

English National Ballet
Dance for Parkinson's
An investigative study

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Executive Summary

English National Ballet commissioned Roehampton University to conduct research into the effects of dancing with Parkinson's as seen within the Company's pilot project. It was hosted at Markova House, London, between October 2010 and February 2011. The project introduced participants to the ballet *Romeo & Juliet* and provided 12 ability-appropriate dance sessions of structured and creative movement accompanied by live piano and flute music.

The research collected qualitative and quantitative data from the project using interviews, film footage, validated measurement techniques, diaries and observations. The resulting report analyses and documents the findings.

The research study concluded that dancing, as seen within English National Ballet's project:

- Aids people with Parkinson's physically, mentally and socially
- Does not help with physical development in a uniform or linear fashion, but can help with mobility in the short term, particularly when there is musical accompaniment
- Gives participants the tools to increase body awareness and to increase confidence in order to use the mobility they have, but may not have had the courage to use
- Provides tools to help with activities in everyday life
- Gives participants the opportunity to experience different qualities and ways of moving
- Can loosen up the spinal area and help with stability and posture
- Can encourage a greater reach, focus and projection
- Provides a vehicle for social interaction
- Precipitates feelings of well-being, determination and achievement
- Provides opportunities to create movement and stimulate the imagination
- Provides an event for people with Parkinson's that is about art, rather than about disease
- Provides opportunities to learn about ballet
- Provides an enjoyable way for participants to exercise as a group in a structured environment
- Allows participants to enjoy the excitement of being a part of the goings-on of a professional ballet company.

1. Introduction

The report documents research examining a pilot dance project for people with Parkinson's, run by English National Ballet from October 2010 to February 2011. There were several aims:

- To examine how the dancing affects participants, their carers and other stakeholders
- To assess participants' on-going motivation to attend sessions
- To assess the value of community within the group for participants
- To assess the creative and aesthetic value of dancing with music for the participants
- To evaluate the physiological impact of dancing on participants, specifically on the areas of postural alignment, balance and stability and motor control.

1.1 Parkinson's

Parkinson's is a neurodegenerative disease resulting from the depletion of the chemical dopamine in the basal ganglia of the brain. The lack of dopamine interferes with the ability to initiate movement, to keep movement going, or, contrariwise, to stop moving voluntarily. Parkinson's, therefore, can curtail the implementation of everyday tasks and actions.

Symptoms can vary greatly from one person to another. Some of the more common symptoms include:

- Tremor
- Rigidity or stiffness in muscles
- Slowness of movement (bradykinesia)
- A hurried, shuffling walk (festination)
- Lack of co-ordination, where an arm or arms stop swinging whilst walking
- 'Freezing', where people suddenly cannot move despite wanting to
- Change in posture from a more upright, vertical stance to a more stooped and curved line in the thoracic spine. This curve in the thoracic spine causes compensations in the rest of the body especially the cervical spine or neck
- The voice may become quieter
- Facial expression may lessen
- Depression is common.

Many people with Parkinson's lose balance easily and are at risk of falling regularly. Multi-tasking is often difficult. Neuromuscular tension and pain is common.

There are a range of medicines prescribed to ease symptoms or to help other drugs metabolise. Many of these usually need to be taken several times a day and with continued use can become unreliable; many people also experience uncontrollable movement (dyskinesia).

Parkinson's is a progressive, degenerative condition for which there is no cure. The disease does not progress in a linear fashion. Some people may experience periods where they feel more affected by Parkinson's than at other times. Even in a single day people may have 'off' and 'on' periods; 'off' periods being moments where symptoms are much worse than 'on' periods.

1.2 Dance for Parkinson's

English National Ballet's Department of Learning joins a small, but growing, number of dance practitioners delivering dance for people with Parkinson's in the UK. Most practitioners work independently or as small enterprises and with a variety of dance forms and practices, such as creative movement, Tango and somatic imagery. English National Ballet is the first large-scale dance company in the UK to deliver a project specifically for people with Parkinson's.

Much of the inspiration for the project came from the American contemporary dance company, Mark Morris Dance Group, who have been running Dance for PD™ in conjunction with the Brooklyn Parkinson Group for several years with much success. Between 50 and 60 people now attend sessions at Mark Morris Dance Group's headquarters in New York. English National Ballet has re-interpreted this approach, making it unique to the Company and reflecting what they have to offer as an internationally acclaimed classical ballet company.

1.3 The English National Ballet Project

With support from City of Westminster, London, English National Ballet set up a pilot dance project for people with Parkinson's from October 2010 to February 2011. There were 12 dance sessions, given once a week for between an hour and 15 minutes and an hour and a half, with time afterwards for refreshments. They were run in two blocks of six consecutive weeks with a break of four weeks over the Christmas period. The sessions took place in a fully accessible studio at Markova House, English National Ballet headquarters.

Like many of the Company's community-based projects, this one was based on repertory the Company was performing at the time, namely, Rudolf Nureyev's *Romeo & Juliet*, danced to Prokofiev's music. Not only did participants learn about the ballet through dancing adapted sections of the repertory, but they also danced to the music throughout the sessions. In addition, participants were invited to watch a rehearsal of a pas de deux from the ballet. They were taken to a performance of *Romeo & Juliet*, complete with a pre-performance talk at the London Coliseum.

The project was primarily focused on the artistic content and context of *Romeo & Juliet*, rather than being a therapy class for people with Parkinson's.

The sessions were targeted at those living in the London Borough of Westminster and its immediate localities. The project was marketed to the Kensington & Chelsea Parkinson's UK Support Group and the Central London Parkinson's UK branch. The project was also advertised on English National Ballet's website, in the local press and information was sent to local Neurology departments, consultants and Parkinson's specialist nurses and physiotherapists in hospitals such as Chelsea and Westminster and UCL. Dance organisations with a remit for health and older people were also informed of the project. People with any stage of disease progression were welcome to the project.

The project was delivered and managed by Danielle Jones, Learning and Participation Officer from the Department of Learning at English National Ballet. As Learning and Participation Officer Jones has a remit to make ballet accessible to a variety of community groups and she has expertise in working as a dance practitioner with older people and those with disabilities. Jones trained as a specialist dance worker for people with Parkinson's through the Dance for PD™ training course run by Mark Morris Dance Group in New York.

Jones was joined in facilitating the sessions by Joanne Duff and Anna Gillespie on freelance contracts with English National Ballet. Duff and Gillespie have had the experience of delivering dance sessions for people with Parkinson's for over two years, using Gillespie's live musical accompaniment. Gillespie is an experienced dance accompanist, specialising in improvisation on the piano and flute. Duff has worked extensively in ballet education. Together with Gillespie, she has set up Musical Moving: Dance for People with Parkinson's, running four dance groups for people with Parkinson's in London. They have presented their work at the World Parkinson's Congress, Glasgow 2010.

In addition to the three project leaders, three dancers from the Company and one other person with experience of both dancing and of Parkinson's joined in some of the sessions as participants and helpers. A Parkinson's UK support worker also attended each session.

1.3.1 The participants

14 people began the project. By the end of the 12 weeks 24 people with Parkinson's had attended and 14 people without had also participated, in addition to the helpers, facilitators and researchers.

Participants varied in the severity of condition. Two members of the group were wheelchair users; many walked with a stick. One member had a learning disability in addition to having Parkinson's. The majority of participants were over 60, which matches the main age demographic for the condition.

1.3.2 The sessions

The sessions followed a pattern: participants started seated in a circle for the first half of the session and progressed to standing either at a barre, or in a circle. Movement expanded to fill the whole of the room, as well as travelling across it. The session often ended standing in a circle again.

The sessions were based on the structure of a ballet class, which progresses gradually using more and more of the space. Traditionally a ballet class starts by using an aid for stability, such as a barre (or in this case a chair), to practice in the centre of the room, to moving across it from the corner. Specific codified movement was used, such as the plié, tendu and développé. Ballet principles were also acknowledged in exercises that encouraged a feeling of lift and opening of the upper body, use of varied dynamic qualities, a projection of energy through lines made with the body. Other common elements used in a ballet class that were used in these sessions include visual cues through the demonstration of exercises by facilitators and aural cues through the use of live music.

Live music accompanied each session. The piano, flute, and for one session, the clarinet were played. Prokofiev's *Romeo & Juliet* music was used as a score to which Gillespie improvised around.

1.3.3 The research

The research was carried out by Dr. Sara Houston and Ashley McGill from Roehampton University Department of Dance. The research project was the first in the UK to examine the benefits of dance in an artistic form for people with Parkinson's and one of the first world-wide to prioritise the use of qualitative research methods within a mixed-methods (quantitative and qualitative) study.

Methods for collecting research consisted of:

- Semi-structured interviews with participants before, during and after the project
- Non-structured conversations with participants and carers during the project
- Participant-observation of sessions
- Film analysis of sessions from two view points
- Diaries written by participants of their lives during the project, or their perceptions of each session
- Photographs of each volunteer standing side on for a 2-D postural analysis, conducted before, mid-way and after the project
- Fullerton Advanced Balance Scale conducted before, mid-way and after the project and before and after one session. The Scale measures dynamic and static balance and stability.

The ten tasks of the Fullerton Advanced Balance Scale are as follows:

- Standing with feet together and eyes closed
- Reaching forward to retrieve an object which is held by the tester at shoulder height with an outstretched arm
- Turn 360 degrees in a right and left direction
- Step up and over a six inch bench
- Tandem walk on a line

- Standing on one leg
- Standing on a foam cushion with eyes closed
- Two-footed jump for distance
- Walk with head turns
- Reactive postural control.

Six people took part in all the balance and postural tests (five more participated in some of the tests but due to schedules were unable to complete all), four wrote diaries and 14 took part in semi-structured interviews with two partners also contributing to the data. All agreed to be observed. Participation in the research was entirely voluntary. Ethical approval was passed by the Ethics Committee of Roehampton University.

All quotations from interviews, diaries and conversations are recorded here verbatim. We have credited all respondents at the end of the report. We have chosen not to credit each quotation to protect anonymity as, occasionally, some of the content may be considered sensitive.

2. Adherence

Numbers increased during the project with 10 people with Parkinson's joining during the 12 weeks from an original 14. Out of the 24 participants, none left because they did not want to attend.

Not all have attended every session, but reasons for not coming to a session included trouble with buses and other prior engagements; occasionally because of illness. Several came despite coming from north London and having to negotiate public transport. Several carers joined in with the sessions, but the majority of participants came on their own. A few co-ordinated travelling with each other and came to the sessions together. Interest in the project generated great enthusiasm for the follow up *Strictly Gershwin* project by everyone spoken to:

- Out of all the people who began the project, all saw it through to the end:
 - Out of the 14 people who started at the beginning of the project, there was 100% adherence to the project.
 - Out of the 24 people who participated during the project, there was 100% adherence to the project.
- Out of the 24 people who participated during the project, 19 have returned for the follow up project based on *Strictly Gershwin* and three new people have joined the sessions.

3. Motivation to join the English National Ballet project

Seven participants regularly attended one other dance class during the week. For others, it was the first time they had danced for many years. Reasons varied as to what attracted them to the project:

3.1 Health

I've a lazy mind. I wouldn't do exercise on my own. I'll go anywhere there's a group to make you move...I chose dance because of the movement and it's nice. Gets the muscles moving...Parkinson's is trying to take the muscles so you have to fight back. I want to keep dancing as if you don't use it, you lose it.

Many participants chose to do the English National Ballet project because they thought that it might benefit their health. Many were familiar with research which had suggested that dancing to music would temporarily lessen some of the symptoms of Parkinson's:

I realised I was badly co-ordinated and music helped.

I am in pain when I'm stiff and when I get up in mornings. Movement helps. This is why I want to do the ballet, and to get better balance.

I always liked dancing. It sounded ideal to help my balance. The more I exercise, I do better. It's easier as a group than on my own.

F_ and I used to do ballroom dancing...I've experienced how dance can help me...It's the rhythm. Certain music somehow clicks with the brain. I used to freeze...We put on some dance music. It worked. It got me where I wanted to go. Personally I think dance can help. I think dance will help me keep mobile for longer.

My objective is to hold back progression of Parkinson's as much as possible. They don't seem to have a cure in sight so you have to make the best of the situation you're in.

In addition, what was important to them was the fact that they would be dancing as a group and led by an expert, rather than on their own without the support of a facilitator:

Danielle came to the local group meeting [Parkinson's UK support group]...I thought, ballet, blimey! I'll see how we go. I'm not a great dancer. I'm not disciplined at exercising...This is a discipline. I need to get the weight down. I feel fitter when I'm 3 – 4 lbs lighter.

I do Pilates once a month when I go to the [Parkinson's support] group and someone comes in. But three-quarters of an hour a month is not good enough. I probably should go to the gym...but again, I'm not disciplined.

3.2 Confidence and sociability

You lose confidence and I need to snap out of it. I need to do things to get confidence.

Several participants talked about their lack of confidence in moving since being diagnosed with Parkinson's. Falls are common, particularly in crowded spaces, and this often knocks confidence. Others have experienced a sense of loneliness, which Parkinson's can often precipitate. Part of the reason for doing the project had to do with participants wanting to improve confidence and to counteract feelings of loneliness:

Meeting different people is a good thing. I'm not saying I'm good at it [dancing]. Parkinson's can make you go into your shell. We can share information and experiences.

I get lonely.

The main initial reason for getting involved was to do with getting involved with people with Parkinson's and observe what is happening and the social aspect.

Involvement in goings on means not getting isolated, cut off and bored.

I have worked all my life and would have got myself in a depressive state if I hadn't got something constructive like classes.

[The project] came at a really good time for me. It's the first term I haven't worked. It filled a hole at a time when I needed it the most.

3.3 English National Ballet

Dance is nicer [than exercise] as it's more personal and expressive.

Many participants were excited at the prospect of working with an international ballet company. A couple of people were complimentary about the project manager, citing her as a reason they decided to try out the dancing. Others were interested because of their love of dance and ballet. One person articulated his interest in participating in a cultural activity designed with his needs in mind. He was often reluctant to experience mainstream cultural entertainment because of how Parkinson's interfered with his enjoyment of it:

It's not far to go.

Danielle convinced me.

I love moving to music. It makes you feel so good...I wanted to be in on it [the project]. I don't go that much to the ballet because I don't have a dancing companion...I'm a great TV dance watcher...It'll be really nice going back to the Coliseum.

I'll try anything. I've not danced before. I do a few exercises on my own but I can't walk more than 100 yards and I can't go to the theatre or cinema because of the crowds.

4. The effect of dancing

The research examined the experience and effects of dancing in different ways; through qualitative data from interviews and conversations, reading participant diaries and analysing film footage of the dance sessions and through quantitative measurements.

After outlining the research methods and results in section 4, section 5 of the report triangulates all of the data to present the analysis of the research in detail.

4.1 The experience of dancing from the participants' points of view

Participants' view points, experiences and feelings were ascertained from interviews, informal conversations and diary entries.

Interviews were held at the beginning and end of the project, with some occurring at the mid-way point. They were semi-structured, which meant that open-ended questions were prepared by the interviewer, but these were the starting point for an often organic conversation where interviewees were encouraged to talk at length and change the subject. Most interviews occurred at Markova House, some were conducted at the interviewee's home, or at another venue, such as the Tate Britain.

Questions included: "tell me about yourself", "why were you interested in attending the project?", "can you think of an exercise you found particularly enjoyable and why?", "can you think of an exercise that you found particularly challenging and why?", "can you think of an exercise that you found particularly useful and why?", "what do you value in life?".

Diaries were written by participants in various formats. Some gave detailed accounts of all aspects of their lives over the duration of the project, others gave comments on how they found each session and how this had affected them.

Participants related very individual responses to their experience. Some described how they had taken what they had learnt in the sessions to help them with their daily lives. Others noted changes in their physicality. Several highlighted the emotional response they had. Some participants were adept at explaining what it was like having Parkinson's and the difference dancing makes. Others described eye witnesses, such as family members or health professionals, who made comments to them about changes they saw. All described the social benefits.

In examining interviews, conversations and diaries, 11 different categories relating to the participants' experiences from the project were identified that cut across all interviews, diary entries and conversations:

- Aid to daily life
- Fluency of movement and mobility
- Balance and stability
- Well-being
- Sociability
- Dancing as a group
- Dancing with live music
- Learning about ballet
- Health
- Freedom
- Determination and achievement.

Quotations from interviews and diaries are used verbatim within the triangulation of data to support and illustrate other observations and measurements made. As mentioned in section 1.3.3, due to the potentially sensitive nature of the material, credits are listed at the end of the report, rather than in the analysis to protect anonymity.

4.2 Observations from the sessions

Researchers took part in all sessions as participant-observers. In addition, two static film cameras were set up on tripods in different parts of the studio to film all sessions.

4.2.1 Film Analysis

The analysis tracked each participant from week one to week 12. We examined how each individual responded to movement instructions in terms of posture and body mechanics and how they coped with dynamics and qualities of movement, taking into account their own natural way of moving. Furthermore we looked at how they extended their movement range and how their way of moving changed from week to week using the same exercises. We also examined how the participants coped with learning new exercises and how the pace of the classes affected their response to the movement.

We found Rudolf Laban's descriptions of Effort to be useful in analysing qualities of movement. The descriptions used in the analysis are as follows:

- For weight of movement: 'light' or 'strong'
- For travel through space: 'direct' or 'indirect'
- For duration of movement: 'sudden' or 'sustained'
- For flow of movement: 'bound' or 'free'

Overall we found six common factors that changed across the 12 weeks. These factors were:

- Qualities and dynamics of movement
- Posture
- Energy projection
- Confidence
- Body awareness
- Loosening of spinal area

There were other factors which affected some individuals, but were not common in the rest of the group. Some of these are mentioned in the case studies.

4.2.2 Case studies

Case study 1: Participant A

Normally A walks with a stick and often shuffles, taking very tiny steps. He has a stiff, bound quality of movement. He finds it difficult to multi-task and often loses his balance. He normally sits with his knees tightly closed together and hands close to his body. This was A's first dance project.

Changes after 12 weeks of dance sessions:

A's sitting has improved with a wider stance and sometimes his posture is more upright. He uses his space more during exercises that require his arms to extend out to the side. His coordination and ability to multi-task is better. For example, his arms can do one thing while his feet are doing another. There is an awareness of softness in his movement for some exercises, for instance, in the marriage motif, and at other times he is able to demonstrate the use of weight in movement. For example, he can articulate stamps more clearly and drop his weight in sways. He has grown more confident with some actions. When walking to music, without his stick, A's stride has

lengthened and slowed in time to the music. In the last two weeks, A was able to get out of his chair more easily.

A's improvement in the two-footed jump in the Fullerton Advanced Balance Scale could be connected to a wider base of support from which he could initiate the jump. Furthermore, his sense of weight has improved, which also could have led to the better jump that was seen in the final testing session.

Case study 2: Participant B

Normally B has a very light, delicate quality to her movement. She suffers from bradykinesia so her movement is delayed and movement of her right arm is sometimes affected by a tremor. Her right arm does not stretch out as much as her left and elbows are still bent at the extent of her reach. She does not take medication. This is B's second dance class during the week.

Changes after 12 weeks of dance sessions:

It is easier for B to show weight, sharpness and directness after taking part in these sessions. She can execute dynamics and effort that are different to her usual way of moving. Her energy projects more through stronger, more purposeful movement articulated by her arms and hands, as well as through eye focus. There is less slowing and lingering of movement and an increase in that which was sudden and direct. B's walking changed with a cue of music, someone to copy, or clapping.

B's engagement with the movement is much more confident. She can remember short sequences of movement and demonstrated a greater dynamic range. For example, having had a very limited reach of movement at the beginning of the project, in the 'Juliet' sequence, she leans forward as instructed and throws her arms forward using a stronger and powerful dynamic in order to indicate the anguish Juliet is feeling at that point in the story. The reach in both arms is extended through her arms, hands and fingers that now stretch out with a sudden, direct trajectory. Her movement interpretation has become so much more alive and vibrant.

Case study 3: Participant C

Normally C sits and moves with a kyphosis in his thoracic spine. Initially when lifting his arms up his hips would shift forward. C had quite a lot of mobility at the start of the project. This was C's first dance project.

Changes after 12 weeks of dance sessions:

C's tendency to sit into the hips or shift them forward when lifting the arms has lessened implying that core strength and stability could have improved. The results from the balance tests show a small improvement in being able to balance on one leg, although not enough to change the score. He has freer use of his spine and the thoracic curve is lessened, which also may have accounted for his increasing ability to move without shifting the hips forward.

C seems more confident with his movement, which is matched by a more evident ability to multi-task. Confidence was seen in his ability to give the tester his weight during the postural stability task at the end of the project. Confidence and strength was also seen in the two-footed jump, which improved across time.

Case study 4: Participant D

Normally D walks with a stick and is very stiff throughout his body. He has a kyphosis curve in his thoracic spine. He often loses balance and often articulates his frustration about having Parkinson's. This is his second dance class during the week.

Changes after 12 weeks of dance sessions:

D can now walk with a stronger sense of coordination and direction. His stride pattern has lengthened and his arms swing loosely. He is more aware of his posture when standing and results in the posture assessment support this observation. He can isolate the upper body more when twisting by keeping his knees facing the front. He can also follow and use cross-rhythms in the class music. D is more confident in voicing his ideas in class. He smiles more. D can move with more weight and when improvising with music he shows musicality, creativity, and clear movement.

4.3 Quantitative measurements

The quantitative measurements for the project have included testing for balance and stability using the Fullerton Advanced Balance Scale and a postural analysis.

Pre-testing was completed four days prior to the start of the dance classes at English National Ballet. A mid-way testing session was completed three days after the sixth class and right before the Christmas break. The final testing session was held across three days and was carried out one and a half weeks after the final dance class.

4.3.1 Fullerton Advanced Balance Scale

Results from the Fullerton Advanced Balance Scale were analysed using SPSS statistical software. A total of six participants took part in all testing sessions.

Participant 5 was only able to carry out two out of the 10 balance tasks during the initial testing session. Furthermore, participant 6 was able to complete seven out of the 10 tasks. The reasons for these two participants not taking part in all tasks were mainly due to time restrictions, equipment not being available on the day, or participants not feeling or looking stable enough that day to carry out the tasks. Participants 5 and 6 have been removed from statistical analysis in order to create a more accurate set of data with means that are more representative of the group as a whole. However, the improvements seen from both of these participants will be discussed along with all other participants.

There was a significant difference between the first and last set of balance scores, indicating an increase of stability and balance during the project.

There was no statistically significant difference between the first and middle set of balance scores or between the middle and last set of scores. This comparison was significant at the 0.05 level for the group as a whole ($p=.011$) with an average change in score of +4.0 points. It is important to note that although the statistics represent only four of the six participants, when the other two participants are added in to the statistical comparison, the results are still significant at the 0.05 level ($p=0.038$). Furthermore if all six participants are included and the average results are used for the statistics rather than total results (total score divided by the number of tasks the participant completed), results still show significance at the 0.05 level ($p=0.042$).

Results from the Fullerton Advanced Balance Scale

Participant	FAB Score Pre	FAB Score Post	Change in Score
1	34	37	+ 3
2	27	30	+ 3
3	19	23	+ 4
4	24	30	+ 6
5	4	4	0
6	16	16	0

Two participants showed no change in score from beginning to end. One participant was not able to attend many of the dance sessions. The findings are strengthened by this point showing that those who attended most sessions also showed most improvements for this specific test.

As Parkinson's affects people in very different and individual ways, it seems unlikely that one scale can be used to measure balance in the same way for each and every individual or group of people. It is with this understanding that it became necessary to use the Fullerton Advanced Balance Scale in a way that would show changes in important factors for this particular group of people across time. In other words, the scoring of this balance test took into account important changes in participants that may have not been described or mentioned in the general scoring scale. Furthermore, even if particular scores did not change across time, qualitative analysis of the recorded testing sessions showed there to be smaller changes that were still important and worth taking note of for the purposes of this study.

As mentioned above, the scoring of certain tasks had to be addressed in a more individual manner so that important changes could be taken into consideration. A clear example of this can be seen when looking at the

postural stability task. For this particular task the tester placed her hand in the middle of the participant's upper back and asked that they lean into her hand so as to give their weight to her. Once the weight was transferred into her hand, the tester was required to pull the hand away so that the participant would have to readjust and find their stability by moving their feet underneath their centre of gravity. The scoring of this particular task ranges from 0-4 with a score of 0 representing times where a participant does not attempt to catch themselves once the tester's hand is taken off of their back. A score of 4 represents when the participant takes only one step to regain stability independently. Results from the current research project showed that initially the participants found it difficult to give their weight to the tester due to a fear of falling and not having control over their own bodies. As the project progressed participants showed increased confidence in willingness to give their weight fully to the tester with reassurance that she would be there to catch them. Therefore, the scoring took this into consideration for many of the participants showing that a score of 0 was representative of little to no weight being given to the tester rather than the participant not attempting to re-stabilise after being taken off balance.

4.3.2 Postural alignment

Along with balance and stability, participants were also measured on changes in postural alignment in the thoracic and cervical spine. When assessing postural alignment it is useful to use the idea of a plumb line that runs through the midline or centre of gravity in the body. From the side view one can imagine this invisible line going through the centre of the body and aligning along these specific points: just anterior to the lateral malleolus, middle of the knee joint, greater trochanter, middle of the shoulder joint and middle of the earlobe.

Participants were asked to stand sideways to the camera and a still photograph was taken of the entire body. However for the purposes of this study the main focus was on the upper body and more specifically the angle between the two points at the top of the plumb line (the shoulder and earlobe). The angle between these two points in an ideal postural alignment would be 0 degrees as they would line up along the plumb line however once the thoracic spine (upper back) begins to stoop and form a kyphosis curve, the angle between these two points will be affected. The cervical spine will likely compensate by creating a curve in the opposite direction.

The table below shows the changes in posture from the beginning of the project to the end for all six participants:

Participant	Initial Angle	Final Angle	Change
1	39.06	38.87	- 0.19
2	15.87	18.61	+ 2.74
3	12.88	19.17	+ 6.29
4	11.00	13.00	+ 2.00
5	36.95	28.96	- 7.99
6	5.24	0.00	- 5.24

Results show that two participants showed quite a large decrease in angles.

This means that for these two participants, posture in the upper body improved towards a more upright stance. Participant 1 seems to be showing a postural change in the same direction however the change is quite small. The other three participants seemed to go further into their thoracic curve as the project progressed. It is important to remember that measurement error will always need to be taken into consideration when looking at this kind of analysis.

Along with measurement error it is important to remember that participants may have also affected the results if they were trying to stand in a more upright posture. Verbal cues were given to the participants prior to the photograph being taken encouraging them to stand in a natural stance. Although this is the case it is important to note that error could have occurred.

Although the dance sessions for this project focused on the style of ballet which is a form of dance that inevitably demonstrates and works with a sense of lift and poise in the upper body, it may be that certain participants were focusing on other aspects of the movement. Furthermore, it may be possible that the verbal cues and imagery used in class were not as useful for certain people and thus it may be beneficial for future research to look at using a variety of images, both anatomical and metaphorical, that encourage broad shoulders and a vertical line from head to toe.

4.3.3 Conclusions

Although improvements in balance, stability and motor ability were noted, after analysing the results and taking into consideration the context of the project, it would seem realistic to suggest that the changes across time may be due to an increase in confidence and/or an understanding within each individual of what their own bodies can actually do.

Given that the majority of participants took part in these dance sessions once a week for a 12 week period and had a four week break in the middle of the project, it seems unlikely that the participants would have had enough consistent exposure to these dance sessions to gain significant levels of strength, proprioception and control necessary to improve balance and stability skills. This is of course only taking into consideration the activity that the participants carried out for this project. However some participants were involved in other activities during the weeks and some had been taking part in other dance classes before the project started and continued to take part throughout this project. The researchers feel that changes seen in relation to this project specifically are more likely due to participants uncovering abilities that they already had or could have likely achieved at the beginning of the project but were possibly too unsure of their motor abilities to attempt the actions fully.

This conclusion is backed up by the fact that many participants gained a lot of the points in the final testing session by giving their weight to the tester so that the postural stability task could be completed. This is not necessarily showing a change in stability but rather a change in confidence that they could actually complete the task without falling. Furthermore, even though some participants felt comfortable enough to give their weight by the second testing session, none of the participants showed an improvement on this specific task from the second testing to the final testing session.

4.3.4 Case studies

Case Study 1: Participant 1

This participant was fairly stable at the onset of the project but still showed improvements. In the initial testing session this participant needed manual assistance to help her regain stability in task 10, the postural stability task (please see Appendix A for Balance Scale Instructions). However, in the final testing session she was able to regain stability by taking only one to two steps independently. Furthermore, this participant increased the amount of time that she could maintain balance on one leg (task six) and demonstrated a much stronger stance to show that the lifted leg was not falling closer to the floor as it did in the first testing session.

Participant 1 also showed a more fluid turn in task three when she was asked to turn 360 degrees around herself taking the least amount of steps possible. She also demonstrated a strong sense of rhythm when walking to the beat of a metronome in the final testing session. Although these points did not affect her scores, they are still changes that show clear improvements in aspects of her motor ability.

Case study 2: Participant 2

Participant 2 showed improvements on three separate tasks. Similar to participant 1, this individual also increased his scores in the postural stability task and standing on one leg (task six). In the first testing session he did not feel comfortable giving his body weight to the tester and thus the task could not be carried out properly. However by the final session he was able to give his weight to the tester and needed to take two or more two-steps to regain stability independently. This participant was also able to stand on one leg for a longer amount of time in the final session resulting in an increase in his score. Furthermore, this participant also covered more distance in the two-footed jump in the final session (task eight).

Participant 2 also showed very similar changes to Participant 1 during the walking task and demonstrated a strong sense of rhythm in his legs and feet. However, this change was not large enough to affect his results.

Case study 3: Participant 3

Participant 3 showed improvements on two tasks. Once again this individual was also able to increase his score for the postural stability task. Initially this participant did not feel comfortable giving his body weight to the tester and therefore the task could not be carried out properly. However, by the final session he was able to give his weight and lean back into the tester's hand before she pulled the hand away causing the participant to re-stabilise. Participant 3 was able to regain stability after taking two or more two-steps to bring his base of

support underneath his centre of gravity. Furthermore this participant also covered more distance in the two-footed jump in the final session.

Participant 3 showed more ease and fluidity when turning during task three and was also able to hold his balance on one leg for a longer amount of time. These changes were not large enough to affect the scoring on the balance scale however they are still important improvements that seem to suggest that with more time he may have been able to show significant improvements for these tasks as well.

Case study 4: Participant 4

Participant 4 was also fairly stable at the onset of the project. She improved on three tasks on the balance scale. As seen in participants 1-3, participant 4 also improved on the postural stability task with similar initial problems in giving her body weight to the tester. This participant expressed concern about falling and stated that she had been experiencing more falls in the recent months. By the final testing session this individual was able to give some of her weight to the tester but could not fully let go. However, the transferred weight was enough to take her off balance and regain stability by taking a couple of steps. Participant 4 also showed a more stable tandem walk (task five) with less interruptions or stumbles to the side. This task requires that the participants walk along a straight line placing the feet heel to toe (as you would when walking along a tightrope). This individual also improved on the two-footed jump task. In the first testing session, she did not feel comfortable jumping due to unstable knees and thus this particular task was not completed. In the final testing session she was able to complete a two-footed jump that covered a distance just under the length of her own feet.

Case study 5: Participant 5

As mentioned above, participant 5 was only able to carry out two tasks in the first testing session however he was able to complete seven out of the 10 tasks in the final session. The researcher felt that it was unsafe to ask this participant to complete the other three tasks in the last session (standing on one leg, two-footed jump, and walks with head turns) based on his stability that day and also how he carried out the other tasks. In the first session this participant used a stick to help him walk along the straight line however he did not use this in the final session and thus attempted to complete this task in a more individual manner. With that said his carer did stand behind him and provided support at some points during the walk and thus the walk was not completely independent. However he was able to maintain stability on two feet with his eyes closed for 30 seconds (task one).

Case study 6: Participant 6

Participant 6 was able to carry out all 10 tasks in the initial testing session, however, due to equipment not being available, this individual could only complete seven out of the 10 tasks in the last session. Although this participant did improve on her ability to maintain balance on one leg for a longer period of time, she also showed a decrease in her ability to walk in a straight line with no stumbles or interruptions. Therefore, the two scores cancelled each other out and on the surface level it seems that there was no change from the beginning to the end. However, it is important to note that this is only taking into account seven tasks and it may be that she did improve or decrease further on the other three tasks. As one cannot be sure what would have happened, the three incomplete tasks have not been taken into consideration when scoring this individual for both testing sessions.

5. Triangulation of results

'Triangulation' means drawing together similar results from the different methods of data gathering. Section 5 sets out the analysis of all elements identified in the study that relate to changes or benefits seen within the English National Ballet project:

5.1 Fluency of movement and mobility

22 January: Something wonderful is beginning to happen. After I have done my walk, I usually turn around and watch the others as they walk down the diagonal towards the end where I'm standing and what I see is really moving – most of the class are walking to the music with real fluency, including several who I have never seen walk fluently in normal life.

One of the most frequently highlighted changes that participants noticed in themselves whilst dancing – and for some, for a few days afterwards – was an increased fluency of movement and mobility. This was backed up by our observations and analysis of film footage.

One exercise in particular seemed to help with fluency, namely, walking from one corner of the studio to the other diagonally opposite in time with the Dance of the Knights music from *Romeo & Juliet* and in the manner of proud and angry Tybalt. With the strong pulse underlying the music, many participants lengthened their stride and tempered the pace of their walk in time to the music. In addition, some participants changed from walking with the same arm as leg forward, to contra-lateral movement. Participants were encouraged to look ahead, which straightened up bodies, many of which normally stooped. All of these factors combined initiated a co-ordinated, more fluent walk.

My daughter was very impressed [with watching a class]. She's been telling everyone about it. As an observer she saw all the people dragging themselves in then suddenly all dancing altogether. She couldn't believe it. I've been telling her about it and she didn't believe until she saw.

Some of these factors leading to fluency were noted by participants when interviewed:

Dancing to music:

Moving to music I realise much more it makes it easier to walk. The live music is an advantage over taped music. A musician like Anna can set tempo and change tempo.

4 December: We had a couple of visitors to the class today: Jennie, one of the ENB dancers and Carmella [Pilates teacher for people with Parkinson's. Many of the class know her]...The remainder of the class proceeds along the usual lines and Carmella observes it to the end. While we have tea, she tells me that she found it fascinating. What struck her most forcibly was the fact that a lot of the people in this class are the same people that she sees in her Chelsea class but their movement in this class, with Anna's live music is noticeably more fluent.

Length of stride:

Limited range of movement e.g. length of stride, is one of my symptoms which I feel is relieved for a while after the classes...maybe a day or so I notice the improvement.

Co-ordination:

My co-ordination is getting better in the sessions. It's definitely doing something good.

Focus on character:

Saturday 12 February...Exercise followed exercise as we were led through what we had worked on over the previous eleven weeks culminating in the 'meeting and greeting' walk as proud Tybalt and the confrontation in the Market Place. Again, I watched those walks with a lump in my throat as some of those who have no fluency in walking in real life acquire it here, in character, with the music.

From observing film footage, it was clear that some sessions enabled more mobility in participants than others. Common elements in these sessions include a shorter period of sitting, a quicker overall pace, use of movement that was achievable, the encouragement of larger movement danced with momentum, walking to a pulse and an element of improvisation.

5.2 Loosening of the spinal area

The whole thing loosens you up with a very positive sense of well-being.

Many participants started the project with stiffness throughout the spinal area, some with a characteristic kyphosis. Exercises showed that some participants could not move their arms much without moving the whole of their torso. Often the shoulders were hunched leaving the arms and spine without a lot of mobility. Over the course of the 12 weeks exercises reinforced the twisting of the spine, swinging of the arms, and at times, flowing indirect movement in the upper body. Participants demonstrated a growing flexibility to articulate their arms from their torso and to isolate the twist in their upper body. This made the movement look as though it was more comfortable to do.

There were several exercises that facilitated loosening of the spine, particularly the thoracic area. Movements that aided a freer, more mobile spine include movement that: allowed arms to swing with weight from the shoulder joint, enabled the spine to twist, curled and uncurled the spine. One example of an exercise that used such movement was the Sun Salutation. Practiced sitting at the beginning of each class it included moving the outward stretched arms in an arc from down by the side, to up above the head, twisting the spine whilst taking one arm forward and one arm back, curling the back whilst bringing arms in close to the body and then uncurling the spine to reach arms up and then out to the side.

To begin with, many participants hunched their shoulders when taking arms up above the head, others had a limited range of reach with the arms. In the spinal twist, we saw knees and legs move to the side; an indication that the upper back was not moving in isolation from the lower back. During the last few weeks, some participants began to extend the reach of their arms. Some also began to isolate the upper body from the lower by twisting without involving turning the legs too. This implies greater freedom within the spinal area, as well as more control over the lower body.

Task three of the Fullerton Advanced Balance Scale test asked that participants turn 360 degrees around themselves. A mobile back will help a volunteer turn with more ease. More ease and fluidity was noted with some of them when doing this task suggesting more mobility of the spinal area.

One participant described an everyday action of putting on his jacket, with which a loosening up of the spinal area will have helped:

...Another example [of an extended range of movement] would be putting on a jacket which is more difficult for me than it was before I had Parkinson's and is a bit easier for a while after the classes. Basically the classes act like an athlete's warm up exercises to make the limbs more supple, increase their span of movement, and improve one's control over them. Nothing dramatic but a positive change can be felt.

5.3 Balance and stability

I've felt there's been less falls over the last few weeks.

Exercises in sessions did not have any specific movements focusing on balance. There were, however, several that contributed towards developing stability, with improved balance in mind. Movements seated and standing that required participants to align their shoulders over their hips helped to establish a more stable posture, transferring the weight from one foot to another during sways or stamps also gently challenged stability, as did walking with various turns of direction. Challenging stability helps to engage the muscles which control balance.

There were certain days when individual participants came to sessions feeling unstable. Some requested the help of a carer or used their stick when dancing. When watching the film footage, it was evident that sometimes those people dispensed with their walking aid and danced more fluently despite claiming that they had felt particularly vulnerable to falling that week.

Balance remains my biggest problem but I think it has been helped by the classes.

As pointed out above, we observed better isolation of the upper and lower body by the end of the project. If one moves in a stiff, rigid way, it is less likely that one will be able to regain or maintain stability if knocked off balance. With freeing up of the upper torso and more control over the lower body to enable participants to twist (isolate upper from lower body), balance and stability will be helped. These two participants comment on the small but lasting effects from dancing:

4 December: I think my balance is a tiny bit better since I began dancing, and I am a tiny bit more relaxed and less stiff.

21 February: It is hard to be specific but I do feel a positive benefit in my muscular control and freedom which lasts for several days after the class.

Results from the tests using the Fullerton Advanced Balance Scale were statistically significant. The test results for the project suggest that balance and stability had improved, or at least that participants had gained the confidence to use their motor abilities that they still possessed in a dormant capacity. One comment by a participant suggests the latter conclusion:

It is hard to be quantitative about balance but I do feel more confident about regaining my balance when I lose it for a while after the classes, maybe it is still with me even?

5.4 Qualities and dynamics of movement

It's helpful swinging arms. It's much easier to walk if I can do that. Some of the big flowing movements – side to side – when I get into the swing of it is helpful...If I move in a big loose way, there's more momentum. I'm in control and relaxed and I don't always do that movement.

It is important to note that individual participants came into the project with different qualities of movement, which has been heavily influenced by their Parkinson's symptoms. For example, some moved in a very bound, stiff and sustained way while others moved in a light, indirect and sustained way. For each individual we were looking for possible changes in their natural tendencies to a particular quality of movement. Some exercises during class emphasised the use of different dynamics. The analysis showed that these exercises proved to be useful in helping participants challenge their dynamic range.

For example, all participants entered the class with a light-weight quality to their movement, irrespective of whether their flow of movement was bound or whether their use of space was direct or indirect. This lightness manifested itself in, for instance, a lack of bend in the knees whilst dancing, a hesitant or careful quality in movement, a walk that did not engage the heel in the movement lending it a floating quality.

Examples of dance exercises that challenged the participants' light-weight quality of movement worked with stamping, with swinging arms whilst legs were bending, with walking diagonally across the room, with focusing on the emotional drama of *Romeo & Juliet* through movement (specifically, Juliet's angst and the sword dance). The beneficial link to the emotional content of the movement was also highlighted in section 6.

In dancing Juliet's discovery that her lover had killed her cousin, a strong, weighted movement was demonstrated by some participants. The light-weight quality of movement changed as arms were thrown out to the side in a sharp, direct and strong manner.

In swinging the arms side to side and in front and behind, some participants started to bend their knees and swing the arms in a freer manner where arms gave into gravity more on the downward motion of the swing. This helped a downward, stronger weightiness to emerge.

In walking diagonally across the room, many participants started to plant their heels into the ground to give a less floating quality to walks and a more intentional and direct quality.

Many participants had a bound flow of movement, made more pronounced by the stiffness of muscles and the disjointed quality of uncoordinated movement. One exercise where more free flowing and co-ordinated movement was observed through the film analysis was in the flag dance. Participants were asked through the movement of their arms to imagine flags or silk curtains fluttering in the breeze. From first of all using their hands like paws, without articulation, and with a limited flow and range of movement, some participants gradually started to articulate their hands, wrists, elbows and shoulder joints to mimic the rippling of flags. In addition, some began to co-ordinate both arms to draw figures of eight in the air, or draw symmetrical patterns.

Some participants had a very indirect trajectory of movement, emphasised by dyskinesia or the sustained hesitation in movement enforced by bradykinesia. Several exercises helped participants direct their movement in a more emphatic, intentional way: stabbing with an imagined sword, walking towards the corner or to a partner accompanied by a strong pulse, clapping a rhythm, pushing their arms forward and then into the chest in an echo of the market place motif in the ballet, stamping in time to the music. These were all dance exercises where participants would divert from indirect ways of moving to prove that they could perform sudden, intentional movement.

The quotation at the beginning of this section comments on the momentum given by big, flowing movement. The change in dynamic can be seen as being helpful in aiding mobility.

5.5 Posture

Dancing helps me walk and swing my arms and stand up more.

A number of participants came into the project with a characteristic kyphosis curve in their thoracic spine. It was evident from early classes that core stability was often absent through participants' tendency to veer away from

their centre of gravity during movement. Some participants seemed more aware of how to change their posture by the end of the 12 weeks, which was noted to a limited extent in the postural analysis and balance tests. For these participants the postural analysis showed that their natural way of standing may have changed from a more stooped posture in the thoracic spine to a more lengthened, vertical posture with the head sitting right on top of the shoulders. It is important to note that changes seen in the postural analysis could be due to participants consciously trying to stand taller and this limitation needs to be taken into consideration. However, verbal cues from the tester did encourage the participants to stand in their natural posture without trying to change anything.

To strengthen our findings it was necessary to also look for postural changes qualitatively throughout the dance sessions. Through looking for postural changes in a more dynamic setting it was clear that by the end of the project the participants were able to lengthen out of their thoracic spines so as to appear more vertical. This change was more sporadic in nature with most participants showing this length at certain points during the class but this did not always stay in their bodies for the entire session. Furthermore, some weeks the participants seemed to show an improvement and length in their upper body and other weeks this was not so evident. This finding shows that progression in posture and stability may not happen in a linear manner but rather in a more sporadic way. This relationship mirrors the fact that people with Parkinson's experience their symptoms in the same sporadic manner with good and bad days occurring throughout the week.

5.6 Energy projection

I think it's good for me, stretching.

At the beginning of the project many participants had an inward focus when moving with their arms staying close to their body and their gaze falling to the floor or fixed in one spot. Gradually we saw participants extend their arms and hands away from their body with a clear sense of direction. Their awareness of surrounding space improved and they were more able to reach into that space. Their gaze opened out and their eyes made contact with other individuals in the class.

Many exercises worked by encouraging eye contact with someone across the room. The weaving of characters from *Romeo & Juliet* into the movement also encouraged projection of passion, anger, anguish and love. Focusing on dynamic qualities helped with energy projection. Reaching out into the space was encouraged through exercises, such as the Sun Salutation, where stretching the arms out was emphasised. The improved reach of legs, arms and direct eye focus in the diagonal walks also aided energy projection.

During the Fullerton Advanced Balance Scale test, participants were asked to perform a two-footed jump. The increase in ability to do this task indicates a stronger sense of projection and direction in movement.

5.7 Body awareness

I consciously stand with my feet apart more and walk to a beat.

Many people with Parkinson's lose balance because their response times are slower and because their bodily stance is compromised. More awareness of what their bodies are doing at any given moment may prevent falls.

The dance sessions always began by leading the participants through a series of images and movements that enabled better awareness of how they were sitting, how their body was placed between the Sitz bones (Ischial Tuberosity) in the pelvis, how they were breathing and that encouraged release of breath in conjunction with movement.

By the end of the project many participants could distinguish between various dynamics in movement, change their stance and some could alter their posture. This implies a general increase in awareness of what their body is doing at any given moment. Learning how to do specific actions adds to this awareness:

I'm using the stick less and less now in the last few weeks. Only to get up from the chair I've learnt nose over toes.

The balance tasks required volunteers to maintain balance on one leg, to jump safely and to re-stabilise after being knocked off balance. In order to do these tasks successfully, a sense of body awareness is required:

Walking on the line and standing on one leg were difficult but improved a lot after the class, but this was in part due to learning the best technique as much as any inherent improvement due to the class. Will try again next week.

This participant highlighted the body awareness that he needed to conduct the tasks successfully. He places equal emphasis on awareness and physical conditioning for the successful completion of the tasks.

5.8 Health

My consultant said three weeks ago, you're looking a lot better. (19 February)

It is extremely difficult to prove a causal link between any improvement in physical or mental health and a dance project that takes place as one activity within individual's lives; particularly when Parkinson's is a condition that fluctuates. However, it is worth noting that two participants mentioned the positive outcome of their recent visits to their consultants, which occurred during the last few weeks of the dance project. Such information points to the possibility that the dance project has contributed to changes in that individual's health. One other participant's wife commented on 24 January:

The consultant thought his movement was better and didn't want to see him for three months. We saw the consultant last Thursday.

A partner emailed with this observation about her husband:

T_ loves being part of it. It means a lot to him and we are sure it helps maintain mobility. His consultant had warned me to expect he would need a hoist for transfers before last Christmas, but he and his carers are still managing without!

Another participant remarked in her diary on how the dancing made her forget how ill she was feeling before a particular class:

27 November: Our fourth session at Markova House. I have not felt very well for two or three days. In particular, the tremor in my leg seems more intrusive than usual. I know that stress does exaggerate the tremor...I also feel that I'm in a Catch 22 situation: if I'm anxious about my health then the tremor gets worse but if the tremor gets worse, I get anxious!...As I got ready to leave, I realised that I had been unaware of feeling unwell for some time – the class had worked its magic.

This feeling was echoed by another participant who suffers from depression:

I suffer from depression. Dancing takes me out of myself. I forget about other things in life.

5.9 Well-being

My carer came today. I told her about English National Ballet. She said 'pity you can't do it every day. It's good for you, you look different'. I was elated and it showed in my face.

Several of the participants have the characteristic face 'mask', where the face does not always communicate what that person is feeling very well. It was clear, however, from the many smiles and laughter that some of the exercises really were enjoyable for participants. Notable exercises that people liked or were seen to be enjoying include a challenging one where hands had to pat heads, shoulders and thighs to a quick rhythm, Zorba the Greek grapevine seen in *Romeo & Juliet*, walking across the floor in time to the music and warming up vocally, rhythmically and with somatic imagery using a scenario from *Romeo & Juliet*.

Participants talked about how the project made them feel better, giving them a sense of well-being:

Over the last six months I've experienced more side effects with Parkinson's. Exercises have been good at relieving stress, stiffness particularly and generally...it's difficult to describe...a feeling of well being as a result. Overall the project was very good for me.

I feel good within myself, which is very important. It makes me feel happy.

It's joyous seeing people move in a way people were not moving before...It's very uplifting.

It was spectacular. I couldn't have enjoyed it more. It didn't matter how bad I felt I always wanted to go.

To laugh and joke is very important.

5.10 Determination and achievement

I appreciate the sense of working as a community which can take up a challenge and collectively work towards solving this.

Some participants spoke of how much they were determined to do well in the class, or get through the class despite Parkinson's symptoms taking over. This determination points to the class being enjoyable, being a vehicle for an individual to feel they can strive to overcome their situation and being a vehicle for communal endeavour:

It's being with people who are the same as yourself and all making every effort. Because what you're feeling yourself you know what effort they're making.

It does feel different dancing slowing down. I didn't feel like stopping...It was difficult to do standing on my own two feet and I was a bit wobbly but I was determined to do it.

The teachers were positive. They helped you rather than being critical...It was very positive the whole atmosphere. You felt you could keep on going. It wasn't boring.

I'm much more alert in the dance class. I try to remember when I don't have dancing...Remembering is more important than doing. If I can't remember then I can't do

There were also real senses of achievement, which were documented by participants:

M_ he's come a long way. To see him walk across the floor with military precision. I feel like cheering when he does that. Sometimes...his wife will say something and he said 'I can't'. He meant it, but he could.

It's such an achievement. It's wonderful to do something that's difficult and you pick it up.

What was nice about the last session was that it had a show and end of term feel. There was a certain pride in that last session in what we'd achieved. We rose to the occasion.

When living with a condition that robs people of automatic, fluid movement, achievement and determination to achieve can be extremely important for well-being.

Case study:

J_ arrives at the studio in a wheelchair as she feels too unsteady now to move around town without one. She always comes with a carer. She gets out of the wheelchair when she is in the session. For one session in December, she arrived by herself. She explained that her carer was late and she did not want to miss the session so she decided to come by herself. It was the first time that she had come out without anyone to help her.

5.11 Freedom

Handicapped though I am, I value the freedom of expression and for this I am deeply grateful. I realise how difficult it must be to include me in the class and how small my contribution is. However, to me it is a breath of fresh air for which I am most appreciative.

Participants talked about freedom in several ways: freedom of expression, freedom to fail and freedom from being labelled by their disease.

Communication is often more limited for some people with Parkinson's as voices soften, faces lose some expression and bodies do not always do what the individual wants. The opportunity for expression through dance can be very liberating, as the quotation above states. In addition, observing creative tasks in the sessions, such as the flag dance and the mirroring exercise at the end of class, it was clear that the opportunity to improvise

sometimes led to greater fluency of movement, as well as being a time to validate individual's creation of

movement and way of moving.

Participants also felt confident in performing, despite sometimes the lack of balance and co-ordination. The positive attitude of the facilitators played an important role in participants feeling accepted for whatever contribution they offered. One participant wrote:

'Freedom to fail' atmosphere very encouraging.

Despite the project being for people with Parkinson's, several realised that the sessions helped them think beyond being a person with Parkinson's. For those who did not want to be associated with Parkinson's events, the ballet sessions offered time for artistic and creative exploration, at the same time as catering to needs:

I tend to shun special Parkinson's events because I do not want to be defined by my illness. Parkinson's is an unfortunate and involuntary part of my identity which I try to deny and reject. I am not a 'person with Parkinson's', I am C_ who would like to forget she has Parkinson's. Special Parkinson's events can be extremely depressing, serving only to remind me of my illness, and to suggest how much worse it will become. Getting together to dance, however, can be helpful, because it involves imaginative expression, and so enables me to transcend/forget my Parkinson's.

Case study:

J_ frequently suffered from falls and always used his stick outside of the dance class to aid his balance. Twice during the project, J_ forgot his walking stick at the end of the session and walked out of the building without it. A combination of being able to increase fluidity of movement and mobility and being a part of a social gathering made J_ forget his mobility challenges.

5.12 Dancing with live music

4 December: This session I really felt the benefit of moving to music. Things I could not do without music became possible if I listened hard to the beat – if I let myself be focused and freed by the melody.

The live music played an important part for participants in terms of the pleasure it gave them, in influencing how they moved and in how it affected motor symptoms of Parkinson's.

One pleasurable aspect for participants was dancing to Prokofiev's music from *Romeo & Juliet*. Powerful and memorable, there were certain motifs and themes that were chosen to play and improvise around throughout the 12 weeks:

I like being made to move and moving to music...I tend to become very stiff and every joint hurts. I like the pleasure of moving to music. I like classical music.

In addition to being pleasurable, some participants compared the use of live music in the dance project with other forms of exercise, which do not use music, or use recorded music:

Anna's music is terrific and a big positive for the ballet approach versus, say, Pilates exercises.

Anywhere music was involved it made a big difference, having been to classes without

Live music a big plus, compares very favourably with tapes as per recent Tai-Chi attempt. (Failed actually!)

From conversations with participants and in observing their movement, live music was not only pleasurable, but also a helpful aid in moving in a more fluid or co-ordinated manner, as noted in the comments in the section on fluency of movement. The fluency was most prominent in the diagonal walks, but also occurred in exercises where large, sweeping movements were encouraged. The music also helped change dynamic and quality of movement. As an aural cue, it might have aided the initiation and continuation of movement. On one occasion, a participant had had an episode of freezing beforehand. Gillespie started to play familiar tunes to enable her to resume dancing.

Mobile music (a flute) was fun and helpful in a couple of exercises.

I have done some physiotherapy in hospital, had Conductive Education lessons, tried Yoga with my daughter-in-law, and Tai Chi and Falon Dafa with my youngest son, and now I am trying ballet. The surprising thing to me is how very similar all these systems of movement are. The first ballet session

confirmed what I already knew – it is easier for me to move in a particular way if I can copy someone else (i.e. use a visual cue for the brain), and it is also easier to move when attempting to keep in time with the music – so ballet, being the movement system to which music is integral, may prove to be the most helpful to me.

Case study:

M_ has pronounced dyskinesia, where her head, arms, body and legs roll and move uncontrollably in an indirect manner. Despite this lack of control and co-ordination, M_ is able to capture dance movement, which is clear and direct, on the intended beat of the music. This is noticeable when she dances sitting down.

5.13 Sociability

Movement good but social dynamic was great fun – like ‘walking out’ with M_ from Buenos Aries!

One of the defining aspects of the project was how it worked as a social event.

Saturday afternoons is something to look forward to, meeting everyone and having a laugh.

Although several participants knew each other from the Parkinson’s UK support groups that they attend, and some knew each other from another dance class that they go to, they did not all know each other to begin with. That did not deter anyone from talking and sessions were punctuated by chatting and laughter, particularly before and after class, as well as between people dancing as a pair. The time for tea and biscuits became a time to swap details of complementary therapists, to compare Parkinson’s medication and to learn about new medication taken by one or two of the participants. Several people have taken the opportunity to learn more about how others cope with having Parkinson’s, others prefer to chat about other aspects of their lives. For example, one regular topic of conversation was dance on television, in particular Strictly Come Dancing (BBC1, Winter 2010).

The time we have afterwards is important with a cup of tea and everyone chats.

Classes three and four: Getting to know the group members and teachers – spoke to M_ and R_ who lives near me and several of the women, some known from the Tite Street group. Everybody is very ‘sociable’ and atmosphere easy going.

Warm welcome – people remembered my name!

Interviews and diaries highlighted the immense social support the project gave them, even in comparison to Parkinson’s UK support groups/branches:

I know the Chelsea [Parkinson’s UK Support Group] people by sight but not to speak to – there we come in, then there’s a talk...so this project we get to know people. S_ I say hello to but now we’ve had a nice chat.

We talk more here than at Chelsea.

It’s very interesting seeing people you know and learning things about them. It’s a really nice relaxed atmosphere.

It’s nice to get to know some people you already know better and new people.

It was beneficial exercise and enjoyable and social. You get to meet the regulars. There’s a community spirit about it. So and so isn’t here, let’s see what’s wrong with so and so.

The social aspect fed into the actual dancing, as the quotation at the top comments. The tactile nature of dancing was also mentioned as a strength:

I quite like it when it’s a group project. Holding hands and that sort of thing.

Being very enjoyable, many participants mentioned how it has given them a new topic of conversation with family and friends. The project therefore has performed a social function outside of the sessions themselves:

I’ve talked about it to all my friends.

The social aspect of the project affected people emotionally in a positive way, as this quotation testifies:

I'm feeling different. I enjoyed the company. I didn't think I would. One doesn't enjoy being around people with Parkinson's. I like youthful people. I was surprised. Nice people.

5.14 Dancing as a group

It is hard to exercise alone. Movement is much easier with a leader to give verbal instructions and visual cues, so group lessons are good.

Some participants talked about the benefits of dancing as a group, as they predicted in their reasons for joining the project (see section 3.1). It was motivating to dance as a group, as is also clear from the comments in the section on determination. With visual and verbal cues from facilitators, participants felt that it was easier to move and to remember phrases. Indeed, many stopped dancing whenever the leader stopped moving.

Organised exercising with a group is better for me. That's the value from it.

Dancing as a group also brought emotional significance:

The closing circle was very moving on the 22 – somehow we were drawn together by our disability, the only time in the class that when I felt Parkinson's really having a defining influence on the class.

5.15 Aid to daily life

6 November: We are divided into two groups to become the Jets and Sharks of West Side Story – the Broadway musical version of the Romeo & Juliet story. I am reminded again of how much easier it is to walk fluently to music than in normal life...I sometimes silently hum the Prokofiev music in my head while walking in the street to get a rhythm going.

Participants talked about how the dancing was aiding them outside of the studio, in their everyday lives; often helping with physical challenges, but also mental challenges too.

Although it is not clear that the improvement in fluency and stability lasted beyond the sessions or beyond a week and a half afterwards, there were skills and techniques that participants kept and used. One technique several participants used was humming the music to Romeo & Juliet to aid mobility and rhythm, as the diary entry above mentions. Others have been using the actual dance, or research balance tasks, to add to their daily exercise routine:

When I returned from Dancing, I regained my mobility and kept mobile till I went to bed at 10pm. I tried The Crossover Step (Zorba). I remembered doing that dance and tried a dip after the crossover – and I did it a couple of times. I've added Zorba to my morning exercise, one step right and one step left. F_ and I tried the Zorba Dance together and laughed remembering it.

Other participants noted that they could do activities a little bit better up to two days after the dancing session; for example, putting on a jacket, as stated by one participant in section 5.1. Although no causal link can be proved here, it is worth noting the possibility that the dancing may have contributed to how participants carried out the activities:

I sat up in the bath without a handrail a couple of days after the dancing. I usually feel out of balance.

5.16 Confidence

I've been listening to Scottish reels. I was listening in pain and I was stiff but then I did it [got up and danced]. Because of the sessions I had the confidence to do it...It's stopped me thinking I'm...stuck. I did know before but it's reinforced my mind.

In our view, one of the profoundly influential factors of the project was its encouragement of participants to take risks, or to do things that they previously may not have had the confidence to do:

Having Parkinson's makes you insecure because you can't predict what will happen. Something like this is wonderful as it makes me feel better. The fact of getting up and doing something and finding you can.

The building of confidence is important for people who face many challenges daily - from drying hair and

carrying tea to negotiating crowds and public transport - and for some who have had their confidence knocked due to a bad fall. It is also important for some people, who may feel lonely, or isolated with their condition, or who have negative feelings about having Parkinson's:

About a year and a half ago I avoided getting involved in meetings with Parkinson's people. I was frightened and not wanting to admit to having Parkinson's. I overcame that. It was one of the important outcomes of this for me.

For this participant, the dance project has helped him to come to terms with having Parkinson's. The artistic nature of the project might have aided this in that although it was for people with Parkinson's, it did not concentrate on the disease itself, but on enabling dancing and on learning about ballet and *Romeo & Juliet*.

The dance sessions were all facilitated to emphasise inclusion. The exercises were led in a way to enable participants to achieve, rather than highlighting disability. All participants, including those who were in wheelchairs, who could not move without a walking aid or carer, or who had learning difficulties, were all included in each exercise, occasionally with adaptations.

Expectations of the people who run it help make it possible. They actually expect you to be able to do. Somehow you don't want to disappoint them.

The constant use of a circle and partner-work helped with inclusion. In addition, dance partners were all very accommodating of each other's way of moving and their pace of movement. One example of an inclusive exercise was the name game. Performed at the beginning of each class in the first few weeks of each term, participants in turn had to perform a signature movement, made up by themselves, and say their name. Everyone else then copied the movement and said the name. In doing so, people acknowledged everyone by name and by their own unique movement. It validated people's ideas, way of moving and presence in the project.

The section on energy projection stated that energy projection improved in some participants during the project. A more outward looking projection points to an increase in confidence. Similarly, participants who began the project or a class with very small movement finished often with the ability to dance with big, strong movement, which also infers that confidence grew. One participant acknowledged:

I gained in confidence and risk taking as the class continued.

5.17 Learning

I found it very interesting, exciting and opened new doors. I had no knowledge of ballet and found it quite exciting. It stirred my memory and mind, made me think, put my mind into gear.

The Department of Learning at English National Ballet has a remit to educate people about ballet and about the repertory performed by the Company. As part of the sessions, the facilitators talked about different aspects of *Romeo & Juliet*; the story, the movement, the music, costume and set. The leaders also talked about ballet in general; the structure of a class, particular codified movements, some principles of ballet. Participants found they enjoyed learning about ballet and music:

*At the beginning of the class, Anna talked to us for some time about Prokofiev's music and his use of leitmotifs in *Romeo & Juliet*. It took me back to my twenties, when I was discovering the operas of Richard Wagner, reading about his use of leitmotifs, especially in the Ring cycle, with some excitement. Anna stops and apologises for having taken up so much time but she didn't have to: it had been really interesting.*

It's a bonus learning about ballet and hearing the music and imagining and taking my mind off moving.

5.18 Participants' verdict on the project

I will certainly tell anyone with Parkinson's to do it.

I think it was good and good for me in a number of ways.

I felt disappointed when it was coming to an end. I'd like it to have gone on longer.

At first I was a bit dubious. I'm completely tone deaf, little knowledge of ballet. I found I could cope as well as the next.

The help and the encouragement that one receives from the English National Ballet dancers make the whole exercise seem worthwhile.

I loved it, every single moment. They showed nothing but kindness. I can't praise it enough.

6. The effect of participating in a project run by English National Ballet

Although several of the participants already went to a dance class, the English National Ballet project had its own special resonance for all of them. As noted in section 3.3, some participants were keen to do the project because of its association with one of the UK's leading ballet companies. Without exception, the close involvement of a few of the Company members with the project has boosted excitement amongst participants. In addition, watching Company dancers in rehearsal and in performance proved to be an important part of the experience, together with the question and answer sessions.

6.1 Watching Company rehearsal

I was a bit daunted by the ballet aspect as I've rarely seen ballet...but having seen those dancers, it was wonderful. It was moving and magical to be there so close to them.

Participants were invited to watch a rehearsal of a pas de deux between *Romeo & Juliet* for the introductory session of the project:

I felt very privileged to be watching such an intimate rehearsal at such close quarters - it was very generous of those involved to allow us to share it with them.

I felt elated from watching the dancers. It enchanted me. Such love and tenderness of movements.

[it was a] strange and moving experience of sitting really close to professional ballet dancers...I was struck by how ballet movement was such a rich means of communication, an eloquent, lyrical language – 'poetry in motion'.

It's nice to get to know...the world of dance, especially seeing how hard they work, how committed, how precise and how bodies don't always do what you want them to do.

The ballet did make me urgently want to move more, and move better and hinted at how this might be possible.

6.2 Dancing next to Company dancers

We also had two of the ENB dancers present – Makoto and Jennie. It is always fascinating to see 'our' exercises being done by trained dancers: we have, of course, already had the example of our teachers but I'm sure they too would agree that seeing Makoto leading the pack of Sharks at the end of the class was something special – he was the essence of cool!

Participants found it a pleasure to dance with Company dancers and to follow their movement. It is not clear whether this aided with fluidity of movement, but we did observe that if people were copying each other, co-ordination often lessened. We can surmise, therefore, that there might be an element of kinaesthetic empathy with the involvement of the Company dancers, but this needs more investigation.

My favourite part was the music and dancing, trying to dance; realising I have a partner from English National Ballet is a lovely feeling...I love to see people do something very well.

6.3 The effect of English National Ballet hosting and leading a dance group for people with Parkinson's

It's just wonderful. I love moving to music. It makes you feel so good. The teachers are wonderful. They are very patient, encouraging and non-judgemental. The classes are very well taught.

Participants spoke of the kindness and welcome they received from the Company. This welcome made them feel accepted:

I didn't know at first that English National Ballet was here. The fact they took us in and made us feel at

home. Everyone treated us with respect and kindness. They treated everyone the same, the most disabled like normal. You have to admire that.

People are willing to help other people like us who are past it. It's kind.

It is fun on Saturdays. I get quite a kick out of it.

6.4 Romeo & Juliet

I enjoyed going to the ballet...I've never really separated ballet out as an interest. It has awakened an interest in me...I think the cultural side has done me good.

Watching the performance of *Romeo & Juliet* at the London Coliseum in January was an important aspect of the project and one which many participants, some first time dance goers, commented on:

The performance was very interesting...It was my first time seeing dancing. I go to the theatre quite a lot but normally to see plays. It was a good experience; worth going to.

I go to the theatre less nowadays. I've got no one to invite me. I love going out to the ballet, theatre, cinema and exhibitions.

Relating the choreography to the dance sessions was a helpful and interesting part of the process:

The ENB project interests me because it offers music and movement in a wider context. Having seen the ballet of Romeo & Juliet, the sessions at ENB have a greater relevance and one can begin to see and understand the small parts of the whole.

'Rehearsing' Romeo & Juliet provides an interesting structure to the class and helps sustain a lively interest.

I particularly enjoyed the cut and thrust exercise of the warring families in Romeo & Juliet. Having seen the real exercise in the BBC film [The Agony and Ecstasy, BBC4, 2011] I understand what lies behind this exercise.

7. Impact on the Company dancers

It is important to note that three Company dancers have taken part in several sessions. From their perspective it has given them an added benefit to being in the Company. One dancer explained that belonging to a ballet company means being very single minded and focused on rehearsals and performances. The Parkinson's project has given her a wider perspective on life. Another stated that it was enlightening to see how people who find walking or speaking difficult push themselves to dance. The third dancer argued that the project had taught her that it was important to not take movement for granted. They all agreed that they could help with putting forward the ballet ethos of thinking about how the body moves before then going on to move.

8. Participant's without Parkinson's

It is interesting that although participants all have specific physical challenges compared to the carers, friends or family members who come with some of them, both Parkinson's and non-Parkinson's participants demonstrated a similar level of ability when, for example, dancing at the barre. Negotiating pliés and tendus created a level playing field between the carers and people with Parkinson's. Similarly, some of the participants without Parkinson's found similar challenges at co-ordinating movement; some demonstrating homo-lateral movement instead of contra-lateral walking and dancing in time to the music.

Although the research project did not examine the carers closely as a control group, (there were only a few constant companions), observations suggest that there were potential benefits to be gained from the project for people without Parkinson's too through the medium of dance.

9. First time dancers and more experienced dancers

Both first time dancers and participants who regularly attend another dance or movement class seem to have

benefitted physically and mentally from the English National Ballet project. The project was unique in offering a repertory-based class, along with Company dancers as helpers. This was of interest even to those who already danced with Musical Moving. There was no indication that either group performed better or worse through the balance tests or through observations. Past research in exercise physiology suggests that one might expect to increase fitness, stamina and increased technical competence with more than one physical activity per week. Further investigation is needed to expand on this discussion.

10. Facilitation

There were many elements that the project leaders wanted to cover in the project: an enjoyable experience of dancing, developing a class focused on artistic expression, dancing which was tailored to participants' needs, the *Romeo & Juliet* repertory and music, ballet movement principles and the introduction of the general workings of an international ballet company. Given that there were many elements to establish in the new class and given that it was the first time that the three facilitators had worked together, the first half of the project was led by a much slower pace. There was, for example, much more talking and explaining in the first half of the project. We observed when the pace picked up in the second half of the project that participants began to demonstrate more physical changes in how they were moving.

The group was large and people were reliant on copying facilitators and helpers. It was clear that the number of leaders and helpers was extremely useful in enabling participants to copy without straining necks and to aid with one-on-one guidance. One-on-one guidance was often needed to help individuals correct stance and posture, or to aid with stability or mobility.

11. Limitations to the research study

As the project was primarily an artistic one, researchers could not design the project to suit the research. For example, we could not stipulate that all participants should be dance novices, or at what stage of disease progression they should be, as other research projects have done. We had to work within the framework created by English National Ballet. This was done willingly as there were a number of positive aspects of observing dancing in a real, rather than experimental, setting.

Due to Company rehearsal timetables and participants' own schedules, it was not possible to test the participants using the balance scale at the same time of day each time or to test the participants within the week after the last dance session. It is possible that this affected the accuracy of these results.

All but one participant were on different kinds of medication and took their medication at different times of the day. Initially the participants taking part in the balance testing were asked to sign up for a testing time that would be best for them in terms of when they take their medication and how they feel at certain times of the day. However, due to final testing sessions taking place during the evening, it is possible that medications or lack of medications in their body had an effect on the results. In addition, the amount of medication, or its reliability, may have affected how participants performed during the sessions.

Filming with static cameras meant that we did not always have a good view of the individual we were observing all of the time, however, two cameras meant that we usually had a shot of him or her most of the time.

Although semi-structured interviews help mitigate against rehearsed answers, the organic nature of them meant that not all areas of interest that could have been covered were dealt with.

The small sample size in this study is a clear limitation to statistical analysis and thus we cannot say that these changes and statistics are representative of what would happen with the greater Parkinson's population. We cannot make any generalized conclusions about dance helping to improve balance and stability in people with Parkinson's, however, we can look to other studies to compare our results to what others have found. It does seem that our findings follow a trend in past research suggesting that dance is beneficial in a number of ways for this population, including the potential to improve upon balance and stability.

As a mainly qualitative study, the research project does not aim to prove causal effects of dance, as other research projects have done, but to discuss significant features and ideas stemming from observations and participant experience. This we feel is a strength to promote further discussion and research. Its rigour should be judged on the quality of synthesis and analysis.

11.1 Extrinsic factors affecting participants

Parkinson's is an unpredictable condition where sufferers find they have good days and bad days. The type of day can depend on when medication is taken, how far Parkinson's has progressed, what one has eaten, stress, cold weather, emotional highs and lows, as well as other factors. It is therefore difficult to achieve a linear pattern of increased competency in dance.

Some participants feel that cold weather makes some symptoms worse. During the 12 weeks of the project and particularly before Christmas, there was snow and very cold weather in London.

Three participants had felt a worsening of their Parkinson's symptoms and their consultants had recommended they try out different drugs. One participant volunteered to continue to take her original prescription until the end of the project to keep external manipulation of results to the minimum. The majority of participants took medication to lessen symptoms, but often people would talk of how, for example, one generic form of a drug would not work so well as the branded one. This would take many weeks of sorting out when to take it during the day in order to feel comfortable with it with a knock on effect on physical aptitude.

Emotional factors also affected how participants moved on particular days. One participant's son was getting married the day after the first bout of testing. Unusually, she could hardly move and could not even attempt any of the tasks. She attributed her condition to the stress of the wedding build up. Conversely, another participant began to have heightened dyskinesia in response to the emotionally charged music and dance in the performance of *Romeo & Juliet* at the London Coliseum.

The unpredictability of the disease and other external factors means that it is difficult to measure precisely how much dancing helps people with Parkinson's (and this is true of research projects in the field and within an experimental setting too). Our intention of examining the project from multiple angles was to help identify unpredictable external factors and to take these into account when analysing results.

12. Conclusion

Dancing like this is helping me to get Mr Parkinson out of the driving seat of my life.

The study concludes that dancing affects people with Parkinson's in a number of ways. As the quotation above illustrates, it was a project that enabled people to achieve more physically and helped them to rise above some of the limitations of their neurological condition. It created an event where people relished the social interaction and, in some, it encouraged a more positive outlook on their lives.

The artistic content, both the *Romeo & Juliet* ballet and score, played an important role in attracting people who were not interested in coming to a Parkinson's support group. Dancing to the music as a group also provided an interesting way for participants to exercise, particularly for those who were not keen on exercising alone. Most dramatically, dancing to the musical score enabled participants to increase fluidity of movement. The opportunity for freedom of expression through movement creation stimulated imaginations and allowed participants to expand beyond their habitual ways of moving.

Researchers, fellow participants, carers and some medical professionals all observed positive changes in participants either during sessions, or afterwards. The study did not detect long term changes in mobility, but short term gains in mobility were observed particularly in the latter half of the project. Well-being, positive attitude and other beneficial emotional feelings were consistently documented.

All participants were highly motivated to attend sessions. This is indicative of the welcoming atmosphere, the excitement of dancing with a professional ballet company and watching a rehearsal and performance, the perceptions that the dancing was doing them good and the quality of the facilitation and project management.

The involvement of the Company dancers was also an important aspect for participants. The glamour of the stage was embodied in the three dancers who helped with the project. This was exciting for participants and lent an extra layer of quality and interest to the sessions. Participants also found it enjoyable to have several graceful movers to copy and gave some of them a sense of determination or urge to keep dancing.

The opportunity to watch a rehearsal and a performance of *Romeo & Juliet* gave several who had not been to a dance performance before the chance to become acquainted with the art form. These participants have been keen to go again. It was also an opportunity for those who were keen theatre goers in the past the chance to renew their interest.

One of the most noticeable aspects of the project was how it engendered confidence, as well as body awareness and relative physical dexterity. We observed this increase in confidence through how participants attempted the balance tests over time. Observations of how participants performed movement over the duration of the project also suggest that some of the achievements were made possible by growing self-confidence. We would like to suggest that this increase has been encouraged by the inclusive facilitation practices and the warm social ambiance, as well as, importantly, by the integration of live music and specific dance exercises that aided mobility.

We would argue that faced with an unpredictable disease, a project that encourages confidence, greater awareness of one's own movement potential, social interaction and communal bonding is vitally important to those who live with Parkinson's.

Credits

The respondents, who, through interview or diary, are quoted in this report:

Anon 1	(interviewed 2 November 2010 and 19 February 2011 at Markova House; diary entries from 30 October 2010 to 24 February 2011)
Anon 2	(interviewed by email 7 February 2011 and 9 May 2011)
Anon 3	(interviewed 24 January 2011 at interviewee's home)
Anon 4	(unprompted email sent 16 May 2011)
Ann	(interviewed 30 November 2010 at interviewee's home)
Jane	(interviewed 12 November 2010 at interviewee's home; diary entries from 25 October 2010 to 12 November 2010)
Micaela	(interviewed 2 November 2010 and 19 February 2011 at Markova House)
Stella	(interviewed 2 November 2010 and 19 February 2011 at Markova House)
Michael Archer	(interviewed 24 January 2011 and 25 February 2011 at interviewee's home)
Michael Bennett	(diary entries from 11 December 2010 to 18 February 2011 and interviewed by email 2 March 2011)
Mary Carmody	(interviewed 19 February 2011 at Markova House)
John Harris	(interviewed 2 November 2010 at Markova House and 25 February 2011 at interviewee's home)
Caroline Harte	(interviewed 2 November 2010 and 19 February 2011 at Markova House)
Roy Kettleborough	(interviewed 2 November 2010 and 19 February 2011 at Markova House)
Claire Anne Nolan	(interviewed 2 November 2010 and 11 December 2010 at Markova House)
Margaret Parsons	(interviewed 2 November 2010 at Markova House and 22 February 2011 at Tate Britain)

Glossary of Terms

Anterior: In front.

Balance: An ability to maintain equilibrium in the body.

Barre: A hand rail used for light support at the beginning of a ballet class.

Bound: A more restricted and controlled way of moving.

Bradykinesia: A symptom of Parkinson's that describes a slowing of initiating or continuing movement.

Centre of gravity: The average location of the weight of the body.

Cervical spine (neck): Includes 7 vertebrae located above the thoracic spine (upper back).

Contra-lateral: When parts of the right and left sides of the body move in opposition from one another (i.e. The right foot steps forward while the left arm swings forward).

Developpé: A movement of one leg, which slowly bends as it lifts and unfolds out to stretch to the front, side or back.

Direct: This relates to how individuals use the space around them and describes when movement has a strong quality of attention.

Dyskinesia: Refers to a wide variety of repetitive, involuntary movements that are not in the individual's control. Dyskinesia can be a side-effect of taking levodopa, the main drug for Parkinson's.

Free: A way of moving that is not restricted or too controlled.

Greater trochanter: located at the top of the femur (thigh bone), it forms part of the hip where some of the buttock muscles attach.

Indirect: This relates to how individuals use the space around them and it describes when movement does not have a strong quality of attention and is more abstract.

Kyphosis or Stooped Posture: When the thoracic spine falls into a posterior curve creating a 'hunched' back position.

Lateral malleolus: The external part of the ankle (end of the fibula).

Pas de deux: A featured dance for two people seen within a larger dance work.

Plié: A bend of the knee or knees.

Proprioception: The ability to sense where the body is in space and when and where the body is moving in space at any given time.

Qualitative research: Research that is not based on the use of numbers, but rather it uses a spectrum of methods (such as interviews, documentary material, observations) to interpret phenomena from which people make meaning; bringing understanding to people's actions and perceptions.

Quantitative research: Research that uses numbers and data to look at the relationships between various things.

Sitz bones: Two bones in the bottom part of the pelvis, which can be felt when sitting upright on a hard seat.

Somatic imagery: Anatomical and other imagery of the functioning body to aid focus and awareness on one's own state of being.

Stability: The ability to regain equilibrium or resist after the body has been disturbed from equilibrium.

Significant difference (p value): A statistical output that shows 2 groups of data are different from one another. This includes a p value which represents how probable or likely it is that the observed difference is true.

Tendu: A movement where the leg and foot stretch out to the front, side or back without the foot moving from the floor. Also called a battement tendu.

Thoracic spine: Includes 12 vertebrae situated above the Lumbar (lower back) and above the cervical spine (neck) and is otherwise known as the upper back.

If you have found this report useful, please contact us.

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