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Original Article

Influence of Self-Efficacy and Perceived Barriers on Physical Activity among Patients with Chronic Kidney Disease

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SUMMARY

Background: Self-efficacy and perceived barriers can be regarded as positive and negative drivers of physical activity, the relationships among self-efficacy, perceived barriers, and physical activity is complex in patients with chronic kidney disease (CKD). However, there is a lack of research exploring these relationships.
Methods: A total of 207 patients with CKD were enrolled at a tertiary hospital in Taiwan. Data were collected from December 2013 to March 2014. Physical activity was assessed by the International Physical Activity Questionnaire. A validated questionnaire was used collecting the data about self-efficacy and perceived barriers to physical activity. Multivariate models were performed to assess the individual and interrelated of self-efficacy and perceived barriers on physical activity.
Results: Self-efficacy and perceived barriers were independently associated with physical activity in CKD patients. Compared with the those with lower self-efficacy and higher perceived barriers, patients with higher self-efficacy and lower perceived barriers had the highest odds to achieve recommended physical activity level (odds ratio [OR]: 8.68; 95% CI, 3.01–24.9), followed by patients with lower self-efficacy and lower perceived barriers and the patients with higher self-efficacy and higher perceived barriers.
Conclusion: Self-efficacy and perceived barriers were individually and jointly correlated to physical activity in patients with CKD. Patients with higher self-efficacy and lower perceived barriers were more likely to achieve sufficient physical activity.

1. Introduction

Chronic kidney disease (CKD) has been recognized as a leading public health problem contributing to many adverse health outcomes and disease burden.[1] Effective interventions should therefore be developed as early as possible to relieve the disease burden.[2] Physical activity (PA) can improve physical function, reduce morbidities and mortality, and improve health-related quality of life in patients of CKD.[3] Despite these demonstrable benefits, PA levels in people with CKD are low,[4,5] and the prevalence of sedentary behavior is approximately twice that of the general population.[6] Promoting PA for this population is therefore important. The National Kidney Foundation Disease Outcomes Quality Initiative guidelines recommended that increased PA level to be established as part of routine care in patients with CKD.[7]

Several theories associated with behavior change recommend that PA participation is influenced by behavioral factors, and psychological considerations. For example, Pender's Health Promotion Model (HPM) highlights that psychosocial variables, including self-efficacy, and perceived barriers, play vital roles in predicting participation in PA.[8,9] The HPM provides a framework for understanding the level of PA and behavior change, and presents concrete strategies on how to intervene for specific individuals.[10]

Self-efficacy and perceived barriers can be regarded as positive and negative drivers of physical activity, respectively, and their association with levels of PA in people with CKD may be interactive. People with higher self-efficacy report a more positive effect, and feel more revitalized during exercise.[9,11] Perceived barriers might play an important factor in hindering patient's intentions to participate PA.[12] Previous studies have focused solely on the association of self-efficacy or perceived barriers on PA levels.[13,14] Evidence of the joint relationship between self-efficacy and perceived barriers with PA level in patients with CKD remains limited. Thus, the purpose of our study was to evaluate the potential individual and joint associations of self-efficacy and perceived barriers on the PA level in the patients with CKD.

2. Methods

Participants were recruited from the renal outpatient clinic of a tertiary hospital in Taiwan between December 2013 and March 2014. At the time of their scheduled medical appointments, patients were approached by research assistants and given a questionnaire to complete. The inclusion criteria were age > 20 years, diagnosis of CKD and not on dialysis, willing and able to give informed consent for study participation. Patients with maintenance dialysis, impaired

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cognition or severe mental illness were excluded. The questionnaire was developed to gather information about the demographic information, educational level, occupation, and marital status. Information regarding medical history, stage of CKD disease, and laboratory test data were obtained from medical records.

The questionnaire regarding self-efficacy and perceived barriers was developed by our research team according to the Pender' Health promotion model with references to the relevant literature. The questionnaire was first tested for validity. The content validity index (CVI) of the self-efficacy component was 0.95; its Cronbach's alpha was 0.84 in the pilot test, and 0.96 in this study. This indicated that the questionnaire had acceptable reliability and validity. The following five statements were included as indicators for perceived barriers: "I cut down on physical activity in case of bad weather," "I often cut down on physical activity owing to skeletal, muscle, or joint pain," "I cut down on or avoid physical activity owing to other diseases (such as diabetes, hypertension, or arthritis)," "I worry that I will fall during physical activity," and "I need company during physical activity, which heightens my caregiver's burden." Each item was scored from 1 to 4. The total score was calculated by adding the points of the five items with a higher score implying a greater barrier to physical activity. Regarding self-efficacy, four items were presented: "I feel confident about physical activity even though my kidney function is declining," "I feel confident about physical activity despite a lack of company," "I feel confident about physical activity even when I am in a bad mood," and "I feel confident about being able to engage in physical activity even when my schedule is busy." These items were scored from 0–10, and with a higher score denoting that participants had a better confidence in their ability to engage in physical activity. The mean values of self-efficacy and perceived barriers associated with PA were used as cutoff points to divide the participants into high- and low-groups respectively.

PA was measured using the validated Chinese version of the International Physical Activity Questionnaire-Short Form (IPAQ-SF). The IPAQ-SF, a seven-item self-report questionnaire was used to assess participants' levels of PA, which are categorized into four intensity levels: vigorous-intensity activity; moderate-intensity activity; walking and; sitting. For all intensity levels, the patients were asked how many days per week and minutes per day they performed the activity. The PA level can be calculated as a continuous score by multiplying activities' metabolic equivalent (MET) with the time spent (minutes) and the number of days engaged in those activities. For analysis purposes, sufficient PA was defined in accordance with the World Health Organization (WHO) guidelines. Therefore, patients who reported PA level $\geq$ 600 METs/week were considered active. Similarly, patients who reported < 600 METs per week were considered insufficiently active. Informed consent was obtained from all participants, and ethical approval was obtained from the Institutional Review Board of Shin Kong Wu Ho-Su Memorial Hospital (Approval No. 20131004R_B).

2.1. Data analysis

Participants were classified into active and insufficient active groups on the basis of PA level. Demographic data and clinical characteristics were expressed as mean $\pm$ standard deviation for continuous variables as appropriate and as proportions for categorical variables. Demographic data and clinical variables were compared between groups by using independent t test for continuous data and chi-square test for categorical data. Spearman correlation coefficients were used to analysis the relationships between physical activity level and self-efficacy and perceived barriers scores.

To determine the individual associations between self-efficacy and perceived barriers with PA. Three different models were used in the logistic regression analyses. Model 1 evaluated the crude association between self-efficacy, perceived barriers, and PA. Model 2 was adjusted for age, height, weight, sex, education level, marry status, work status. In the final model, diabetes mellitus, hypertension, cardiovascular disease, gout, chronic kidney disease stage, albumin level, hemoglobin level, blood urea nitrogen level, and creatinine level were added as covariates.

To explore the joint association of self-efficacy and perceived barriers with the ability to achieve the sufficient level of PA, the participants were classified into four groups: high perceived barriers and low self-efficacy, low perceived barriers and low self-efficacy, high perceived barriers and high self-efficacy, and low perceived barriers and high self-efficacy. The group with high perceived barriers and low self-efficacy was chosen as the reference group. Through multivariate logistic regression, all relevant covariates were entered into the model to compare the reference group with other groups based on the proportion of participants with sufficient physical activity. All statistical analyses were performed using SAS, version 9.2. Values with $p < .05$ were considered statistically significant.

3. Results

We collected data from 207 CKD patients (119 men and 88 women; mean age, 68.5 $\pm$ 12.8 years) who met our preset criteria. Among the study participants, 100 (48%) were active and 107 (52%) were insufficient active. Patients with higher self-efficacy were mostly likely to be males, with higher physical activity level, with higher educational levels, and with less severe kidney disease. The patient with higher perceived barriers were older, mostly likely to be female, married, with less physical activity level, and had poorer kidney function and most likely have diabetes, hypertension, and cardiovascular disease (Table 1). Self-efficacy scores were shown to have significant positive correlations with physical activity level ($r = 0.28$, $p < 0.0001$), but the scores of perceived-barrier were to be significant negative correlations with physical activity level ($r = -0.26$, $p < 0.0001$) (Figure 1).

After adjusting for potential confounding factors, patients with high self-efficacy were more likely to be active than those with low self-efficacy. Similarly, patients with high perceived-barriers were more likely to be insufficient active than those with low perceived-barriers (Table 2). Table 3 shows the joint effect of self-efficacy and perceived-barriers on PA levels. Compared with patients with high perceived-barriers and low self-efficacy, those with low perceived barriers and high self-efficacy had the highest odds of sufficient PA level (OR: 8.68; 95% CI, 3.01–24.9). Patients with low perceived barriers and low self-efficacy had higher odds of sufficient PA level (OR: 2.07; 95% CI, 0.75–5.69), also, patients with higher perceived barriers and higher self-efficacy had higher odds of sufficient levels of PA (OR: 2.00; 95% CI, 0.46–8.71) than those with high perceived-barriers and low self-efficacy.

4. Discussion

Our study found that patients with CKD have lower levels of PA. Among the participants, 52% failed to achieve the WHO recommended level of PA. Previous research found that both higher self-efficacy and lower perceived barrier, when considered in isolation, are associated with the higher level of PA. Less research, has evaluated the potential joint association of self-efficacy and perceived barrier with PA levels.[15,16] Our study also found that patients with

Table 1
Baseline characteristics by barrier and self-efficacy level.

	Lower barrier (n = 155)	Higher barrier (n = 52)	p-value	Lower self-efficacy (n = 117)	Higher self-efficacy (n = 90)	p-value
Age (years)	66.7 ± 12.8	74.3 ± 11.2	< 0.001	68.9 ± 12.6	68.0 ± 13.2	0.61
Height (cm)	161.0 ± 8.5	156.1 ± 9.5	< 0.001	157.8 ± 8.3	162.3 ± 9.3	< 0.001
Weight (kg)	67.0 ± 12.5	65.1 ± 13.6	0.38	66.2 ± 12.6	67.0 ± 13.1	0.66
Physical activity level (MET)	1264 ± 146	526 ± 100	0.007	774 ± 115	1507 ± 215	0.002
GFR	34.5 ± 17.1	30.4 ± 13.1	0.12	32.1 ± 14.6	35.1 ± 18.1	0.18
BUN	36.5 ± 20.6	35.5 ± 15.7	0.75	37.4 ± 21.2	34.8 ± 17.0	0.35
Creatinine	2.5 ± 3.8	2.2 ± 1.1	0.53	2.6 ± 4.4	2.3 ± 1.1	0.45
Albumin	4.3 ± 0.4	4.2 ± 0.5	0.33	4.2 ± 0.4	4.3 ± 0.4	0.27
Hemoglobin	12.5 ± 2.2	12.0 ± 1.9	0.14	12.5 ± 2.1	12.3 ± 2.1	0.60
Sex, female	57 (36.8%)	31 (59.6%)	0.003	58 (49.6%)	30 (33.3%)	0.02
Comorbidity						
DM	66 (43%)	25 (48%)	0.48	59 (50%)	32 (36%)	0.48
Hypertension	99 (64%)	33 (63%)	0.95	73 (62%)	59 (66%)	0.64
Cardiovascular disease	32 (21%)	21 (40%)	0.005	31 (27%)	22 (24%)	0.74
Gout	30 (19%)	6 (12%)	0.20	19 (16%)	17 (19%)	0.62
Work			0.07			0.40
Yes (employed)	47 (30%)	9 (17%)		29 (25%)	27 (30%)	
No (unemployed; retired)	108 (70%)	43 (83%)		88 (75%)	63 (70%)	
Married			0.04			0.89
Yes	133 (86%)	38 (73%)		97 (83%)	74 (82%)	
No	22 (14%)	14 (27%)		20 (17%)	16 (18%)	
Education			0.22			0.001
≤ 6	75 (48%)	33 (63%)		73 (48%)	35 (39%)	
7–9	23 (15%)	5 (10%)		12 (15%)	16 (18%)	
10–12	37 (24%)	11 (21%)		26 (24%)	22 (24%)	
≥ 13	20 (13%)	3 (6%)		6 (13%)	17 (19%)	
CKD stage			0.31			0.03
I, II, IIIa (early CKD)	32 (21%)	5 (10%)		12 (11%)	25 (27%)	
IIIb	44 (28%)	16 (31%)		36 (31%)	24 (27%)	
IV	49 (32%)	22 (42%)		44 (37%)	27 (30%)	
V	30 (19%)	9 (17%)		25 (21%)	14 (16%)	

Continuous data are presented as mean ± standard deviations and categorical data as number (%).
Abbreviation: MET, metabolic equivalent; GFR, glomerular filtration rate; BUN, blood urea nitrogen; DM, diabetes mellitus; CKD, chronic kidney disease.

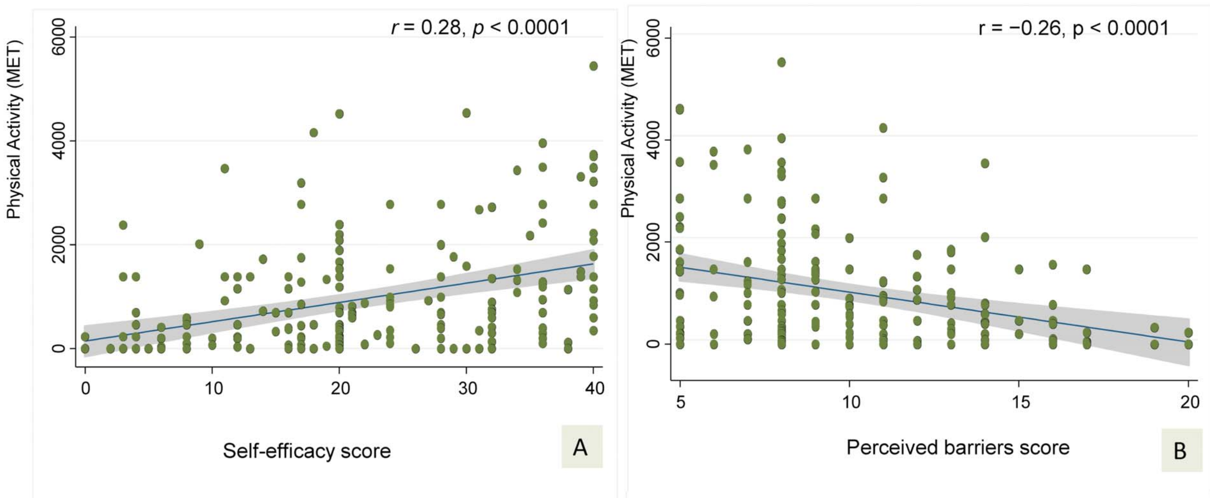

Figure 1. The correlation between physical activity level and self-efficacy score (A) and perceived barriers score (B).

lower self-efficacy and higher perceived barrier had greatest risk to be insufficient active as compared patients with high self-efficacy and low perceived barrier. Ultimately, these finding high-light the critical importance of development strategies to increase physical activity in patients with CKD, especially in patients with low self-efficacy and high perceived barrier to PA.

Our study found that self-efficacy and perceived barriers play an important role in the ability to achieve sufficient PA levels. When participants had higher self-efficacy or lower perceived barriers, they were more likely to achieve a sufficient level of PA. These findings were similar to previous studies.[9,17] Self-efficacy refers to an individual's confidence in the ability to sustain a target behavior in various situations. Bandura's social cognitive theory indicates that behaviors are influenced by a variety of external factors, the key factor being self-efficacy. It emphasizes that self-efficacy is an internal core belief. When individuals believe in themselves, even when they do not have the actual ability to practice the behavior, this internal driver could still prompt them to exercise self-control and change their health-related behavior. Self-efficacy also influences individuals' affect and cognition toward certain matters, thus motivating them to take action. Individuals with high self-efficacy tend to feel more confident about facing up to and overcoming problems.[18] This may explain why people with high self-efficacy are more likely to implement health behaviors and display a more satisfactory level of PA than people with low self-efficacy.

Patients with CKD often feel powerless and frustrated because of disease's progression during the course of illness.[19,20] Thus did not feel confident about engaging in activity and to reduce their physical activity level. The interplay of emotional distress and physiological symptoms tends to lower self-efficacy in the long run. Consequently, their motivation and willingness to participate in self-care and adopt a healthy lifestyle are relatively low. That implies that clinical care should not only focus on physiological aspects but also extend care to the psychological level.[4]

Perceived barriers refer to an individual's evaluation of the potential obstacles that curtail him or her from engaging in exercise. Consistent with previous studies, our study also found that patients with low perceived barriers engaged in sufficient levels of PA. The major perceived barriers of patients with CKD included discomfort in hot weather, comorbidity, and muscle, or bone pain. This was possibly because the participants were mainly community-dwelling elderly people with multiple comorbidities. Owing to their kidney disease and older age, a relatively large proportion of them had deteriorating musculoskeletal systems, potentially restricting their mobility and influencing their engagement in daily PA.[4] In addition, as older adults residing in communities need to use facilities such as community parks and activity centers to engage in PA,[21] poor weather conditions such as rainfall, excessive heat, or excessive cold may hinder their outdoor activity.[22]

Table 2
Independent association between barrier and self-efficacy and sufficient PA in patients with CKD.

Variable	Odds ratio	95% CI	p values
Model 1			
Lower barrier	1 (reference)		
Higher barrier	0.37	0.18–0.75	0.005
Lower self-efficacy	1 (reference)		
Higher self-efficacy	3.07	1.70–5.55	< 0.001
Model 2			
Lower barrier	1 (reference)		
Higher barrier	0.37	0.17–0.81	0.01
Lower self-efficacy	1 (reference)		
Higher self-efficacy	3.34	1.77–6.32	< 0.001
Model 3			
Lower barrier	1 (reference)		
Higher barrier	0.37	0.16–0.83	0.02
Lower self-efficacy	1 (reference)		
Higher self-efficacy	3.64	1.85–7.20	< 0.001

Model 1, crude model.
Model 2, crude model added adjusted age, height, weight, sex, education level, marry status, work status.
Model 3, Model 2 added diabetes mellitus, hypertension, cardiovascular disease, gout, chronic kidney disease stage, albumin, hemoglobulin, Blood Urea Nitrogen, creatinine.

A new finding in our study was that the association of perceive self-efficacy and perceived barrier with the level of PA might be additive and interactive. Our study showed that, when considering the joint association of both factors with PA, changing either of them could raise PA levels up to the recommended level. Those with combination of high self-efficacy and low perceived barriers had a significantly higher chance of achieving sufficient PA than the other groups. Our results confirm Bandura's suggestion that self-efficacy can directly affect health-promoting behaviors and also determine how obstacles and impediments are viewed.[18] Even if barriers exist in reality, the motivation to overcome barriers can be enhanced through self-efficacy.[23,24] When combined with the removal of barriers, action can be pushed towards healthy behavior.

Self-efficacy and perceived barriers are the positive and negative drivers on PA, respectively. During the dynamic process from conception to action, a decline in the negative effect of perceived barriers also diminishes their interference in the positive effect of self-efficacy. Thus, reinforcing the positive driver and reducing the negative driver concurrently can give play to the additive effect between the two factors, thus achieving the sufficient level of activity. This finding is based on the same concept that underlies the health promotion model, who believed that individuals are driven and motivated and endeavor to attain optimum health through behavioral performance. These variables can be modified through interventions or external stimuli, and the incentives affecting health-promoting behavior will lead to behavioral changes.[25] Therefore, changes in self-efficacy or perceived barriers will influence the implementation of health-promoting behaviors.

4.1. Limitations

Our study has some potential limitations. First, this was a cross-sectional study, and the findings indicate associations between self-efficacy and perceived barriers with PA in patients with CKD, rather than imply any predictions or causal relations among these variables. Second, PA was assessed by self-report. Although the questionnaire has been previously validated, the level of measurement error might be considered. Third, although multivariate analysis was used to adjust for potential confounding factors, residual unmeasured confounding factors may have remained. Finally, the generalizability of this study is limited by the single hospital basis of the data.

5. Conclusion

Our study demonstrated that self-efficacy and perceived barriers are important factors associated with PA among people with CKD. We also found that participants with high self-efficacy and low perceived barriers were most likely to achieve the sufficient PA level,

Table 3
Joint association of barrier and self-efficacy with sufficient PA level in patients with chronic kidney disease.

Group	Odds ratio*	95% CI	p-value
Higher barrier and lower self-efficacy (n = 39)	1 (reference)		
Lower barrier and lower self-efficacy (n = 78)	2.07	0.75–5.69	0.16
Higher barrier and higher self-efficacy (n = 13)	2.00	0.46–8.71	0.35
Lower barrier and higher self-efficacy (n = 77)	8.68	3.01–24.9	< 0.001

* Adjusted age, height, weight, sex, education level, marry status, work status, diabetes mellitus, hypertension, cardiovascular disease, gout, chronic kidney disease stage, albumin, hemoglobulin, Blood Urea Nitrogen, creatinine.

which indicated that the two factors had an interactive effect on PA. Hence, effort should be made to enhance their self-efficacy, recognize of perceived barriers, and improve their ability to overcome such barriers at the same time.

Conflict of interest

No conflict of interest.

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References

1. Crews DC, Bello AK, Saadi G, et al. Burden, access, and disparities in kidney disease. *Nephron.* 2019;141:219–226.
2. Hoerger TJ, Simpson SA, Yarnoff BO, et al. The future burden of CKD in the united states: A simulation model for the cdc ckd initiative. *Am J Kidney Dis.* 2015;65:403–411.
3. Barcellos FC, Santos IS, Umpierre D, et al. Effects of exercise in the whole spectrum of chronic kidney disease: A systematic review. *Clin Kidney J.* 2015;8:753–765.
4. Wilkinson TJ, Clarke AL, Nixon DG, et al. Prevalence and correlates of physical activity across kidney disease stages: An observational multicentre study. *Nephrol Dial Transplant.* 2019:gfz235.
5. Zelle DM, Klaassen G, Van Adrichem E, et al. Physical inactivity: A risk factor and target for intervention in renal care. *Nat Rev Nephrol.* 2017; 13:152–168.
6. Glavinovic T, Ferguson T, Komenda P, et al. CKD and sedentary time: Results from the canadian health measures survey. *Am J Kidney Dis.* 2018; 72:529–537.
7. Heiwe S, Jacobson SH. Exercise training for adults with chronic kidney disease. *Cochrane Database Syst Rev.* 2011:CD003236.
8. Alghafri T, Alharthi SM, Al Farsi YM, et al. Perceived barriers to leisure time physical activity in adults with type 2 diabetes attending primary healthcare in oman: A cross-sectional survey. *BMJ Open.* 2017;7:e016946.
9. Higgins TJ, Middleton KR, Winner L, et al. Physical activity interventions differentially affect exercise task and barrier self-efficacy: A meta-analysis. *Health Psychol.* 2014;33:891–903.
10. Rahimian M, Mohammadi M, Mehry A, et al. The predictors of physical activity among health volunteers based on pender's health promotion model. *J Research Health.* 2018;8:305–312.
11. Oh C, Kang H. Effects of tai chi exercise on the body composition, self-efficacy and life satisfaction of older adults in korean local community. *Int J Gerontol.* 2019;13:134–138.
12. Delgado C, Johansen KL. Barriers to exercise participation among dialysis patients. *Nephrol Dial Transplant.* 2012;27:1152–1157.
13. Lu W, McKyer ELJ, Lee C, et al. Perceived barriers to children's active commuting to school: A systematic review of empirical, methodological and theoretical evidence. *Int J Behav Nutr Phys Act.* 2014;11:140.
14. Adeniyi A, Idowu O, Ogwumike O, et al. Comparative influence of self-efficacy, social support and perceived barriers on low physical activity development in patients with type 2 diabetes, hypertension or stroke. *Ethiop J Health Sci.* 2012;22:113–119.
15. Al-Otaibi HH. Measuring stages of change, perceived barriers and self efficacy for physical activity in Saudi Arabia. *Asian Pac J Cancer Prev.* 2013;14:1009–1016.
16. Lari H, Tahmasebi R, Noroozi A. Effect of electronic education based on health promotion model on physical activity in diabetic patients. *Diabetes Metab Syndr* 2018;12:45–50.
17. Williams SL, French DP. What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour—and are they the same? *Health Educ Res.* 2011;26:308–322.
18. Bandura A. Health promotion by social cognitive means. *Health Educ Behav.* 2004;31:143–164.
19. Chiang HH, Livneh H, Yen ML, et al. Prevalence and correlates of depression among chronic kidney disease patients in Taiwan. *BMC Nephrol.* 2013;14:78.
20. Yu IC, Tsai YF. From silence to storm–patient illness trajectory from diabetes diagnosis to haemodialysis in Taiwan: A qualitative study of patients' perceptions. *J Adv Nurs.* 2013;69:1943–1952.
21. Fu C, Wang C, Yang F, et al. Association between social capital and physical activity among community-dwelling elderly in Wuhan, China. *Int J Gerontol.* 2018;12:155–159.
22. Eronen J, von Bonsdorff MB, Törmäkangas T, et al. Barriers to outdoor physical activity and unmet physical activity need in older adults. *Prev Med.* 2014;67:106–111.
23. Slovinec D'Angelo ME, Pelletier LG, Reid RD, et al. The roles of self-efficacy and motivation in the prediction of short-and long-term adherence to exercise among patients with coronary heart disease. *Health Psychol.* 2014;33:1344–1353.
24. Van Zanten JJV, Rouse PC, Hale ED, et al. Perceived barriers, facilitators and benefits for regular physical activity and exercise in patients with rheumatoid arthritis: A review of the literature. *Sports Med.* 2015;45: 1401–1412.
25. Wu TY, Pender N. A panel study of physical activity in Taiwanese youth: Testing the revised health-promotion model. *Fam Community Health.* 2005;28:113–124.