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DOES PHYSICAL ACTIVITY CHANGE AFTER PROGRESSIVE RESISTANCE EXERCISE IN FUNCTIONALLY LIMITED OLDER ADULTS?

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To the Editor

Maintaining a physically active lifestyle is important throughout the lifespan and is especially vital in late life. Physical activity declines with age, with older adults taking fewer steps per day¹ and spending less time in moderate to vigorous physical activity than middle-aged adults.² A potential reason for this decline is the onset of functional limitation, such as difficulty walking or climbing stairs. Progressive resistance exercise (PRE) is commonly used to address impairments in muscular strength and improve physical function in older adults,³ but it is not known whether improvements in physical function coincide with an increase in physical activity after an intervention of PRE. Changes in physical activity and

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physical function before and after a 6-month PRE program in older adults with functional limitation were compared.

METHODS

Existing data from a cohort of 80 functionally limited community-dwelling older adults aged 70–85 who participated in a 6-month PRE program were used. Specific details of this study have been previously published.⁴ Participant physical activity level was objectively measured using an activity monitor (Model 7164; ActiGraph, LLC, Pensacola, FL). Participants were asked to wear the device for seven consecutive days at baseline and again before the 6-month visit. Physical function was assessed using the Short Physical Performance Battery (SPPB), the repeated chair-rise (10×) test, a timed stair climb, and the 400-m walk test.

All participants participated in a 6-month PRE program three times per week that targeted major muscle groups. Throughout the intervention, intensity progressed from two sets of 10 repetitions at 80% of the one repetition maximum (1RM) to three sets of 12 repetitions. 1RM was reassessed monthly, and an exercise physiologist supervised all sessions. Adherence to PRE was calculated according to average attendance at scheduled sessions over the length of the trial.

Change in physical activity and physical function from baseline to the 6-month follow-up was assessed by calculating the mean difference (6-month–baseline), 95% confidence interval (CI), and *P*-value for each study variable.

RESULTS

The mean age $\pm$ standard deviation of those who wore a monitor and were included in the study was 77.1 ± 3.9 , and mean body mass index (BMI) was 26.5 ± 3.2 kg/m². In general, those not included in the study ($n = 35$) were similar in age, sex, BMI, and physical function scores to those included ($N = 45$). Of those included, 18% ($n = 8$) attended fewer than 70% of the PRE treatment sessions and were considered to have low adherence to the intervention.

There were statistically significant improvements in all measures of physical function from baseline to the 6-month visit (Table 1), although there was no change in physical activity from baseline to the 6-month visit in any physical activity count category. One exception was that there was a decrease in the 2,000–2,499 activity count range at the 6-month visit from baseline (Table 1).

CONCLUSION

Physical activity did not increase materially despite statistically significant improvements in physical functioning. Although a recent study has shown that physical activity prevents the onset of limitation in physical functioning in older adults,⁵ the reverse may not necessarily be true, that is, improvement in physical function does not necessarily increase physical activity. Previous cross-sectional studies have consistently shown a small to moderate

association between physical activity and physical function.^{6–8} The current study adds that, although resistance exercise improves physical functioning, it is unlikely to increase physical activity.

A major reason why PRE does not increase physical activity may be because the determinants of physical activity differ from those of physical functioning in older adults. The determinants of physical activity include psychological factors such as self-efficacy and confidence⁹ in addition to lower extremity strength.¹⁰ Hence, the findings of the current suggest that other modifiable factors, such as self-efficacy, may need to be targeted to increase physical activity in older adults. An important limitation to consider is the lack of a control group to compare natural changes in physical functioning and physical activity with those in the PRE group over time, but these factors are unlikely to have declined substantially over the short duration of the study.

In conclusion, PRE improved physical function in older adults with functional limitation but did not change physical activity. These findings indicate that factors other than muscular strength may need to be targeted to promote physical activity in older adults with functional limitation.

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Table 1

Change in Physical Function and Physical Activity from Baseline to 6-Month Follow-Up (N = 45)

Measure	Baseline Mean $\pm$ Standard Deviation	Follow-Up	Mean Change from Baseline to Follow-Up (95% Confidence Interval)	P-Value
Physical function				
Short Physical Performance Battery score (range 0–12)	8.7 $\pm$ 1.1	10.5 $\pm$ 1.4	1.8 (1.3 – 2.2)	<.001
Repeated chair rise (seconds)	34.1 $\pm$ 15.2	26.0 $\pm$ 6.5	–8.9 (–13.7 to –4.1)	<.001
Stair climb (seconds)	7.2 $\pm$ 3.1	6.3 $\pm$ 1.6	–1.0 (–1.9 to –0.1)	.03
400-m walk (m/s)	1.06 $\pm$ 0.17	1.12 $\pm$ 0.18	0.07 (0.03 – 0.11)	.002
Activity counts (min/d)				
<100	568.8 $\pm$ 73.4	562.5 $\pm$ 71.0	–6.2 (–27.7 – 15.2)	.56
100–499	148.9 $\pm$ 37.0	149.8 $\pm$ 36.8	0.9 (–10.0 – 11.8)	.87
500–999	44.9 $\pm$ 22.0	43.8 $\pm$ 21.7	–1.1 (–6.7 – 4.4)	.68
1,000–1,499	17.1 $\pm$ 13.0	15.2 $\pm$ 9.5	–1.9 (–5.4 – 1.7)	.30
1,500–1,999	8.6 $\pm$ 7.3	7.6 $\pm$ 6.8	–1.0 (–3.4 – 1.3)	.39
2,000–2,499	4.3 $\pm$ 4.1	3.1 $\pm$ 2.9	–1.2 (–2.3 – 0.0)	.05
2,500	5.2 $\pm$ 9.0	3.7 $\pm$ 6.4	–1.5 (–3.1 – 0.2)	.08