



A Randomized Controlled Clinical Trial of a Core Stability Exercise Program for the Intrinsic Motivation of Parkinson's Patients

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ABSTRACT

This study aimed to test the effectiveness of a core stability exercise program in the intrinsic motivation of Parkinson's patients in Nanjing (China). The study used a single-blind, parallel group, randomized controlled trial design. The study also involved 28 Parkinson's patients who were less than 30 weeks referred to three regional general psychiatric outpatient clinics in Nanjing. The sample was randomly assigned to a core stability group (n = 14) and home exercise group (n = 14). The primary outcome was the intrinsic motivation of Parkinson's patients. Outcomes were measured at recruitment, three days and 8 weeks after the core stability program. Participants in the core stability group reported statistically significant increases in intrinsic motivation compared to the home exercise group. There were also significant increases in interest and pleasure, perceived merit, effort and general motivation over the 8-weeks follow-up. The findings provide evidence that the core stability exercise program resulted in improved intrinsic motivation outcomes in Parkinson's patients.

Key Words: Core stability, Parkinson, Intrinsic Motivation, Exercise

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Introduction

Parkinson disease is a progressive neurodegenerative disorder and associated with the reduction of neoplasms secreting dopamine in the black body and basal complexes. This disease occurs in all races, and it has a prevalence of 1-2 per 1,000 people with a sex distribution of approximately equal in the United States and Western Europe. This disorder is more common with age. The most common cause is idiopathic illness, but it can be seen through the use of drugs or toxins or in other neurological diseases (Roger *et al.*, 2009). In Parkinson disease, the natural balance between dopamine and acetylcholine in a complex body is confused. The main

clinical manifestations include: resting shaking that rises during stressful times and better through intentional activity, tightening or increasing gear resistance against passive gestures that is a hallmark of illness, and tones disorder that is the cause of the patient's bent position (Salisachs and Findley, 1984). In the body's condition, the trunk bends forward and holds the hands in front of the body. Slow-motion includes slow movements, difficulty starting movements, and loss of automatic movements. Less motion includes reduce the motion range and perform part of it with repetitive motions (Roger *et al.*, 2009; Deng, 2017; Li *et al.*, 2017).

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Cognitive disorders and thinking, depression and dementia disorders are also important symptoms of this disease, and also olfactory disorders, with a general prevalence of 45-90% in patients, and may sometimes be an early sign of the disease (Haehner *et al.*, 2009; Wang *et al.*, 2016). Parkinson disease is not fatal, but it reduces the patient's longevity by reducing individual abilities. Other complications of this disease that come from the disease or dopaminergic treatments are included Motor complications and body instability, abnormal walking, swallow disorders, urinary and sexual problems, night-time sleep disorders, hallucinations especially visually impaired, lack of sleepiness, lock-up, jerky movements in the hands and legs (Larsen *et al.*, 1994). As a result of these problems, the patient gradually becomes incapable of performing daily routines, and finally, is placed on a bed as a completely impotent and helpless person.

According to previous studies, in addition to medication, sport and exercise therapy as a complementary therapeutic approach have a positive effect on controlling part of the complications of Parkinson disease and improving the daily performance of patients (Ridgel *et al.*, 2016). Exercise and physical activity improves the function of the nervous system and anatomical adaptations and the breakdown of the negative cycle of the combination of disease, aging and inactive and the performance of patients with Parkinson disease through positive effects on dopamine levels (Tillerson *et al.*, 2003). Motivation is one of the important topics of sports psychology that is effective in the extent and intensity of performance (Williams, 1993; Wu, 2017). In fact, motivation is one of the main factors in trying and strengthening human willful behaviors to achieve goals. Motivation comes from external rewards with positive and negative reinforcements from other people, and individuals also participate in sports and physical activities for internal reasons (Cox, 1998). Individuals with internal motivation endeavor from within to be competent and independent to be successful in achieving the task that they are doing.

Studies in the field of exercise effects on internal motivation are scarce. However most studies are in the field of motor learning and examine the impact of different types of feedback on participants' intrinsic motivation (Kerr *et al.*, 2006; Koka and Hein, 2003; Mouratidis *et al.*,

2008). Kerr *et al.* (2006) stated that motivation depends on the psychological experiences of individuals to maintain their activity. Koka and Hein (2003) and Mouratidis *et al.* (2008) have shown that providing exercise conditions with positive emotions in relation to the implementation of individuals leads to the promotion of self-efficacy.

Exercise and physical activity improve the performance of the muscular nervous system and anatomical adaptations, break down the negative cycle of illness, aging and inactive and the performance of patients with Parkinson's disease through positive effects on the level of dopamine (Lauzé *et al.*, 2016). Parkinson disease experience a very high functional and psychological decline (attitude and self-esteem reduction) and especially increasing fatigue and decreasing motivation; therefore attention to this ability in practice and everyday life is essential in order to retrain and enhance functional and psychological level. In addition, motivation is the main reason for trying and strengthening the willful behaviors of humans to achieve goals. Attention and consideration of psychological indicators such as motivation in these patients can be effective in designing sessions and practice styles.

The use of exercise programs is one of the important and effective factors in improving the physical capacity of Parkinson patients (Cheon *et al.*, 2013). Recent studies showed that resistance exercises are effective in improving balance, physical fitness factors related to health, as well as quality of life, but in contrast to these studies, researchers are trying to answer this question that can a core stability exercise program be effective in increasing the internal motivation of older people with Parkinson's, or not? This randomized controlled trial therefore aimed to investigate the effects of a core stability exercise program for the intrinsic motivation of Parkinson patients. As an indicator of obtained motivation, we used the variables interest and pleasure, perceived merit, effort, and general motivation (McAuley *et al.*, 1989; Koka and Hein, 2003). The main question of this paper is that does a core stability exercise program protect Parkinson's patients from a decrease of interest and pleasure, perceived merit, effort, general motivation at the rising of the age?



Methods

Trial design

This study was a randomized controlled trial that assigned participants randomly into experimental (core stability) and control (home exercise) groups. Participants in the core stability group received 60 minutes of core stability exercise three times a week for eight weeks from the beginning of October 2016 to the end of December 2016. Our study first investigated the effects of the core stability exercise program on Parkinson patients' intrinsic motivation over a 2-month period and a 2-month follow-up compared to home exercise care. Fig. 1 shows the procedure of our controlled trial study.

Study setting

Participants were recruited from three regional general psychiatric outpatient clinics from January 2016 to September 2016 in China. We completed the follow-up of Parkinson patient outcomes by the end of February 2017.

Ethical approval

This study was approved by a psychology and counseling services center in Nanjing (China).

Inclusion criteria

The inclusion criteria for patients attending the psychology and counseling services center

included: a confirmed diagnosis of serious Parkinson illness, 2) age 55–75, 3) Brief Psychiatric Rating Scale (BPRS) score of ≥ 25 , and 4) medication stable. Individuals with other psychomotor interventions, a diagnosis of an intellectual disability or dementia or other motor illness that would limit participation in the exercise intervention of this study were excluded from the study.

Recruitment process

Among the 64 patients referred to the regional general psychiatric outpatient clinics in Nanjing between October 2016 and December 2016, we assessed the patients for study inclusion. Of these patients twenty three (36%) were not able to meet the study criteria and forty one met our study inclusion criteria. These patients were asked to sign a consent form. Of these 64% Parkinson's patients, thirty five (85%) agreed for participation.

We randomly selected 28 (68.2%) Parkinson's patients for participation in this study and assigned to either home exercises group (n = 14) or the core stability group (plus home exercises care; n = 14) using a predetermined computer-generated sequence (i.e., one for each clinic).

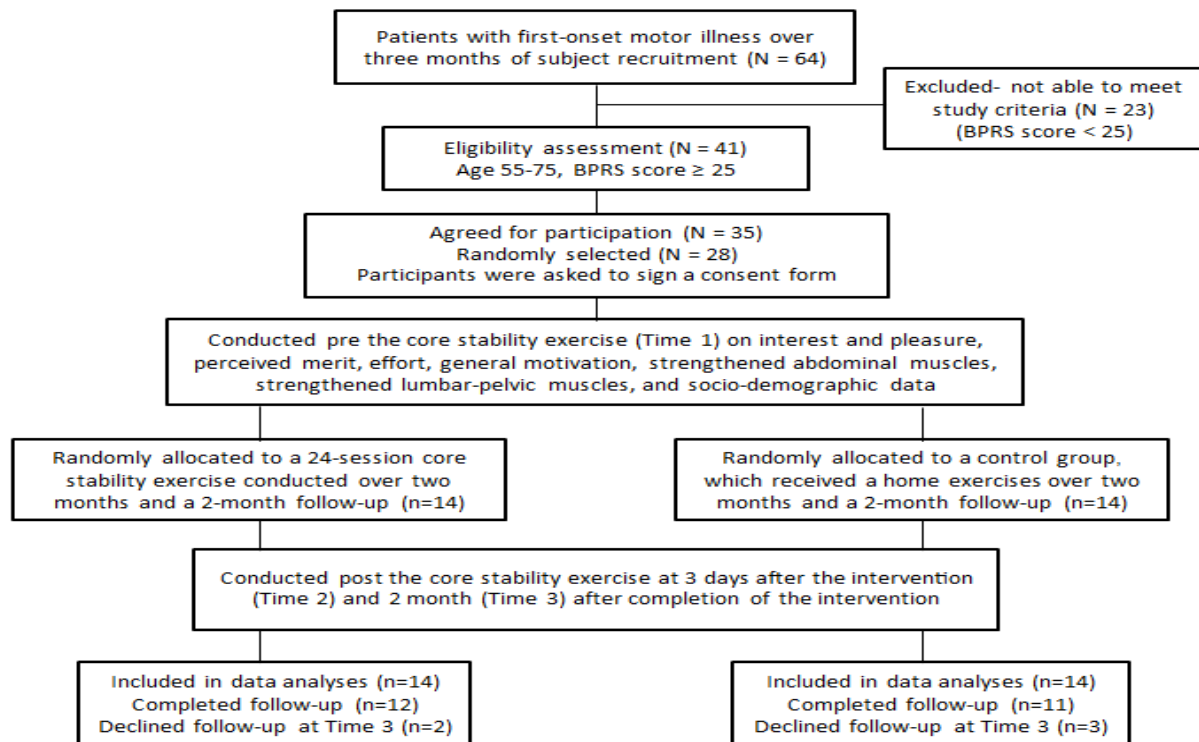


Figure1. Flow diagram of study procedure of our study



Procedure

The researcher who was blind to group assignment (except at the follow-up) undertook the assessments at before the core stability exercise program and two post-exercise (at 3 days and 2 months after the core stability exercise program) for the core stability group and the home exercise group. Participants completed the self-report measure and a structured interview to assess Intrinsic Motivation Inventory (IMI). The core stability group completed the intervention following the post exercise assessment and therefore 2-month follow-up measures.

shown to have a positive effect on obtained motivation in the occupational context (Jeffreys, 2002; Bliss & Teeple, 2005; Tan and Kwan, 2016; Huxel Bliven & Anderson, 2013), aimed to empower patients to manage their psychiatric symptoms by strengthening their abdominal and multifidus muscles and improving their understanding of motor illness. Tonic contraction exercise of abdominal and multifidus transverse muscles simultaneously with the movement of limbs (hands and legs), first performed separately and then both opposite organs together (opposite hand and legs). These exercises are in the following situations, respectively.

The core stability exercise

The core stability exercise program, with respect to another core stability exercise intervention

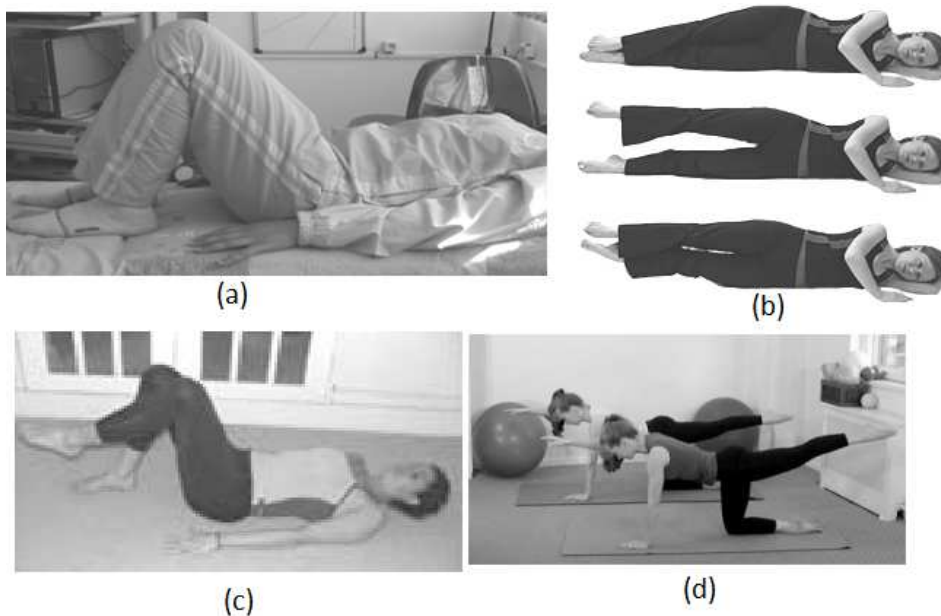


Figure 2. Core stability exercise protocol from in the first four weeks

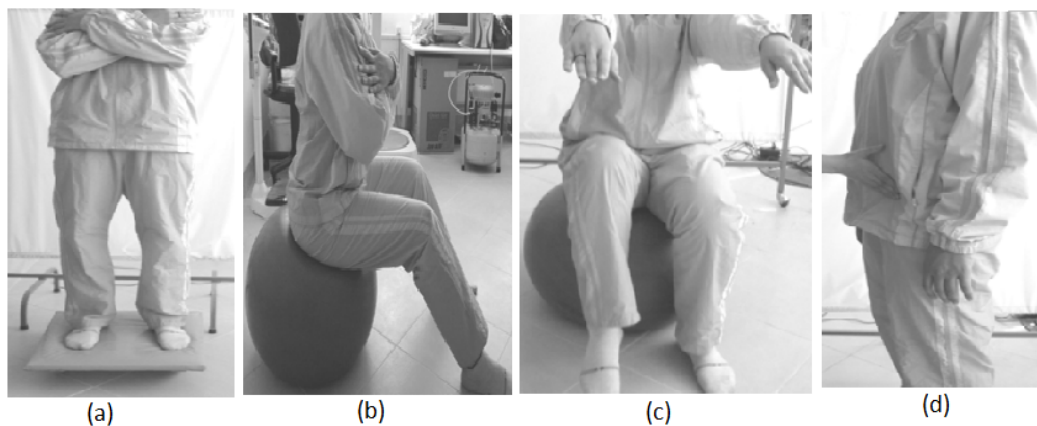


Figure 3. Core stability exercise protocol from in the second four weeks

Outcome measures

We used the scales interest and pleasure, perceived merit, effort and general motivation of the Intrinsic Motivation Inventory (IMI) as indicator of obtained motivation (McAuley, Duncan & Tammen, 1989; Koka & Hein, 2003). The scales measured the rate of patients' motivation. The scales cover intrinsic aspects of obtained motivation. The scales consisted of fifteen items. The reliability and validity of the scales interest and pleasure, perceived merit, effort and general motivation were supported by empirical evidence (Choi J, Mogami T, Medalia, 2009). The scales ranged from 1 (never) to 5 (always).

Data analysis

We analyzed data using the IBM SPSS for Windows, version 20.0. We compared the demographic characteristics of the core stability group and the home exercise group in a one-way analysis of variance (ANOVA) or Chi-square test. Further, we compared the scales interest and pleasure, perceived merit, effort and general motivation at pre the core stability exercise (Time 1) between both groups by using independent samples t-test (two-tailed). We also compared the core stability group and the home exercise group in a two-way ANOVA at two post-exercise (at 3 days and 2 months after the core stability exercise program).

Results

Participants in both groups completed the core stability exercise (i.e. an attendance of at least seven sessions); two of them in the core stability group (14.3%) and three in the home exercise group (21.4%) could not be contacted at 8-weeks

follow-up. We included the data of the sample (the Parkinson's patients: 14 in the core stability group and 14 in the home exercise group) in final data analysis. Attendance rate of the core stability exercise was 90%.

Table 1 shows that more than half of the Parkinson's patients of this study were male. The mean age of our sample was 62.2 (SD = 4.0) years in the core stability group, 63.1 (SD = 5.0) years in the home exercise group and 63.9 (SD = 6.0) in the non-participants group. Comparison of the two groups shows that about half of the participants had 6-10 weeks of Parkinson's disease and more than half of the participants had less than 10 weeks. The findings in Table 1 indicated that there were no differences concerning Characteristics of participants between the core stability group, home exercise group and the non-participants (p values > 0.05). According to the results of Table 3, there were no significant differences on the mean scores of outcome scales between the core stability group and the home exercise group at before the core stability exercise program. Parkinson's patients in the score stability group reported significantly greater increases in interest and pleasure, perceived merit and effort between before and after the score stability exercise program than controls. In total, compared with participants in the home exercise group, Parkinson's patients in the score group reported significantly greater increases in general motivation. In addition, Parkinson's patients in the score stability group also showed a significant greater increase the average duration of increases in interest and pleasure, perceived merit, effort and general motivation over the 8-weeks follow-up.

Table 1. Characteristics of participants in groups (core stability, home exercise only, eligibility non-participants)

Variables	Core stability (n = 14)	Home exercise (n = 14)	Non- participants (n = 13)	t	ρ
Gender				1.27	0.30
Male	9 (64.3)	8 (57.1)	10 (71.4)		
Female	5 (35.7)	6 (42.9)	4 (28.6)		
Age	62.2 ± 4.0 56-70	63.1 ± 5.0 57-68	63.9 ± 6.0 55-70	1.87	0.14
55-60	2 (14.3)	3 (21.4)	4 (30.8)		
61-66	4 (28.6)	4 (28.6)	4 (30.8)		
67-75	8 (57.1)	7 (50.0)	5 (38.4)		
Duration of Parkinson's disease (weeks)	11.3 ± 4.2 5-20 weeks	12.1 ± 6.3 5-25 weeks	14.4 ± 7.0 2-28 weeks	1.58	0.23
< 6 weeks	4 (28.6)	4 (28.6)	3 (23.1)		
6-10 weeks	7 (50.0)	6 (42.9)	5 (38.4)		
11-20 weeks	2 (14.3)	3 (21.4)	2 (15.4)		
21-30 weeks	1 (7.1)	1 (7.1)	3 (23.1)		



Table 2. Means (and SD) of outcome measures for intervention and control groups

Scales	Core stability group (n = 14)						Home exercise group (n = 14)						F ^a , ρ
	T1		T2		T3		T1		T2		T3		
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	
Interest and pleasure	12.3	1.24	16.4	1.31	19.8	1.29	12.5	2.04	12.9	2.26	12.8	2.34	3.57, 0.027
Perceived merit	10.6	2.54	14.7	2.66	17.9	2.78	10.4	3.44	10.6	3.11	10.9	3.24	5.11, 0.004
Effort	13.8	1.87	17.1	1.84	22.3	1.85	14.1	2.81	13.6	3.27	13.9	2.68	4.29, 0.003
General motivation	36.7	3.34	48.2	2.97	60	3.02	37	4.21	37.1	4.54	37.6	3.95	6.07, 0.003

^a df = (1, 26)

Discussion

This study shows that the score stability exercise program significantly improved the symptoms of Parkinson's disease over a 8-weeks period. It seems that the experience of doing motor homework and exercises in Parkinson's patients due to poor motor can induce better feelings and provide more motivation for double-effort and getting stronger, and probably it led to an increase in interest/pleasure, perceived merit and effort. In studies that measured the motivation of participants by using feedback, it was found that encouraging participants to perform a good exercise would increase each of the subscales, which could increase the amount of intrinsic motivation and lead to a superiority of the positive-normative group, and also successful experience increases their motivation and hope for future performances (West *et al.*, 2005).

Positive normative feedback, in addition to influencing performance and learning, can also be effective on psychological factors. Various authors have reviewed and confirmed the self-efficacy increase in adults and the perceived competence increase in children through questionnaires. Also, the belief in being better than the average leads to increase the motivation of participants. This belief reduces performance concerns and control of nuisance factors (Ávila *et al.*, 2012).

Studies showed that the ability to change individual attitudes can have a very fast and positive effect on learning and exercising at high ages. A lifestyle without mobility leads to muscle weakness and problems with such activities in patients and elderly. Therefore, it can be expected that Parkinson's disease interactions with motor poverty and aging lead to increase disability and reduce motivation and quality of life. In Parkinson's patients, sport exercises in particular resistive exercises provide similar effects, such as increasing mobility, improving nerve function, weight loss, improving mental factors (reducing depression and anxiety), reducing muscle spasm, reducing sensory disturbances and muscle weakness, increasing muscle strength, and

reducing fatigue. In the present study, the core stability exercise has able to influence the amount of internal motivation in Parkinson's patients. However, it can't be conclusively stated that the changes that have taken place will be stable in the pattern because was only measured the psychological index. So this requires more research, especially in physiological and motor areas.

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