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The feasibility and acceptability of a home-based dual task exercise and cognition intervention after stroke

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Background

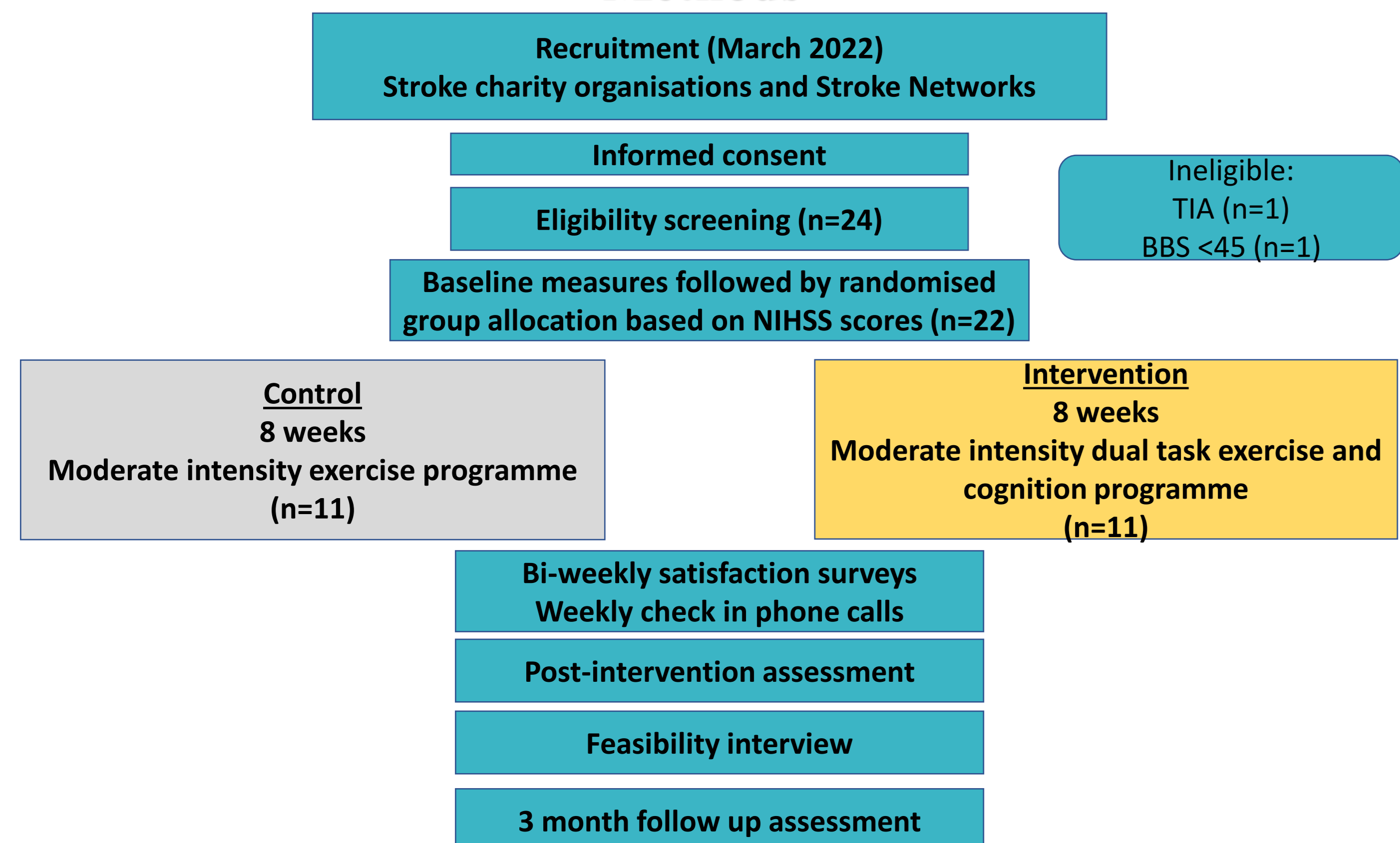
Cognitive impairment after stroke is common with up to 83% of stroke survivors living with impairments in areas such as information processing, executive functioning, attention, memory and other higher order functions^{1,2}. Aerobic exercise has been widely recognised as a viable rehabilitation option due to evidence of its effectiveness to improve cognitive function after stroke and other neurodegenerative diseases such as Alzheimer's of Parkinson's.³ However, survivors often feel ill equipped to engage in physical activity, therefore designing interventions that are acceptable and meet the needs of stroke survivors is important.

A previous qualitative study which was part of this PhD research programme investigated the barriers and facilitators of exercise. Common facilitators were programmes that were adaptable and programmes that could be completed at home as many survivors were unable to drive or did not have access to exercise equipment. Developing interventions to improve cognitive function was also considered the second greatest research priority for life after stroke.⁴⁻⁶ With all of this in mind, a homebased dual task exercise intervention that has a focus on improving cognitive function and does not require any exercise equipment other than normal household items was designed to test feasibility.

Aim

To evaluate, using a randomized control trial design, the feasibility and acceptability of an eight-week home-based dual task intervention to improve cognitive functioning among stroke survivors.

Methods



Eligibility screening assessments: BERG Balance Scale, NIHSS, Timed Up and Go.

Outcome measures at baseline, post programme and 3 month follow up: Cognitive function (TMT A&B, Digit Span, MMSE), BERG Balance Scale and Timed Up and Go, Stroke Specific Quality of Life Scale and Physical Activity Scale for Individuals with Physical Disabilities

Study location: Three in person visits to Ulster University or Community Centre for eligibility screening and assessments. Eight week programme was completed virtually in participants homes.

Process Measures:

Feasibility: recruitment and retention

Acceptability: post intervention interview assessing acceptability (verbal feedback), and bi-weekly satisfaction surveys.

Ethical permission: granted by the research ethics committee at Ulster University

Methods: Example Exercise Programme



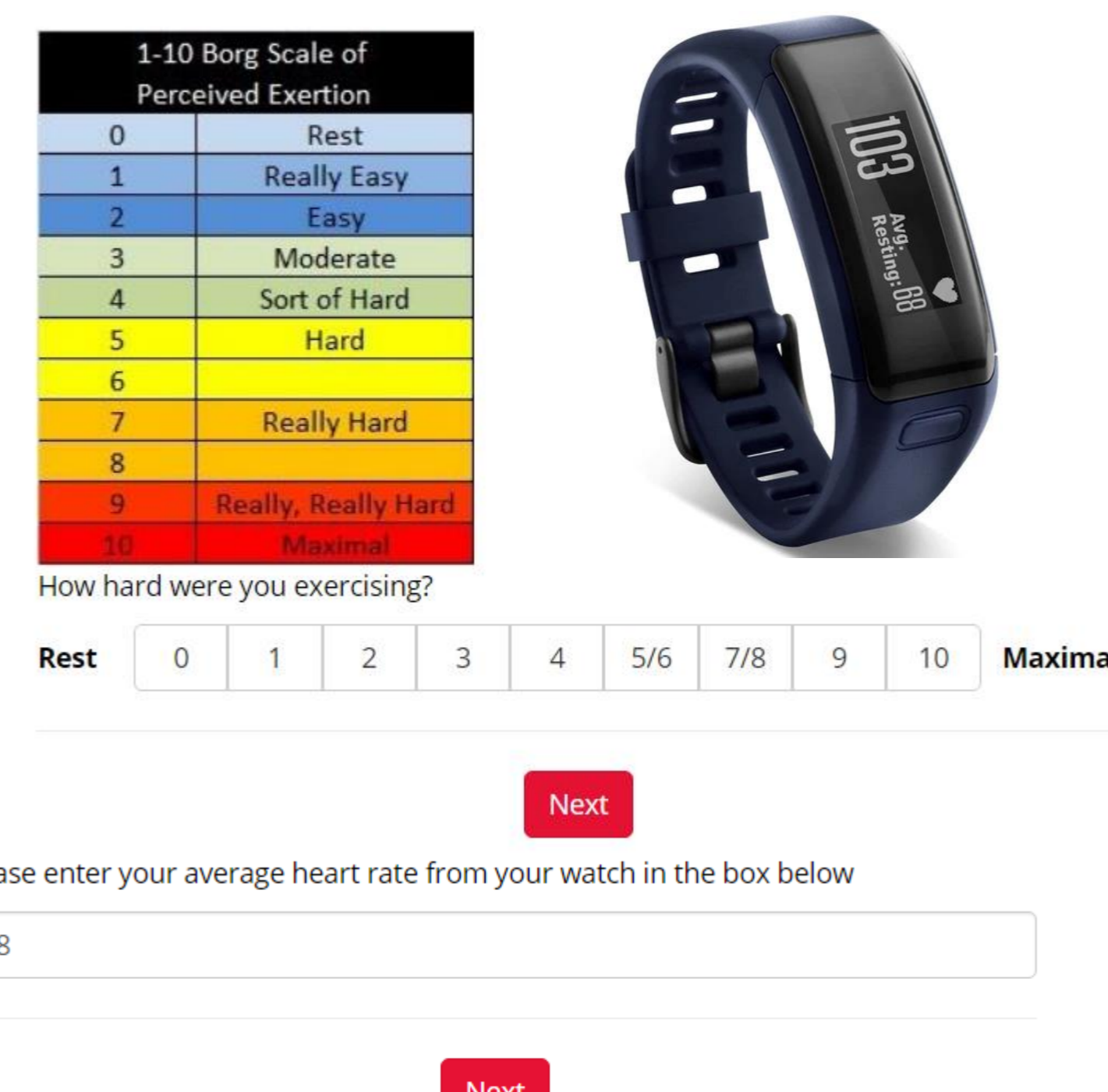
Cognitive Task

Begin with the number "1" and name an object for each letter of the alphabet starting with "A"

At home exercise sessions were completed three times per week, for eight weeks.

Stroke survivors who were part of the intervention group completed a dual task programme where they simultaneously completed various cognitive tasks while exercising.

Stroke survivors wore Garmin Heart Rate watches to record their average heart rate during the exercise session. Average heart rate was recorded at the end of each session, and survivors also reported how difficult they felt the exercise session was using the 1-10 Scale of Perceived Exertion.



Stroke population demographics

Participant characteristics and baseline measures	INTERVENTION (n=10)	CONTROL (n=11)	COMPLETED THE STUDY (n=13) Intervention: n= 7; Control: n=6	
Male/female (n=)	5/ 5	4/7	4/ 3	3/3
Mean age, SD, range	53.9, 13.3, 34-71	65.18, 9.6, 49-75	54.3, 15.3, 34-71	62.5, 10.2, 49-75
Time since stroke (months)	46.7, 78.05, 8-264	75.7, 105.1, 2.5-336	58.7, 92.2, 8-264	67.9, 131.6, 2.5-336
Ischemic stroke (n=)	7	10	4	6
Haemorrhagic stroke (n=)	3	1	3	0
BERG Balance score (mean, SD, range)	50.9, 4.1, 45-55	52, 1.6, 49-54	52, 3.05	52, 1.9
MMSE score (mean, SD, range)	28.3, 1.6, 26-30	29.09, 1.04, 27-30	28.14, 1.9	29.5, 0.8
NIHSS score (n=)	0=3 2=4 3=2 4=1	0=2 1=4 2=2 3=2 4=1	0= 2 2= 3 3= 1 4=1	0=1 1= 2 2= 1 3= 2
Timed Up and Go in seconds (mean, SD, range)	8.9, 2.3, 5.15-11.53	8.4, 2.5, 4.8-11.85	8, 2.27	7.7, 2.8
PASIPD	10.4, 9.09, 0.64-30.12	11.9, 10.8, 0.44-28.8	11.03, 10.94	13.31, 10.90

Results

FEASIBILITY

- Inclusion criteria was feasible, only two out of the number recruited were ineligible for the study
- Recruitment target was 20 stroke survivors. 22 were recruited within 4 months
- 70% attrition for intervention group
- 55% attrition for control group
- All withdrawals occurred between weeks 1 and 3
- Three sessions per week was feasible for the majority of stroke survivors. Survivors in the intervention group who completed the programme had an adherence rate between 87.5-100% with the exception of one survivor with a 45% adherence rate.
- Remote data collection methods including online questionnaires (Qualtrics) and virtual exercise sessions (Gorilla Experiment Platform) were feasible within this population.
- Technical difficulties including accessing links through email, enlarging video to full size or recording average heart rate were often occurring between weeks 1-3, and were resolved via weekly check in call with lead researcher.

ACCEPTABILITY

- Verbal feedback highlighted:
- Technical issues with Gorilla platform and accessing links via email, however most technical difficulties occurred within weeks 1-3 and were resolved.
- Two participants completed the programme on their smart phones, the programme is more user friendly on a laptop or computer.
- 10/13 said that 3 sessions per week was acceptable
- Bi-weekly survey data highlighted:
- 7/13 said that the gorilla platform was somewhat easy-extremely easy to use, 6/13 said that it was somewhat difficult.
- 9/13 said they were very-extremely satisfied with the quality of the videos
- 7/13 felt that the exercise difficulty was moderate, 3/13 found it difficult, and 3/13 found it easy.
- 12/13 said that they enjoyed the exercise programme

"I certainly feel mentally better because for me it's two things. It's contributing to research, but it's also committing to something and trying to stick with it. I mean, physically, I do feel better"

"The exercise programme has really given me the encouragement to continue my strive and strive forward to get fitter and healthier because if I can do more fun stuff like that in the future"

"I feel very motivated and one particular reason is that I'm coming to 70. I want to try and live as long as I can. And to me that means you need to try and exercise. I don't need to go out and run marathons or anything like that. I can just do my own thing. And that's the nice thing about that program because it's online"

Discussion

- Home-based online dual-task exercise delivered through the Gorilla platform is feasible and acceptable in a stroke population.
- Three stroke survivors in the intervention group, and six in the control group withdrew from the programme before week four. Withdrawal was mostly due to health related issues or family commitments.
- Garmin HR watches were not user friendly. Other user friendly options for measuring average heart rate are needed.
- Gorilla experiment platform was feasible and acceptable in this population, after initial technical difficulties were resolved.
- More challenging options (e.g. high intensity exercise) should be available for individuals who are capable of a more complex and challenging programme.
- Moderate intensity exercise three times per week is feasible and acceptable in a stroke population with mild-moderate stroke severity

REFERENCES

