by summing up the raw scores in each IPA domain and dividing that by the number of items answered in the domain. The mean score could be calculated for each domain if at least 75% of the domain items had been answered by the participant. A higher score indicates more restrictions in participation and autonomy, which thereby implies a lower level of participation and autonomy. The work and education domain was omitted due to the low number of persons applicable ($n=19$) for inclusion in the validation study analysis (19).

Two linear measures of "participation" were created, one for performance-based participation and one for social-based participation (19). As these two dimensions were demonstrated to be unidimensional and met the assumptions of the Rasch model (19), the linearized Rasch-generated person estimates produced by the Rasch rating scale analyses were used in order to further regression analyses.

The associations in this study between different aspects of functioning, contextual factors and health conditions with dependent variables (two dimensions of participation) were examined based on the ICF framework suggestion concerning the possible influence of impairments, activity limitations and contextual factors on participation. This examination was performed to identify statistically significant correlated variables with dependent variables. For this purpose, univariate regression analyses were used for the continuous independent variables, and the univariate analysis of variance (Uni ANOVA) for categorical variables. The univariate analyses were used to guide the choice of which variables should be included in the linear multiple regression analyses; intended to explore their influence on each dimension of participation.

The variables that, separately, were significantly associated with each of these two dimensions of participation ($p<0.05$) according to the results of the univariate analyses (see Tables III and IV), were selected as independent variables included in 2 different linear multiple regression analyses. The independent variables included in the linear multiple regression analysis with the dependent variable, performance-based participation were: (*i*) age; (*ii*) educational status; (*iii*) access to rehabilitation services; (*iv*) cognitive functions; (*v*), mood state; (*vi*) motor function; (*vii*) physical function; (*viii*) dependence in ADL; and (*ix*) mobility.

The independent variables included in a linear multiple regression analysis with the dependent variable, social-based participation were: (*i*) access to caregiving services; (*ii*) mood state; (*iii*) physical function; and (*iv*) dependence in ADL. Variables, age was ratio, educational status, access to caregiving services, access to rehabilitation services, and mobility were all dichotomized, and cognitive functions, mood state, motor function, physical function, and dependence in ADL were continuous. Dependent variables, performance-base participation and social-based participation, were treated as linear. Other variables were not included in the multiple regression analysis because there were no significant associations based on univariate analyses between them and the dependent variables (see Tables III and IV).

Two different multivariate regression analyses were conducted; including all identified significant independent variables from the first step analyses. Thereafter those variables that did not emerge as statistically significant in the regression model were excluded. The normal distribution of 2 dependent variables was analysed statistically using the Kolmogorov-Smirnov test, and visually using histograms. The significance level was set at $p < 0.05$ and the confidence intervals at 95%. A normal probability plot was used for visual inspection if the data fulfilled the criteria for model assumption. The possible presence of multicollinearity in the data was explored based on tolerance statistics, squared multiple correlation ($SMS = R^2$), and finally variance inflation factor (VIF) according to the related criteria (37). The SPSS software program, version 15.0, was used to perform the descriptive and regression analyses in this study.

RESULTS

The characteristics of the study population are presented in Table I in terms of different aspects of functioning, contextual factors and health conditions. The gender distribution in the study was more or less even. Forty-three percent of the participants were independent in ADL, 46% were moderately dependent and approximately 11% were severely dependent. Twenty-nine percent of the participants were depressed. The evaluation of motor function in terms of the participants' level of impairment showed that 30% of them had severe impairment, 25% marked impairment, 19% moderate impairment, 17% slight impairment and 9% had no motor impairment (normal).

Table II presents the frequency distribution of the perceived level of participation and autonomy in the participants for each IPA domain expressed as a percentage and also the separate mean scores of each IPA domain. Table II shows that the least restrictions were perceived by participants in the autonomy indoors and social relations domains, compared with other domains. Most reports of very good to fair participation were found in the autonomy indoors, social relations and family role domains, respectively. In the autonomy indoors domain 100% of the participants perceived that their participation was very good to fair; among these approximately 7% perceived no restrictions in their participation, and no-one reported perceiving poor or very poor participation in that domain. In the social relations domain only 2% reported poor or very poor participation and autonomy, and the rest of the participants reported their participation to be good to fair. In the family role domain 75.5% of the study population reported their participation as being good to fair. The most participation restrictions were found in the autonomy outdoors (32.4%) domain where participants perceived their participation to be poor or very poor. Most reports of poor to very poor participation were found in items of the autonomy outdoors and family role domains, respectively (see Table II).

Table II. *Frequency distribution of perceived level of participation and autonomy for each domain, based on domain mean scores, measured by Impact Participation and Autonomy (IPA) in percentage, in a sample of persons with stroke from Tehran, Iran. All participants answered at least 75% of the items (*n*=102)*

	Domain mean scores[a]			
IPA domains	Mean (SD) [Range]	Very good 0 %	Good–Fair 1–2 %	Poor–Very poor 3–4 %
Autonomy indoors	0.96 (0.6) [0–2.71]	6.9	93.1	–
Family role	1.96 (1.1) [0–4]	1.0	75.5	23.5
Autonomy outdoors	2.35 (0.9) [0.2–4]	–	67.6	32.4
Social relations	1.48 (0.7) [0.14–3.57]	–	98.0	2.0

Each domain mean score was estimated only if at least 75% of the items were responded to by the participant.

[a] Higher scores represent more restrictions in participation and lower level of participation.

SD: standard deviation.

The findings of the univariate regression analyses between the independent variables in the study including different aspects of functioning, contextual factors, and health conditions and the dependent variables, i.e. performance-based participation and social-based participation are presented separately in Tables III and IV for continuous and categorical variables.

The results of the gender comparison of participation and autonomy in different domains of IPA-P are presented in Table V and Table IV for each dimension of participation.

According to the multivariate regression analyses findings, physical function and mood state were found to be the

Table III. *Reports of associations between continuous variables and measures of performance-based participation and social-based participation as dependent variables (*n = *102)*

	Performance-based participation			Social-based participation		
Independent variable	*p*-value	B	CI	*p*-value	B	CI
Age	0.008	0.029	0.008 to 0.051	0.476	0.006	–0.011 to 0.023
Time after stroke	0.838	0.003	–0.023 to 0.029	0.586	–0.006	–0.025 to 0.014
MMSE score	0.005	–0.145	–0.245 to –0.044	0.053	–0.077	–0.156 to 0.001
HADS score	<0.001	0.167	0.125 to 0.210	<0.001	0.109	0.074 to 0.144
FMA score	<0.001	–0.018	–0.026 to –0.010	0.226	–0.004	–0.011 to 0.003
SIS-16 score	<0.001	–0.049	–0.056 to –0.041	<0.001	–0.021	–0.030 to –0.013
Barthel's ADL index	<0.001	–0.040	–0.052 to –0.029	0.007	–0.014	–0.025 to –0.004

B: regression coefficient; CI: confidence interval; ADL: Activities of Daily Living; MMSE: Mini-Mental State Examination; HADS: Hospital Anxiety and Depression Scale; FMA: Fugl-Meyer Motor Assessment; SIS-16: Stroke Impact Scale – short version.

Table IV. *Reports of associations between categorical variables and measures of performance-based participation and social-based participation as dependent variables (*n = *102)*

	Performance-based participation			Social-based participation	
Independent variable	Frequency	Mean (SD)	*p*-value	Mean (SD)	*p*-value
Gender					
M	60	–0.29 (1.3)	0.171	–0.51 (0.9)	0.443
F	42	–0.66 (1.3)		–0.67 (1.2)	
Marital status					
Married	85	–0.51 (1.4)	0.279	–0.59 (0.9)	0.792
Not married	17	–0.12 (0.8)		–0.52 (1.4)	
Educational status					
Educated	75	–0.63 (1.3)	0.016	–0.63 (1.0)	0.438
Not educated	27	–0.09 (1.4)		–0.45 (1.11)	
Employment status					
Worked	19	–0.87 (1.3)	0.118	–0.68 (0.8)	0.643
Did not work	83	–0.34 (1.3)		–0.56 (1.1)	
Access to caregiving[a]					
Had support	73	–0.08 (1.1)	0.522	–0.58 (1.0)	0.021
No support	6	0.22 (0.7)		0.40 (0.84)	
Living status					
Living alone	6	–0.23 (0.6)	0.697	–0.49 (1.0)	0.830
Living with others	96	–0.45 (1.3)		–0.58 (1.0)	
Rehabilitation services					
Had services	82	–0.31 (1.3)	0.047	–0.57 (1.0)	0.791
No services	20	–0.97 (1.5)		–0.63 (1.2)	
Ethnicity					
Persian	62	–0.42 (1.3)	0.88	–0.56 (1.1)	0.839
Not Persian/others	40	–0.47 (1.5)		–0.61 (0.9)	
Type of stroke					
Ischaemic	88	–0.46 (1.4)	0.778	–0.55 (1.0)	0.46
Haemorrhagic	14	–0.35 (0.7)		–0.77 (1.0)	
Hemisphere lesion					
Left hemisphere	45	–0.34 (1.2)	0.538	–0.57 (1.0)	0.649
Right hemisphere	52	–0.47 (1.5)		–0.62 (1.1)	
Others	5	–1.02 (0.8)			
Mobility					
Used aid/wheelchair	30	0.59 (0.9)	<0.001	–0.38 (0.6)	0.208
No aid/wheelchair	72	–0.87 (1.3)		–0.66 (1.1)	

The mean scores are presented based on Rasch-generated values of performance-based participation and social-based participation. The higher mean scores represent less participation.

[a] Twenty-three out of 102 did not need any support, while the rest of the participants ($n = 79$) needed support.

SD: standard deviation.

Table V. *Reports of gender comparison in measures of perceived participation in each Impact of Participation and Autonomy (IPA) domain (*n = *102)*

IPA domain / Gender (M/F: 60/42)	Mean (SD)	*p*-value*
Autonomy indoors	–1.98 (1.6)	0.106
	–2.63 (2.4)	
Family role	–0.51 (2.5)	0.026
	–0.53 (1.9)	
Autonomy outdoors	0.64 (1.6)	0.804
	0.55 (1.7)	
Social relations	–0.51 (0.9)	0.443
	–0.67 (1.2)	

The mean scores are presented based on Rasch-generated values of perceived participation and autonomy in each IPA domain. Higher mean scores represent less participation.

*p-value <0.05.

SD: standard deviation.

most influential variables associated with performance-based participation. It could be concluded from this that having higher levels of physical function and higher scores for mood state could be associated with higher levels of performance-based participation. This final model explained approximately 67% of the total variance in performance-based participation. In this model, physical function alone explained 62% of the total variance in performance-based participation, and mood explained 5% of the total variance in performance-based participation (Table VI).

Mood state, physical function, and access to caregiving services were found to be the most influential variables associated with social-based participation, which explained 42% of its total variance. This means that higher scores for mood state, higher levels of physical function, and having access to caregiving services contribute significantly to higher levels of social-based participation. In this final regression model, mood alone explained 29% of the total variance in social-based

Table VI. *Results of multivariate analyses performed with performance-based participation as dependent variable (*n = *102)*

Independent variable	*p*-value	B	CI
Multivariate analyses[a]			
Intercept	0.074	2.414	–0.240 to 5.069
Age	0.129	0.012	–0.004 to 0.027
Educational status (educated or not)	0.575	–0.123	–0.559 to 0.312
Access to rehabilitation services (had services or not)	0.316	–0.232	–0.690 to 0.225
MMSE score	0.126	–0.057	–0.129 to 0.016
HADS score	0.001	0.07	0.032 to 0.109
FMA score	0.516	–0.003	–0.010 to 0.005
SIS-16 score	<0.001	–0.04	–0.054 to –0.026
Barthel's ADL index	0.281	0.008	–0.007 to 0.024
Mobility (used aid or not)	0.867	–0.042	–0.535 to 0.451
Best model[b]			
Intercept	<0.001	1.652	0.862 to 2.442
SIS-16 score	<0.001	–0.040	–0.048 to –0.031
HADS score	<0.001	0.070	0.032 to 0.107

[a]Total $R^2=0.689$ (adjusted $R^2=0.658$).

[b]Total $R^2=0.666$ (adjusted $R^2=0.659$).

B: regression coefficient; CI: confidence interval; MMSE: Mini-Mental State Examination; HADS: Hospital Anxiety and Depression Scale; FMA: Fugl-Meyer Motor Assessment; SIS-16: Stroke Impact Scale – short version.

participation. Physical function explained 7%, and access to caregiving services explained 6% of the total variance in social-based participation (Table VII). No evidence was found of multicollinearity among independent variables in related measurements, based on the criteria (37).

DISCUSSION

According to the findings of this study the majority of the study population perceived their participation and autonomy as being good to fair in the different domains of their participation except in the autonomy outdoors domain, where one-third of the study population perceived their participation to be poor to very poor. The main finding of this study was that physical function and mood state were found to be the most influential variables explaining performance-based participation after stroke. In social-based participation mood state, physical function and access to caregiving services were revealed to be the most influential variables. These differences support our findings on the two dimensions of participation and demonstrate an interesting divergence from studies on IPA in the western world, where participation was found to be a unidimensional construct in different populations (21, 22, 26–28, 38). Cultural differences regarding family-orientation might be one explanation, since Iran can be regarded as being a very family-oriented society with clear roles within the family and distinct expectations with respect to care and support within the family context (19), all of which shape and reflect their social environment. A recent sociological study in Iran shows that the family is the hub of the culture and the core of the social networks in Iran and individuals maintain close ties to their kin throughout their lives (39). However, participation defined from a western perspective has also been discussed in both quantitative and qualitative studies as a complex and multi-dimensional construct and as potentially having different dimensions (13, 15, 40, 41). As concluded by Whiteneck & Dijkers (17), there can be various distinct dimensions to consider rather than one single dimension of participation. Future studies are essential to explore participation and the possible dimensions in different societal and cultural backgrounds.

Table VII. *Results of multivariate analyses performed with social-based participation as dependent variable (*n = *102)*

Independent variable	*p*-value	B	CI
Multivariate analyses[a]			
Intercept	0.021	–1.218	–2.246 to –0.19
Access to caregiving services (had support or not)	0.007	0.957	0.269–1.644
HADS score	0.003	0.065	0.023–0.107
SIS-16 score	0.001	–0.025	–0.040 to –0.01
Barthel's ADL index	0.265	0.008	–0.006 to 0.022
Best model:[b]			
Intercept	0.038	–1.040	–2.020 to –0.060
HADS score	0.002	0.068	0.026–0.110
SIS-16 score	<0.001	–0.019	–0.029 to –0.009
Access to social support	0.005	0.996	0.311–1.680

[a]Total $R^2=0.433$ (adjusted $R^2=0.402$).

[b]Total $R^2=0.423$ (adjusted $R^2=0.400$).

B: regression coefficient; CI: confidence interval; HADS: Hospital Anxiety and Depression Scale; SIS-16: Stroke Impact Scale - short version.

Although the majority of the population perceived the family role domain as good to fair, approximately 24% did nevertheless perceived this domain to be poor to very poor (see Table II). Since approximately half of the participants were female, the family role domain was expected to be reported as being more restricted in this sample. However, the results of gender comparison were contrary to our expectations. No gender differences were found in the results of the univariate analyses with two dimensions of participation (see Table IV). However, when considering each domain one significant gender difference was found in the family role domain. The findings show that men perceived less participation and autonomy in their family role compared with women (see Table V). Since men in this cultural context traditionally have the role of head of the family, this role might affect perception of participation and autonomy to a larger extent after stroke than the traditional woman's role of domestic and household responsibilities. Interestingly, the results of other studies (mostly western) reveal contrasting findings. Sturm et al. (6) have not found gender to be independently associated with participation restrictions after stroke, while some other studies found gender to be among the factors predicting participation restrictions (9, 10).

In the results, physical function was found to predict both dimensions of participation and it was the most important influential variable explaining performance-based participation. This finding suggests a consideration of the impact of physical function as one important aspect of functioning (both body function and activity) in facilitating performance-based participation. The importance of physical function confirms the necessity of evaluating and promoting physical performance in order to facilitate higher levels of participation after stroke. This applies especially to those daily activities requiring performance-based aspects of participation in which a person's "doing" is much more of a concern. This result is in line with previous studies concerning physical impairments being among the best predictors of participation after stroke (3–5). Physical impairment and disability have previously been identified as determinants of participation (6, 7). Therefore interventions aimed at reducing impairment and disability are most effective in increasing participation after stroke (6).

Mood state was also found to predict participation in both dimensions, the stronger relationship being with social-based participation. This result emphasizes the importance of mood state as an important aspect of functioning (body function) in enhancing social-based participation. Other studies have come up with the same results, supporting our findings regarding the importance of psychological functions in predicting participation among persons with stroke (3–5). Cardol et al. (20) found that emotional distress was the most important factor contributing to restrictions in participation among adults with chronic conditions including stroke. The association with mood emphasizes the importance of depression after stroke as a determinant of participation restrictions (3–7, 9). The findings of this study suggest that the psychological consequences should be taken into account as soon as possible after stroke. This underlines the necessity of evaluating and treating possible psychological consequences resulting from stroke, parallel to rehabilitation programmes, to thereby facilitate participation in different daily activities for the persons involved. Previous studies found physical function and depression to be among the important factors predicting participation restriction in long-term post-stroke in both the eastern and the western world (7, 9).

Access to caregiving services was a predictor only of social-based participation and not for the other dimension of participation in this study. The association between this predictor and social-based participation demonstrates that persons with stroke need to receive caregiving services in performing their daily activities, both physically and emotionally, in order to participate in social activities. The findings show that among those who received caregiving services in this sample ($n=73$), approximately 97.3% received support from informal caregivers, including family, relatives, friends, neighbours, etc. Approximately 6.8% received support from formal caregivers and only 1.4% received community services from governmental/non-governmental associations and organizations. These results also indicate the importance of the family as an important part of this socio-cultural context providing the major part of social support for persons with stroke rather than formal caregiving provided by the community. This study emphasizes the necessity of having access to social support as an environmental factor influencing social participation, as well as its importance in person-environment interaction to promote participation after stroke. Other studies have found that social support can moderate the effects of functional limitation on participation for persons with stroke (7, 42). The findings of this study support taking the family system into account from the first step of rehabilitation as an important predictor to facilitate social participation in this socio-cultural context.

Comparing the results of the univariate analyses reveals a lower number of variables significantly associated with social-based participation compared with performance-based participation. On the other hand, comparing the total variances explaining two dimensions of participation reveals that the variables predicting performance-based participation could explain a larger amount of the total variance (69%) than the variables predicting social-based participation (43%). One possible reason could be the non-inclusion of other variables explaining social-based participation in the study. These variables were precisely those that could influence our model. There are probably other effective variables, such as environmental factors, which could have been overlooked in this study. Further studies are needed to find the possible variables explaining different aspects of participation.

Interestingly, the time after stroke was found to be unassociated with participation (none of the dimensions). However, comparing the regression coefficient (B) among those dimensions shows that the pattern could be different for the two dimensions of participation (see Table III). Another interesting finding of this study was that no significant association was found between age and social-based participation, while there was a significant association between this variable and performance-based participation in the univariate analyses (see Table IV). Chau et al. (9) found age to be among the factors that had a direct effect on participation restrictions among their Asian sample of persons with stroke. Age was also found to be important in predicting participation in some western studies (3–6).

Although the results of the univariate analysis exposed cognitive function associated with two dimensions of participation, this factor was not identified in the final model as a predictor of participation. Unlike Clarke et al. (7), Strum et al. (6) also found that cognition was not an independent determinant of participation restrictions (6). One possible reason could be excluding participants with an MMSE score less than 22 to preserve the quality of the data. One could say that this can show that cognitive function seriously influences participation. However, a previous study shows that the mean score of MMSE was high among participants even 5–7 days after stroke with the cognitive function range (23–30) and median of 27 (43). Although the IPA manual prescribes no recommendation regarding using for people with cognitive problems, in our judgment the questions to be answered seem difficult for those with cognitive deficits. This is, of course, a limitation in our study that makes conclusions about cognition and participation uncertain.

Similar to previous studies (3, 4, 7), this study recruited those people with stroke who were able to communicate and had no serious cognitive function. Hence the results of this study could not be generalized to all people with stroke. The data collection was performed in 4 centres in different geographical locations in Tehran in order to enhance diversity and heterogeneity in sampling. A variety of ethnic backgrounds was included in this study, as expected and in line with the ethnic distribution in the country (44). However, these sampling centres were all academic and/or government-run in urban areas and different results could have been found in private hospitals or clinics, and rural areas due to the presence of other variables, such as financial status, social class and ethnicity. Thus the results could not be generalized to all persons with stroke in Iran.

A large number of variables have been examined in this study. The generalizability and the statistical power might increase if the sample size was larger. However, despite the limited sample size of this study, each variable was analysed univariately with each dependent variable. Bearing this in mind, this study is the first exploratory study carried out in Iran on participation after stroke consistent with ICF. More studies should certainly be performed in this area. The literature reflects different views and findings with respect to the importance and priority of predictors of participation after stroke. Strum et al. (6) discussed the fact that the interventions that can reduce impairment and disability are likely to be most effective in reducing participation restrictions. Whereas, Whiteneck & Dijkers (17) argued that environment is more important in explaining participation restrictions than activity limitations and impairments. Due to the low number of environmental factors included in the study, it was not possible to fully assess the impact of contextual factors on participation. This was the first exploratory study of participation after stroke to describe participants' self-perceived participation and the predictors. Further research is to be performed focusing specifically on environmental factors in relation to participation after stroke in the Persian population. Qualitative studies will be essential to find out about more socio-cultural aspects of participation in this context.

As the second scale of the IPA-P focuses on another construct, problems with participation, it was not included in the study. However, in future studies it will be essential also to examine the psychometric properties of this second scale and the possible factors predicting this construct in IPA. Finally, the work and education domain was excluded in the analysis due to the low number of applicable participants. Similar studies have had the same problem (21, 22, 38). Future studies on larger samples are needed to examine how this domain could influence participation.

In conclusion, this study demonstrated that the majority of the study population perceived their participation and autonomy to be good to fair in different domains of their participation, except in that of autonomy outdoors. In addition, physical function was found to be the most important variable associated with performance-based participation, whereas mood state was the most important variable associated with social-based participation. The results emphasize the importance of physical function, mood state and access to caregiving services as predictors of participation in everyday life after stroke. Although there are two dimensions of participation in this Persian sample of persons with stroke, the factors explaining participation seem to be the same across the cultures.

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