

Functional and Psychological Changes During a Community Based 32 Week Postural Stability Training Programme: Recommendations for Future Practice

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1 Executive Summary

1.1 Context

- The report assesses changes in a cohort of elderly adults on a 32 week community-based postural stability training course (PSI) in Tywyn, Gwynedd. The programme is a joint initiative between BCUHB, Gwynedd County council, and the National Exercise Referral Scheme.
- With regional population demographics, healthcare programmes targeting an elderly and ageing population are of strategic interest. Falls prevention is also a priority area given its cost implications and prevalence (1 in 3 > 65 year olds fall each year).
- The programme is aligned with stated aims of the BCUHB 5 year strategy 2010-2015, specifically shifting provision from hospital to community settings, and encouraging physical activity (key action for all clinical programme groups).

1.2 Main findings

- The data strongly support the programme's impact on patients' functional ability, with clear improvements in tests linked to daily activities and the maintenance of independence, confirmed by patient accounts.
- Significant improvements in functional tests continued throughout the 32 week period.
- Psychological variables improved more in the early stages of the programme than in latter stages.
- All variables, including quality of life, demonstrated percentage changes in the desired direction.
- Qualitative data highlighted durable positive changes in attitudes towards exercise and physical activities more generally, improved esteem and confidence, and an enhanced sense of perceived social provision and support/involvement due to the class.
- Cautionary notes include the absence of control/comparison groups, and the low power of analyses due to the small sample size.

1.3 Core recommendations

- The 32 week programme evidences improvements in participants' functional ability and psychological predictors of health and future falls. Programme participants were frail and some had previously fallen, it is reasonable to suggest that expanding provision of PSI courses to those pre-risk of falls may result in greater preventative impact and associated healthcare savings.
- Objective functional changes and added value to patient quality of life in latter stages of the programme justify the duration as opposed to shorter programmes, as is currently best practice.
- The integration of programme provision with leisure services was notably successful, particularly in terms of high attendance and uptake of follow-on programmes. It is recommended that this approach is expanded to maximise participation in preventative programmes as opposed to responsive or unscheduled care.
- Future patient assessment and monitoring of programme efficacy can be more efficient through reducing the number of functional tests employed; objective tests that allow greater variability in performance and have ecological validity are preferable (e.g., 'timed up and go' versus '4-step turn test').

2 Introduction

The aim of this research was to explore elderly participants' experiences of Postural Stability Instruction (PSI) training delivered within a community leisure centre in Tywyn, Gwynedd. The research sought to obtain qualitative data via interviews with participants to understand how participation impacted on them and their lifestyles. The research also examined the participants' motivation to be physically active, their exercise/physical activity identity (the degree to which they view themselves as an exerciser/someone who is physically active), and their thoughts during exercise sessions.

Physical activity contributes to enhanced quality of life and well being, hence, increasing physical activity levels in the elderly is important to optimise later life experience. Key contributors to maintaining physical activity are the development of a personal identity as someone who is physically active and motivation to be physically active that is self-determined, that is, derives from the individual themselves (and not external sources). Although research has examined how motivation is related to exercise in clinical and non-clinical populations the majority has focused on younger populations. Given the increased ageing population research is needed that focuses on this population.

An unexplored question in elderly people, and in falls patients, is how their physical activity motivation and physical activity levels change throughout exercise programmes such as PSI and how and if these individuals develop an exercise identity throughout an exercise programme.

A second unexplored question (with this and other populations) is how any changes in motivation, physical activity, and identity occur. One explanation is the individual's physical activity related self-talk (the internal dialogue we have with ourselves). Positive or supportive (informational) self-talk (e.g., encouraging statements) may be related to positive changes in motivation, physical activity and exercise identity. Negative or controlling/amotivational self-talk (e.g., pressurising statements) may be related to no positive, or negative, change in these variables.

Qualitative research into older people's exercise behaviours and related self-perceptions and thoughts is particularly lacking. Hence, this research employed qualitative (interviews) and quantitative (questionnaires) methods to explore changes in exercise and physical activity, motivation, identity and self-talk in falls patients throughout a 32 week physical activity rehabilitation programme.

The research aimed to offer practical suggestions to enhance the psychological changes that underpin exercise behaviour and optimise exercise levels in this population.

3 Method

3.1 Research Participants

Suitable patients were referred to the Tywyn Falls Programme based on a rating between 1-3 on the Falls Risk Assessment Tool (FRAT). All programme participants were approached individually by the programme instructors to gain written consent to take part in the research which was granted ethical approval by the North Wales Research Ethics Committee.

3.2 Physical Activity Rehabilitation Programme

Participants took part in a physical activity rehabilitation programme as part of their standard care. The programme ran for 32 weeks and consisted of 1 x 60 minute leisure centre based session and 2 x home based exercise sessions per week. Both were prescribed by qualified Postural Stability Instructors (PSI).

3.3 Study Measures

Participants were required to complete questionnaires to assess:

- Exercise motivation (Behavioural Regulation in Exercise-2; BREQ-2, Markland & Tobin, 2004a)
- Physical activity identity (Exercise Identity Questionnaire; Anderson & Cychosz, 1994, modified by Strachan, Brawley, Spink, & Glazebrook, 2010)
- Self-Talk (Functional Significance Questionnaire; FSQ, Oliver, Markland & Hardy, 2010).

Participants also took part in semi-structured interviews which explored exercise and physical identity and effects and use of physical activity related self-talk.

3.4 Physical, Functional and Quality of Life Tests - Falls Programme Team

Participants were required to complete the following physical and functional tests:

- Sit to stand test (time taken for participants to perform 5 sit to stand positions).
- Timed up and go test (TUGG; time taken for participants to stand out of a chair, walk 3 metres, turn and return to seated position).
- 180 degree turn test (the number of steps required to turn 180 degrees).
- Functional reach (the distance reached forward from a standing position without falling).
- Confidence scales (ConFBAL; 10 item measure of confidence in maintaining balance, high score represents lower confidence).
- Fear of falling (FES-I; 7 item measure of fear of falling, high score represents greater fear of falling).

These tests were not conducted as part of the research but as they compliment the research data they are included in this report. In addition they completed the SF-12 which measures Quality of Life (QoL; Ware, Kosinski & Keller, 1996) via two components: Physical QoL (PCS) and Mental QoL (MCS), each with four individual scales: physical function, role-physical function, bodily pain, and general health for PCS, and vitality, role-emotional function, social function, and mental health for MCS.

3.5 Study Data Collection

Participants completed the study measures, listed above, prior to starting the programme, at weeks 10, 20 and 30 of the programme. Participants attended an individual interview with a member of the research team pre-, mid-, post- and distant post- completion of the PSI programme, which was conducted either face to face or via telephone. In addition, at each of weeks 1-6 participants completed the self-talk (FSQ) immediately after their leisure based exercise session. Participants completed the physical and functional tests described above prior to starting the programme and at weeks 11, 22 and 32.

4 Results

4.1 Physical and Functional Tests

- There were significant improvements in class mean scores for the **sit-to-stand test**, **timed up and go test**, and **confidence in maintaining balance** over the course of the programme.
- FES-I scores illustrated a trend, in the expected direction that approached significance ($p = .068$).
- It was notable that direction of change in confidence varies over the 32 week period with both increases and decreases observed.
- These are encouraging findings especially considering the low sample n and the large amount of missing data.

Table 1: Summary of Findings from the Physical and Functional Tests

Test	Δ Week 0-11	Δ Week 0-22	Δ Week 0-32	Δ Week 11-22	Δ Week 11-32	Δ Week 22-32
4 point balance test	No *	No †	No *	No *	No *	N/A
Sit to stand test (s)	Yes ***	Yes ***	Yes ***	Yes ***	No †	No *
180 degree turn test	Yes ***	No *	Yes **	No *	No *	No *
FES-I	No *	No †	Yes **	No *	No *	No *
Functional reach (cms)	Yes ***	No *	No *	No *	No *	No *
Timed up and go test (s)	Yes ***	Yes ***	Yes ***	No *	No *	No †
Balance confidence	Yes ***	No *	No †	Yes**	No *	Yes **

* $p > .05$ (not significantly different); ** $p < .05$; *** $p < .001$; † $p = .052 - .06$; Δ = change

Table 2: Significant Functional Tests Mean Data and Percent Change from Week 1 to 32

Test	Mean Week 0	Mean Week 11	Mean Week 22	Mean Week 32	% Week 0-32
Sit to stand test (secs)	26.36	20.41	17.91	16.22	38.46%
Timed up and go test (secs)	15.89	12.73	12.41	12.02	24.35%
Balance confidence	18.46	15.93	18.25	15.83	14.24%

Table 3: Nonsignificant Functional and QoL Tests Mean Data and Percent Change from Week 1 to 32

Test	Mean Week 0	Mean Week 11	Mean Week 22	Mean Week 32	% Week 0-32
Functional Tests					
4 point balance test	3.06	3.13	3.41	3.33	8.82%
180 degree turn (no. of steps)	5.13	4.26	4.58	4.33	15.59%
FES-I	13.33	11.40	11.36	10.84	18.68%
Functional Reach (cms)	23.30	25.33	25.27	25.20	8.15%
Quality of Life					
MCS	20.55	21.00	21.40	21.13	2.74%
PCS	12.22	13.28	13.90	13.63	11.53%
SF-12 Total	32.78	34.28	35.30	34.75	6.00%

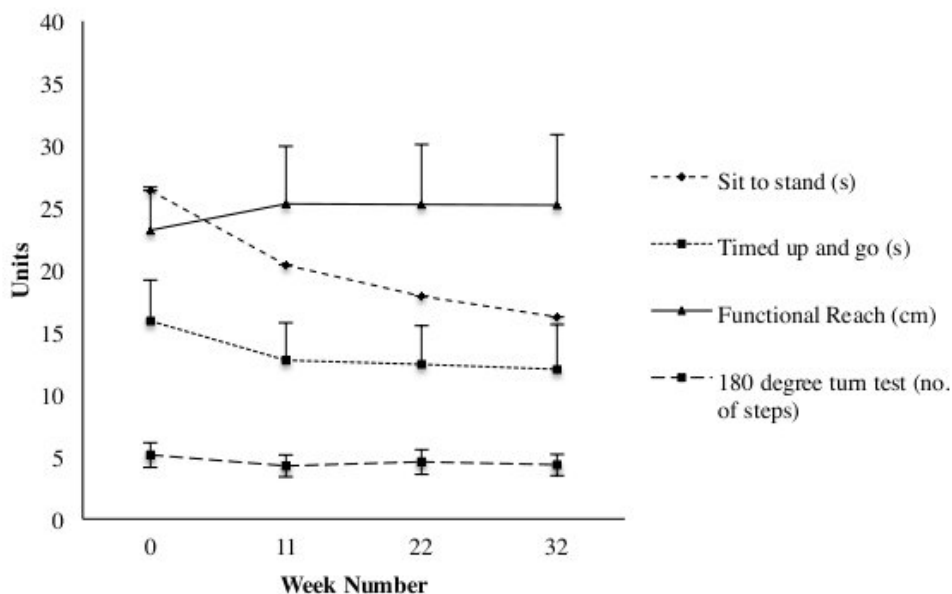


Figure 1: Results from the Significant Functional Tests from Week 0 to Week 32

4.2 Phase 1 Psychological Data: Quantitative

4.2.1 Motivation and Identity

- Nonsignificant changes in motivation from Week 1 to Week 10; a trend for motivation and identity to change in expected directions.
- Increases in all types of motivation - profiles at both weeks suggest self-determined motives dominate.
- Increase in exercise identity - notably high to begin with.

4.2.2 Self-Talk

- Informational Self-Talk significantly increases over the first 6 weeks; by week 6 participants are using significantly more of this type of self-talk than controlling and amotivational self-talk.
- Controlling and amotivational self-talk notably low in this group throughout.
- These findings suggest participants are likely to experience increasing feelings of autonomy as they become more able and possibly that informational self-talk increases as they become more knowledgeable of how to provide feedback to, and encourage themselves.

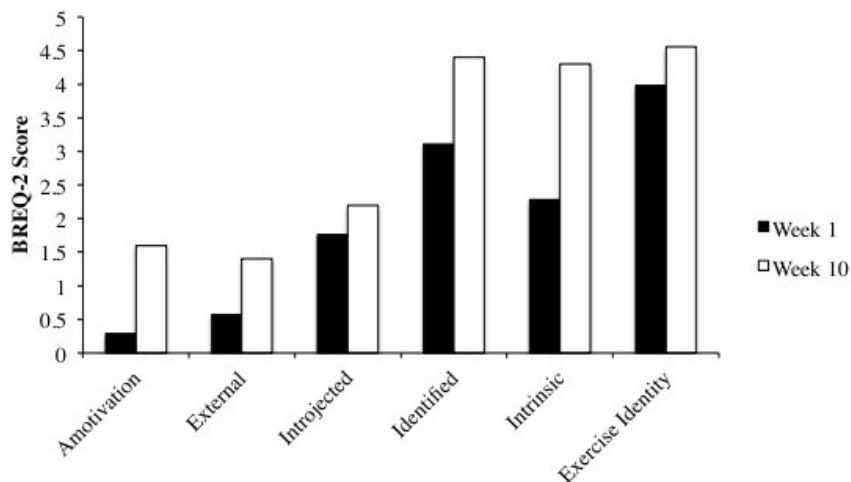


Figure 2: Motivation and Identity changes Week 1 to 10

Amotivation = no motivation to be physically active; *External Motivation* = are physically active to meet externally defined demands and possible rewards; *Introjected Regulation* = become physically active to seek external approval and aim to avoid external disapproval; *Identified Regulation* = become physically active to fulfil extrinsic self endorsed motives; *Integrated Regulation* = become physically active to satisfy valued personal life goals; *Intrinsic Motivation* = are physically active for the inherent satisfaction.

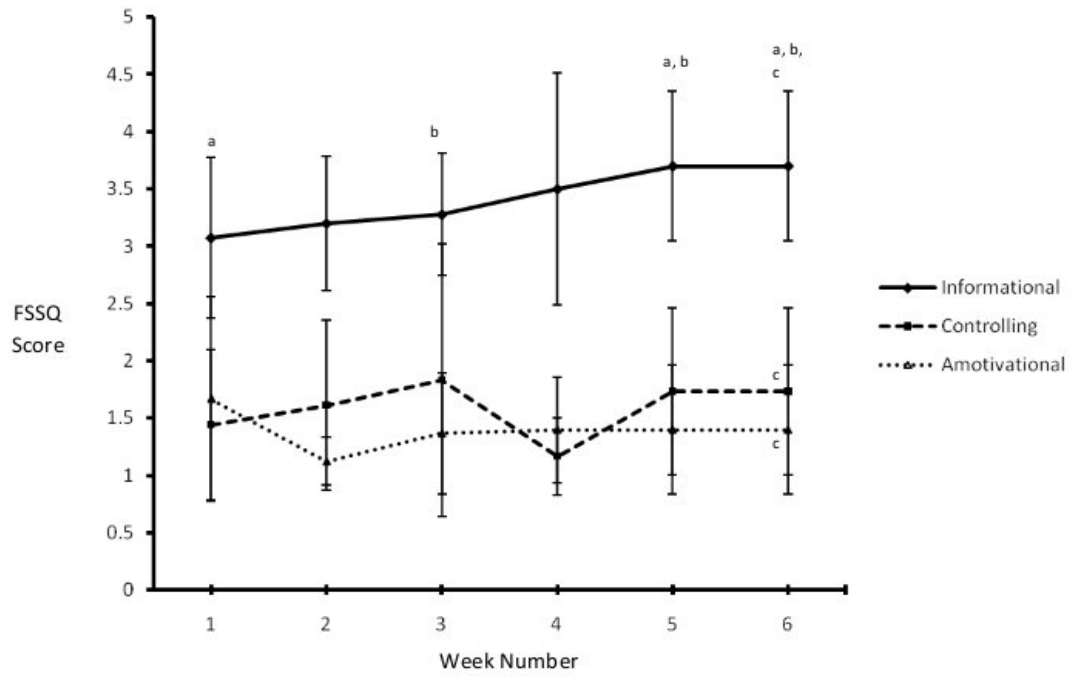


Figure 3: Self-Talk changes Week 1 to 10

4.3 Phase 2 Psychological Data: Qualitative

4.3.1 Key Themes Week 10

Including illustrative quotes from participants' interviews.

Daily Activities

- Can do things like get out of the bath more easily.
- Other people reckon I'm walking better and standing up more (instead of looking where my feet go).
- Still enjoying classes and walks for an hour most days; I can reach the top shelf much easier and other daily activities like going on the bus are easier but I still use a stick.

Physical Capacity

- I'm certainly stronger in my legs; I find I can walk better; more confident
- I'm sure I'm improving physically at the moment. I think my muscles and joints are improving quite a bit; its quite sort of exhilarating; I don't mind that it's quite tiring; I can do everything; I recommend the course; I found it jolly difficult to straighten but it's dead easy now.
- Posture and agility have improved.
- Balance has improved as I'm more conscious of what I'm doing.
- I walk/balance better from the classes.

Attitude/ motivation

- My willpower has improved and I can do things more easily and quickly like shower and I'm doing more...I've got the incentive that's egging me on.
- More get up and go attitude was slipping into a couch potato; going out in the evening now.
- The biggest benefit is the enormous improvement in mental attitude.

Well-being

- My daughters say when I stand up straight/sit up straight, I look ten years younger: I feel pretty chuffed!.
- I'm a bit happier in myself; one thing leads to another.

Lifestyle

- I go for little walks now which I never did for the last 2 years; I'm doing things I would have never dreamt of doing.
- I still stagger when I walk but I feel I'm improving; I'm doing things again that I'd stopped doing (e.g., booked a holiday) as I feel better about doing them physically.
- Doing more physical activity: walking a mile 3 times a week.

They commented that the course gave them:

Sense of purpose

- The programme is fulfilling all my wishes and I enjoy it; it gives me a purpose as you feel like you don't want to do things as you get older.
- I was starting to get bored and fed up with myself and didn't want to get involved in things before the course; now I'm not bored and I'm planning ahead.
- Nice to have something to focus on otherwise everything is the same.

Social elements

- We all have a good laugh and catch up and how you're doing.
- I like exercising; we laugh and it just makes everything relaxed.
- When you're with company you do it better; when you're on your own you think I'll do it later.
- Enjoy the social elements of the group, the group identity and cohesion.

Quality instruction

- I get along well with the instructors.
- The physios give individual attention and monitoring; it's a jolly good course that meets my needs; they explain which muscles we're improving with the exercises.

They commented about friends'and family members'responses to their involvement in the programme:

Effects on others

- Friends have been influenced by my attendance.
- My wife is pleased with the improvements.

But some noted their limitations:

Limitations

- Took a while to get confident to go out/takes a while to stand up and sit down.
- My balance is dreadful; I practice at the sink.

4.3.2 Key Themes Week 20

Physical capacity

- I've improved on the exercises and can mostly keep up with the others; I can get up from a low chair and couldn't before and raise my feet off the floor now when marching.
- It's great to have a chance to move my legs again.
- Walking most days; doing more in the classes, more endurance and I'm enjoying it.
- Feel looser and can move more easily, can bend down and pick things up more easily. I feel happier. I can do daily tasks more easily.

Improved self perception

- Can see the proof that the classes are worth it; it feels good to improve in the tests; this kind of bolsters us up; it's a nice feeling; I feel as fit as a fiddle after the classes.

Increased confidence

- In a way I'm more confident than at the start; if someone asks me to do something I think, Yes I can probably do that. Jolly well gets the circulation going which affects your outlook; classes have made me more confident.

Enthusiasm and self maintenance

- Still enjoying the exercise and the social aspects; I look forward to the classes, am full of enthusiasm.
- The exercise programme has kept me going these last 12 months.
- I'm more determined to succeed than at the start as the programme's made me see how weak I've got and hope to start on the treadmill in the gym soon.
- My general health is good; we definitely benefit from the class.

Again, they commented on positive aspects of the programme:

Quality instructors

- The instructors are good; they don't pressurise but ensure we do it.

Social aspects

- The social aspect of the class helped after losing motivation following illness.
- I like it very much; I like the company; it's easier to do the exercises.

Nevertheless some still reported concerns:

Physical limitations

- I still fear falling when I'm out and in the street; still can't garden which annoys me.
- Still comparing physical capability with that when I was younger which is silly and I get angry when I can't do physical things.
- I persist and force myself to do things which is silly as I've got a bad heart.
- I still want to improve my balance further as my balance when walking is compromised when I'm distracted.

4.3.3 Summary Week 0-20

At both weeks 10 and 20 participants noted improvements in their physical capacity, such as stronger muscles and the ability to perform daily activities more easily. They reported increased confidence and improved self perceptions, increased well-being and for some, the classes offered a lifeline as illness had sapped their motivation. Some were returning to activities they had abandoned and were regaining a positive attitude. Significant others also noted positive changes in some participants. The social support was an important element of the class, increasing both enjoyment and motivation. The quality of instruction, meeting individuals' needs was also an important part of the programme.

4.3.4 Key Themes Week 30 and Post

Physical

- Posture improvements: including being able to sit and stand with improved posture for longer, being able to walk and not focussing attention on their feet.
- Fitness:Endurance sections of the training sessions now feel easy, exercise feels easier to do; Daily activities such as walking, especially on inclines, become easier and I don't get out of breath.
- Functional. Improvements in balance which aid walking ability and also confidence in walking, reduced feelings of embarrassment.

Psychological

- Increase in confidence: to engage in and complete daily tasks, e.g., walking, cleaning and gardening.
- Increase in focus and general well being: becoming happier in themselves and their abilities.
- Motivation: Left to ourselves we would keep having a sit down and we can't do that, now have a purpose in the day to do things; Feeling pretty pleased with myself.

Knowledge and Advice

- Gaining knowledge: enjoyed being able to use the knowledge and equipment from the sessions while at home in their own time.
- Benefits of advice: Discussing how to prevent falling but also information on how to cope in situations if I did fall.

Social

- Social aspects: enjoy the company and exercising with others. Greater competition and motivation, we egg each other on; more stimulating.
- Formed a collective identity: We've all benefitted; We've all improved.

Independence and Daily Task

- Daily functioning: able to carry out daily tasks including walking, gardening, walking up stairs as opposed to using the lift and able to cook for longer as able to stand for greater periods of time, pick things off the floor more easily, vacuum and stretch further which is helpful when reaching shelves etc.
- Confidence in physical functioning: greater confidence in ability to try to complete daily activities for themselves. Yes I can probably do that; Feel more competent; Trying to do things/activities that I wouldn't have tried before.

4.3.5 Summary Week 30 and Post

At both week 30 and post exercise programme completion participants noted improvements in their ability to carry out daily activities including gardening, vacuuming and walking. They reported increased confidence in their ability to carry out these daily activities and also to complete the exercise sessions. Social aspects of the sessions emerged as important for the participants as a motivational tool for increasing enjoyment of the classes and also as feeling part of a group and forming a social identity. The quality of instruction was noted and emerged as an important part of the programme.

5 Conclusions

- The programme resulted in a number of significant improvements in functional tests (timed up and go; sit to stand) which reflect reports from participants in their interviews about their improved ability to carry out daily activities. Similarly, confidence in maintaining balance increased significantly and this again was reflected in greater confidence to be physically active and take part in activities that participants may have avoided previously.
- Although no significant changes were observed in motivation or exercise identity it was interesting that participants, many of whom were not currently physically active due to their health status, had a strong physical activity identity from the outset. They also reported intrinsically derived motivation to attend the exercise programme. This may not always be the case in those who attend similar programmes but could have contributed to the positive outcomes and experiences reported here.
- Interview comments confirmed the sense of physical activity identity held by the participants and social cohesion within the group, facilitated in part by much valued support and guidance from instructors.
- Over the first 6 weeks, participants used more informational self talk which is encouraging as this tentatively suggests a class environment that fosters positive encouragement and motivation rather than pressure to carry out activities.
- Qualitative data indicated a range of positive changes were experienced and maintained up to post programme completion, constituting substantially to participants' quality of life:
 - Improved physical capacity and completion of daily tasks
 - Improved motivation and well being
 - Improved confidence and self perception
 - Social cohesion and a sense of purpose
- The group developed a strong collective identity, displayed consistently high levels of attendance throughout the programme, and uptake of follow-on sessions managed by leisure services has also been high, this highlights a benefit of longer duration programmes with small class sizes.
- Cautionary notes, when interpreting these findings, include the absence of control/comparison groups, and the low power of analyses due to the small sample size.

6 Appendices

6.1 Behaviour Regulation in Exercise-2

WHY DO YOU ENGAGE IN EXERCISE?

We are interested in the reasons underlying peoples' decisions to engage, or not engage in physical exercise. Using the scales below, please indicate to what extent each of the following items is true for you. Please not that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your response will be held in confidence and only used for our research purposes.

		Not true for me	true	Sometimes true for me	Very true for me	4
1	I exercise because other people say I should	0	1	2	3	4
2	I feel guilty when I don't exercise	0	1	2	3	4
3	I value the benefits of exercise	0	1	2	3	4
4	I exercise because it's fun	0	1	2	3	4
5	I don't see why I should have to exercise	0	1	2	3	4
6	I take part in exercise because my friends/family/partner say I should	0	1	2	3	4
7	I feel ashamed when I miss an exercise session	0	1	2	3	4
8	It's important to me to exercise regularly	0	1	2	3	4
9	I can't see why I should bother exercising	0	1	2	3	4
10	I enjoy my exercise sessions	0	1	2	3	4
11	I exercise because others will not be pleased with me if I don't	0	1	2	3	4

		Not true for me	1	Sometimes true for me	2	3	Very true for me	4
12	I don't see the point in exercising	0	1	2	3	4		
13	I feel like a failure when I haven't exercised regularly	0	1	2	3	4		
14	I think it is important to make the effort to exercise regularly	0	1	2	3	4		
15	I find exercise a pleasurable activity	0	1	2	3	4		
16	I feel under pressure from my friends/family to exercise	0	1	2	3	4		
17	I get restless if i don't exercise regularly	0	1	2	3	4		
18	I get pleasure and satisfaction from participating in exercise	0	1	2	3	4		
19	I think exercise is a waster of time	0	1	2	3	4		

6.2 Exercise Identity Scale

Please indicate in the space provided the response that best describes yourself and how you feel. For each item indicate on a scale from (1) disagree to (7) agree, how you feel.

	Disagree						Agree
1 I consider myself an exerciser	1	2	3	4	5	6	7
2 When I described myself to other people, I usually include my involvement in physical activity	1	2	3	4	5	6	7
3 I have numerous goals related to exercising	1	2	3	4	5	6	7
4 Physical exercise is a central factor to my self-concept	1	2	3	4	5	6	7
5 I need to exercise to feel good about myself	1	2	3	4	5	6	7
6 Other people see me as someone who exercises regularly	1	2	3	4	5	6	7
7 For me, being an exerciser means more than just exercising	1	2	3	4	5	6	7
8 I would feel a loss if I were forced to give up exercising	1	2	3	4	5	6	7
9 Exercise is something I think about often	1	2	3	4	5	6	7

6.3 Functional Significance Questionnaire

The term self-talk refers to things people say to themselves, either out loud or inside their head. Self-talk may be whole sentences or phrases, or sometimes just a few words.

Thinking about your self-talk over the course of the exercise session, answer all of the questions below by circling the numbers which best correspond to your self-talk. There are no right or wrong answers.

Overall, my self-talk...	Not at all					Very much so
1. Made me feel I was in control	1	2	3	4	5	
2. Made me feel pressured	1	2	3	4	5	
3. Was encouraging	1	2	3	4	5	
4. Made me feel I had no choice	1	2	3	4	5	
5. Made me feel more in charge	1	2	3	4	5	
6. Assisted my understanding	1	2	3	4	5	
7. Was critical	1	2	3	4	5	
8. Provide me with positive feedback	1	2	3	4	5	
9. Made me feel I had no control over the situation	1	2	3	4	5	
10. Helped reduce the pressure I put on myself	1	2	3	4	5	
11. Reassured me that I was in control	1	2	3	4	5	
12. Directed me to think or feel a certain way	1	2	3	4	5	
13. Was commanding	1	2	3	4	5	
14. Told me what I should be doing	1	2	3	4	5	
15. Was directive	1	2	3	4	5	

6.4 Key Interview Quotes

Physical	Psychological	Social	Daily Activities	Sessions
My posture has improved somewhat	It makes me feel more confident	We all have a good laugh and catch up	My wife says i'm much more agile and able to do more, especially domestic chores	Will be a bit sad when its finished
I just enjoy the exercises and feeling that i'm getting a bit fitter	It makes you realise you can do things if you work at it	I like it very much...I like the company	Walking up and down stairs is much better too, I can do that without holding on the handle	The two instructors are excellent! Very enthusiastic and kind
I'm certainly stronger in my legs, I find I can walk better and more confident	Nice to have something to focus on otherwise everything is he same	Enjoyed it very much! We all want to carry on	Doing things I haven't done for a long time, they might be little things but its brilliant	Thoroughly recommend to anybody who's a bit shaky
I think were all improving- posture and movement	I feel better from the exercise Daughters say I look 10 years younger when I stand up, I feel pretty chuffed!	More stimulating	I jump about the garden now.. find it easier to clean the grate and walk around town	It's good to have the leaders, they know what were capable of...good to have the guidance.
I think my muscles and joints are improving quite a bit	Feel more competent	Greater competition and motivation	Feel more competent	
My health and fitness has improved since the start of the class	Very pleased with myself	We egg each other on	Trying to do things/activities that I wouldn't try before	
We gradually built my stamina up, at the end we could do it	Feeling generally brighter and a lot better in myself			

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