Introduction

Osteoarthritis is the most common form of arthritis, with both prevalence and incidence increasing with age (Valdes et al, 2018). It can affect people's ability to undertake daily activities and is one of the leading causes of pain and disability worldwide (NICE, 2014). Furthermore, nonspecific low back pain (NSLBP) is another cause of pain and disability, which affects around one-third of the UK adult population each year (Hoy et al 2010). A key objective in the management of both NSLBP and osteoarthritis is to ensure that the symptoms do not result in long-term withdrawal from normal activities, including paid employment, hobbies and active social interactions (Hoy et al, 2010: NICE,2014). This can be achieved by improving patient centred outcomes such as pain reduction, reduced disability and the distress that aligns with both of these (National Collaborating Centre for Primary Care (UK)2009: NICE, 2014).

Clinical guidelines advocate exercise for both osteoarthritis and LBP (Delitto et al., 2012; NICE, 2009: 2014: 2016). Pilates is one exercise approach that has become increasingly popular in recent years within physiotherapy-based management for these conditions (Wells, Kolt, Marshall and Bialocerkowski, 2014: Quinn, Barry and Barry, 2011). A number of studies have shown that Pilates exercise programmes reduce both pain and disability (Natour, de Araujo Cazotti, Ribeiro, Baptista & Jones, 2014; Quinn, Barry & Barry, 2011; Choon Wyn Lim et al 2011). Improvements in strength and function (Donzeli et al 2017: Cancella, et al 2014), better static and dynamic balance and improved walking parameters associated with a reduced risk of falls (Pata 2014: Newell 2012: Bullo et al 2015). Furthermore, some studies have reported improvements in quality of life and mood (de 0liveira et al, 2015: Bullo et al 2015: Ferreira et al. 2011).

The increase in the ageing population is driving a worldwide epidemic of chronic diseases. However, there is potential to modify the link between chronological ageing and health (Prince et al 2015) by increasing physical activity and exercise participation in middle aged and older adults with chronic conditions. Maintenance of fitness is key to social activities for people living with long-term conditions both for health related factors and many individuals are now postponing retirement past age 65 years (Pynoos & Liebig, 2009). Since Pilates incorporates more than fifty different exercises with different levels of intensity, exercise programmes can be individualised for people with different needs, preferences, conditions, ages and abilities. Advocating the benefits of exercises relating specifically to the

individual's aims and goals is key for long-term adherence (Segar et al 2016: Taylor, 2014: NICE, 2016). Furthermore, since the positive effects of Pilates exercises such as flexibility, balance and stability can be seen in a relatively short time, this form of exercise may encourage adherence and a lasting behaviour change towards exercise and an active lifestyle.

To date, published studies on Pilates are post intervention studies that have focused on specific outcomes such as pain and disability questionnaires or measures of strength, balance, flexibility and body composition (Natour, de Araujo Cazotti, Ribeiro, Baptista & Jones, 2014; Quinn, Barry & Barry, 2011; Choon Wyn Lim et al 2011; (Donzeli et al 2017: Cancella, et al 2014). To date, no study has investigated the personal experiences and perceptions of the impact of Pilates on the day-to-day lives of people with chronic MSK conditions or the factors that affect an individual's motivation and adherence to a Pilates exercise programme. Therefore, the aim of this qualitative study was to explore patients' experiences and perceptions of Pilates and the effect on their day-to-day lives following a 12-week group exercise programme.

Methods

A qualitative interpretive phenomenological approach (IPA) to both data collection and analysis was utilised. IPA is a qualitative approach, which aims to provide detailed examinations of personal lived experience on its own terms rather than one prescribed by pre-existing theoretical preconceptions. It is particularly useful for examining topics, which are complex, ambiguous and emotionally laden such as living with painful conditions (Smith and Osborn, 2015).

Focus groups were the method of data collection since they are particularly suited for obtaining several perspectives about the same topic (Reeves and Hodges, 2008). They are useful to examine public attitudes on health behaviours and peoples experience of health services. Social interaction and group synergy are features of this methodology thereby creating rich data about personal experiences. Four separate focus groups from three different physiotherapy clinics in the North West were included in the study to make it authentic in terms of capturing different experiences from participants from different classes. The physiotherapists delivering the modified Pilates classes had all received the same Australian Association of Pilates Institution Training (APPI) Pilates training for physiotherapists. They all delivered the same core exercises. An advisory group developed the open-ended questions

and prompts used in the focus groups (Figure 1). The group comprised of a physiotherapist, a sport rehabilitation practitioner and a Pilates instructor.

The four focus groups comprised of both men and women with twenty-two participants overall (two groups of five and two groups of six). It has been demonstrated that four focus groups of between five to six participants is an optimal number to allow a variety of opinions and experiences to be discussed to allow the aims of the study to be achieved (Guest, Naney and McKenna, 2016: Krueger and Casey 2000).

Participants

The University of Salford ethics committee (Ref HSR1617-150) approved this study. A purposive sample including men and women aged over 35 years of age with chronic (more than 3 months) history of osteoarthritis, LBP or other musculoskeletal conditions who had regularly attended weekly Pilates classes for 12 weeks or more, with the ability to read, speak and understand the English language were recruited. Exclusion criteria included those who could not read speak or understand the English language and those who did not consent to participate in the study. Posters advertising the study on the walls of the clinics were used and if potential participants expressed an interest, they were given participation information sheets and has two weeks' time to decide if they wanted to be included in the study.

Data Collection

Each participant gave written informed consent prior to the study. They were aware s aware either they had the right to withdraw from the study at any time during or after the focus group with the choice, whether their data should be included or not. Reassurances were given that all data was confidential and a code number would ensure anonymity. The aim of each focus group was to explore the participant's experiences and perceptions of Pilates exercises via discussions and explore factors that affect adherence and the impact (if any) it had on their day to day lives. The four focus groups took place after the regular Pilates classes in the three Physiotherapy clinics and lasted between an hour and an hour and a half. The aim of using a familiar location was that a relaxed and open discussion would be encouraged. In addition, since the participants were familiar with each other they would feel more comfortable about expressing an honest viewpoint. The interviewer facilitating the focus groups has over 20 years' experience as a Pilates instructor and over 30 years as a chartered physiotherapist. She has conducted focus groups previously and uses a sensitive interview approach, encouraging the quieter member's opportunity to respond. All participants who

consented to be involved in the study were welcomed to the focus group by the researcher and the researcher and team members set ground rules for the discussion so that each participant had a right to respond, and not interrupted. The first question to the group was what are your perceptions and experiences of completing 12 weeks of Pilates exercises? Further prompts and trigger questions to maintain the focus on the aim of the study were used Figure 1. A digital voice recorder recorded each focus group discussion.

Data Analysis

The dialogue was transcribed verbatim the day following the focus groups and the analytical framework of thematic analysis advocated by Braun and Clarke was used (2006). The first authors analysis of the data was confirmed by an independent researcher (the second author) who was not involved in the initial data collection or analysis and each focus group participant was allowed to verify the accuracy of the themes via paper copies. Figure 2 outlines the stages of the data analysis.

The audio recording and transcripts were anonymous and coded, hard paper copies of data, including consent forms were stored in a locked filing cabinet within a locked room, accessed only by the researcher. Data will be stored and archived for a minimum of three years to allow verification of data from external sources if necessary, or longer if used for further research.

Results

Twenty-two participants were included (fifteen females; seven males) Age range was from 36 years to 83 years. Mean age = 57 years (SD 14.1) (Table 1 Participant Characteristics). Twelve had completed **a** 12-week programme, seven participants had completed over 12 months. All had completed the programme within a week of the focus group or had enrolled to continue further classes. Twenty-two participants had chronic MSK conditions. Duration of symptoms varied from two years to forty years (Mean 17 years SD 11.4). The majority of participants attended the Pilates classes after recommendations from health professionals. Other participants had seen advertisements when attending physiotherapy.

Five key themes emerged from the groups including; Physical Improvements: Promotes and Active Lifestyle; Psychosocial benefits; Increased ability to manage their own condition and Motivation to continue with exercises. Notably most of the themes were similar across all the groups

Theme One: Physical Improvements

The majority of participants agreed their core strength had increased both in performing the Pilates exercises and the carry over effects to function in everyday life. Many participants felt that a loss of strength was an inevitable part of ageing or due to their condition and were surprised at how much the Pilates had 'turned the clock back'. Many felt that they were still improving even after months of exercise despite the advancement of age and this motivated them to continue to attend the exercise classes. As one participant revealed,

'I have better core and overall strength now than at any other time in my life it's unbelievable I thought the loss of strength was just due to my age and arthritis and there was nothing I could do about IT {P14}.

And reiterated by another,

'I thought it was an inevitable part of getting older and I think Pilates turns the clock back in a way and I am still improving steadily every week at 50 and actually reversed normal aging, feeling older, stiffer, weaker and flabby' [P12].

The majority reported increased flexibility and reduction of stiffness when carrying out everyday activities as expressed by P16, 'I can touch my toes now I have not done that in ages and can get my shoes and socks on easily. 'Getting in and out of bed and getting dressed is easier because of more movement in my back and hips which is important as I live on my own'.

A number of older participants agreed that the classes seemed to have a positive impact on their balance. This was especially the case for the participants following lower limb surgery and was seen as a confidence giver and potentially reducing their risk of falls. 'I now have better balance in the shower, I can walk quicker and find it easier getting in and out of the car to keep me mobile and less at risk of falling outside because I can stand a bit better on one leg now which I was terrible at initially compared to other people in the class'[P21].

The majority stated an overall increase in their feeling of wellbeing and vitality. Further, they reported an increased fitness since doing the classes. 'I am less out of breath now with my COPD I can do the stairs easier and walk better and can keep up with my younger husband {P15}.

Theme Two: Pilates promotes an Active Lifestyle: Improved performance at work and hobbies

The increased physical strength and fitness gained from the classes helped the participants cope with the daily demands of work. Two participants revealed, '…My back aches a lot less I can stand for an hour or two now before it would ache after a few minutes and walking on site now is much easier' {P10] and also, 'I find it easier in my job as a builder walking, carrying and bending' [P5].

Participants who had desk jobs agreed that an improved posture, being more conscious of the way they were siting and doing a few stretches whilst at work reduced their pain and stiffness with one participant noting that, 'My neck and back ache less because I have better posture sitting and tend to get up and walk more'[P8}.

Older participants said they could engage both in new activities and perform better in activities and hobbies that they had enjoyed for years as reported by one participant. "I'm finding it easier walking quicker and longer now trying to lose weight and I started to break out in a little jog the other day something I haven't done in ages and am considering starting to run again after more than 10 years' [P14]. Another revealed that he is '…able to continue walking around the golf course without feeling as out of breath and keeping up with others more easily than I did before '[P19].

The moderately active older participants who played golf or bowls agreed that Pilates helped to keep them fit flexible and strong enough to continue to play as they were getting older, as reported by P5, 'My improvement in flexibility fitness and strength has improved my swing technique'. And also by P18, '…9 and 18-hole golf requires a lot of walking and these exercises certainly seem to help me continue because I'm a lot fitter and more agile than before and it's important to keep active and continue doing what you enjoy'.

For the younger participants there was a general agreement that Pilates kept them fit to continue with a diverse range of hobbies or actually start again after injury. Participants with a range of conditions reported this. For the participants who engaged in sport the Pilates exercises enabled them to continue with less pain. P7 reported, 'I was able to start running again following an absence of over 10 years following pelvic injury after childbirth I have reduced back pain without jarring' and run better because I'm straighter and don't keep

reducing the amount of times or duration of running like I used to. I can also trampoline now because of the improvement in my core and pelvic floor muscles.

Avoidance of injury and better performance were positive aspects experienced by P9 who specified 'It helps avoid new running injuries that I used to get on a regular basis by improving my posture when running and stretching my hamstrings which were really tight'. In addition, P14 suggested, "better strength in my legs and better core and balance improved my skiing on holiday and the difference really was incredible'

Improvement of fitness was a key factor in continuing with social activities despite living with a long-term condition. One participant suggested, "I feel I will be able to continue bowling as I get older due to better balance, and overall fitness and that is important seeing friends and my fitness matters particularly since I have suffered long term with asthma and COPD'[P15].

Approximately half of the participants were aware that the weekly recommended guidelines for exercise was half an hour per day of moderate activity and half of the participants felt that they were adhering to this by incorporating gym classes, running, walking, bowling, trampoline, housework and gardening regularly into their weekly remit. The other half either agreed that they needed to be more disciplined in the type of exercise they engaged in for optimum benefits but incorporated exercise in their own individual way including walking more and taking the stairs rather than use lifts. The role of Pilates was seen by one participant as being the foundation on which to build improved daily activities, 'Following chemotherapy and hip replacements I am hoping to get back to more walking and possibly swimming again and Pilates is helping with that I have started walking daily again now' [P16].

Theme Three: Psychosocial benefits and improved confidence

The majority of participants said that they enjoyed a feeling of wellbeing both during and after the classes and the relief of tension and stress was as real as the physical effects. The consensus was that focusing on exercises stopped them focusing on other worries, as revealed by P10, 'I get a sense of relaxation because the classes are slow, flowing and focused and different from doing gym exercises which are more competitive. I can de-stress after work and look forward to it on weekly basis it is therapeutic', and this is supported by P11, '…because you have to focus on doing the exercises correctly, you can't think of other

niggles and worries and they are locked out'. Further, P2 compares Pilates to other experiences of exercise, 'the weekly class is good for me psychologically it relaxes me because I feel I am looking after myself and has given me confidence to be more active. I had tried other boot camp and aerobic exercises which actually hurt my back and I dropped out feeling that I could not do exercise and feeling down'. Pilates clearly has benefits over the other forms of exercise.

A few participants noted improvements in posture and overall bodily shape and said the members of their family or other people had commented upon how well they looked which improved their confidence. As P12 revealed, 'I feel better because it has changed my shape and reduced the waistline, I'm not as flabby and my wife said I look less middle aged'. Another participant noted, 'I can see the effect on core muscles more toned, have better posture and I think I look better in clothes because I seem to hold myself taller" [P3].

One elderly lady had moved house to be nearer her family and said she joined the class because she wanted to be part of the local community, as she said, 'It is good for me to be able to stay active as well as meet other people within the community to prevent me being on my own'[P22]. Four participants said they had made new friends/ contacts and socialised outside the classes with people within the Pilates exercise group and this was important to them and encouraged them to continue with the exercises since seeing other friends was part of the overall enjoyment for them.

Theme Four: Increased Autonomy in Managing their own Condition

Because the Pilates instructors were all physiotherapists and certified instructor's they gave individual exercises and advice for individuals allowing them to being in control of ….and understanding the right way to exercise as a therapeutic intervention The abdominals, bridges and back strengthening exercises were the most popular with all of the groups. 'I now know the correct way of doing exercises to address deep muscles for stability and lengthen really tight overactive hamstrings and hip flexors. Pilates is more geared up to help the spine alignment, stability and deep core and feel it is a better balance of exercises that men do on their own in the gym and seems to be helping the nerve pain in my leg'[P1]. This was reiterated by P2 'These Pilates exercises seem to be having a better effect because they are more controlled with centring and explanation and attention to doing specific exercises for your particular problem'.

A few participants said that the choice to do individual exercises with different levels or choice of modified exercises was especially helpful for them. P3 suggested 'You are in your own zone doing your own thing concentrating on your own specific exercises'. 'Having a choice of different levels depending on pain or ability and even though it isn't a competitive class you can still progress yourself by doing the exercises better more repetitions or hold times which is important to improve individually for your own condition.

Half of the participants reported a marked reduction in their pain and three said it relieved their pain completely and a number of these agreed that engaging in weekly Pilates exercises reduced their need for regular physiotherapy but may need the odd session if they suffered a flare up of their pain. P11 emphasises the multiple benefits, 'my back pain is better because I have lost weight and am fitter''. There was general agreement that participants were able to manage their condition independently with exercises and would only require physiotherapy if they had a 'flare up'. P4 explains 'I used to have regular chiropractic treatment but wanted to do Pilates and felt this was better for me in terms of longer term self-management and my pain is now more intermittent'.

Many participants continued with a home programme of Pilates exercises on a daily basis to reduce their specific stiffness or ease aches. P11 explains 'I always do roll ups and bridge exercises because that seems to be what helps my back pain' and P15 who revealed, 'I do some balancing on one leg because it is my worst exercise but helps my hip pain and balance for bowling'. Some spoke about the opportunity within Pilates to make the exercises more bespoken for their needs as P9 describes, 'I do more varied stretching exercises I've learned now for my Hamstrings to improve my running and help prevent overuse injuries' and "The limbering up ones reduce my ache and stiffness to keep me going'[P18].

Theme Five Motivation to continue with exercise

All participants agreed that to maintain benefits they had to continue with either group exercises or a home programme of exercises. The main motivator for all participants was the exercise class with instruction as they said that they were unlikely to set aside a full hour for themselves to exercise independently. They enjoyed the protected time of the class being on the same day at the same time every week and it was part of their routine. If they were unable to make the class, they were able to swap onto a different class at two clinics depending on their ability. The primary motivation to continue to do the Pilates were the actual physical benefits along with the links with an active lifestyle, mental wellbeing, and reduced pain.

There was agreement with all participants that when they did not attend for a week or so they felt the stiffness and symptoms returning and this motivated them to continue. As P9 identifies 'I notice that I soon stiffen up when I missed a few classes and this was an incentive to continue and also my back starts to bother me at work running and cycling'. P14 agreed 'I can really notice a difference in my strength and flexibility doing the exercises and feel younger when I miss a couple of sessions I seem to really stiffen up again so I need to keep doing it especially as I am getting a bit older'.

Participants referred by a clinician said they were more likely to continue because a clinician advised them. One participant suggested 'Following my hip replacement the consultant said Pilates was the best thing and I have found it helps with my function' [P16]. Another participant was motivated to continue exercise to avoid further surgery, 'I have already had one hip replacement and I discussed with the physiotherapist the importance of exercise that may help to stop me having the 2nd one done and it seems to be helping so I will carry on as long as I can'[P21].

However, despite these motivating factors, there was agreement between all participants that the biggest obstacle to continuing with classes included a lack of time to fit everything in including work life and other activities. Some suggested pressures from work and overtime or changes in work hours. Some had family commitments including caring for small children and elderly relatives that affected time designated to Pilates and other exercises.

Discussion

This qualitative study has provided unique insight into patients' experiences and perceptions of Pilates and the effect it had on their day-to-day lives. The perceived benefits align with previous work in relation to physical benefits (Donzeli et al 2017: Cancella, et al 2014). However, this study has revealed additional benefits such as the tangible links between an increased active lifestyle, psychosocial benefits, and ability to manage their own condition more effectively with the net result being a holistic improvement in physical and mental health and positive consequences for the social aspects of their lives.

All participants completed 12 weeks of Pilates to allow potential physical and physiological changes to occur and allow natural fluctuations in LBP and OA in order to gain authentic experience of the Pilates exercise programme over time. The physical benefits reported were the main motivators to continue with exercise. Many participants had assumed the slow decline into a sedentary lifestyle was due to age rather than deconditioning and without the

classes would likely have had poorer long-term outcomes. Short periods of muscle disuse can lead to rapid skeletal muscle atrophy, loss of functional strength and negative health consequences. Prolonged periods of inactivity accumulate throughout an individual's lifespan contributing to the net muscle loss observed with aging (Wall et al 2013: Valdes et al 2018)). The participants felt that the Pilates exercises counteracted the weakness seen by many as simply getting older or having osteoarthritis.

Pilates was a facilitator for a more active lifestyle including the ability to function better at work or continue with hobbies. These positive and tangible benefits are crucial in encouraging the elderly to adhere to exercise (Mailloux et al 2006) and may reduce mortality by encouraging the more sedentary participants to become moderately active (Blair et al, 2012: Paterson, 2007). For example, activities such as walking the dog for longer, brisker shopping, and enabling them to continue at work and hobbies may be key in promoting health among the middle aged and elderly who are the most likely to remain sedentary (Taylor, 2013: Owen at al 2010: Ekelund et al 2016). Pilates can be considered a strengthening exercise for the legs arms abdomen and back muscles (NHS Choices (2015*)* and the improvements reported in body shape may be a marker of reversing consequences of ageing including an increased fat mass and reduced lean body mass (Fourie et al (2013).

Pilates provided a foundation for better performance, alignment and management of risk of injury for participants engaged in physical hobbies such as running, cycling, skiing, trampoline, bowling, and golf demonstrated in a previous study (Lugo-Larcheveque et al (2006). Furthermore, The Pilates exercises improved performance at work for people in both desk based and active occupations which is important considering many individuals are now postponing retirement past age 65 years (Pynoos & Liebig, 2009).

The psychosocial benefits including reduced stress and depression and a sense of relaxation and wellbeing along with reducing social isolation in older participants. Improvements in life satisfaction and quality of life has been demonstrated in middle aged and older women (Ferreira et al. 2011: Rodrigues-Fuentez et al, 2014) following Pilates exercises. Since mood can often deteriorate with the menopause and age this is a very important finding.

Individualised Pilates exercises helped the majority to manage their own condition by reducing pain and disability. Individualised exercise prescription, supervision and functional integration of exercises is crucial for both long-term adherence and may reduce deterioration of chronic musculoskeletal conditions (Wells et al, 2014: Holth et al, 2008). A few

participants said they were more likely to continue with Pilates because they were advised by a clinician who suggested improved function and quality of life. Research has shown that linking exercise with goals and improvement in quality of life is key in developing long-standing behaviour change (Segar et al, 2016: McPhail et al, 2014).

A limitation of the study is that the clinics were in relatively affluent areas and therefore may have been different had the purposive sample included participants from a wider socioeconomic population. A limitation may be the relatively small size of participants and that the results therefore lack generalisability. However, this is not the purpose of qualitative research; rather, the aim is to gain deeper insight and personal accounts, providing detailed and rich accounts of these phenomenon. In addition, the participants in all four focus groups were a heterogeneous group in terms of age, level of function and condition and the perceived benefits were equally diverse.

Despite these potential limitations, it is clear that for these participants, the Pilates classes have had a positive outcome compared with the baseline level of physical function but there are additional benefits. Alongside the physical improvements, the psychological and social benefits are reported within a short time scale and that this acts as a motivator to maintain this activity. This has the potential to reduce the need for other health interventions and the burden that this places on the individual and the NHS. Further, there was evidence to suggest that all these benefits contribute to reversing the effects associated with ageing and chronic conditions.

Conclusion

This study is the first study to investigate individual perceptions of the impact of Pilates on the daily lives of people with chronic conditions. The Pilates based exercise programme enabled the participants to function better and manage their condition more effectively and independently. Further to previous work, this study has revealed physical, psychological and social benefits that increase motivation to adhere to the programme and promote a healthier lifestyle. Practitioners should consider encouraging patients with OA and LBP to seek out Pilates services from NHS or other providers.

References

Bullo, V. Bergamin, M. Gobbo, S. Sieverdes, J. Zaccaria, M. Neunhaeuserer, D. and Ermolao, A. (2015. The effects of Pilates exercise training on physical fitness and wellbeing in the elderly: A systematic review for future exercise prescription. Preventive Medicine, 75, 1-11.

Blair, S. Sallis, R. Hutber. A. (2012). Exercise *therapy—the public health message*. Scandinavian Journal of Medical Science Sports, *22, 24–8.*

Blair, S. Kohl, H. Barlow, C. Paffenbarger, R. Gibbons, L. Macera, C. (1995). Changes in physical fitness and all-cause mortality: a prospective study of healthy and unhealthy men. JAMA, 273, 1093-1098.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3, 77-101. ISSN 1478-0887 Available from: http://eprints.uwe.ac.uk/11735.

Cancela, J. de Oliveira, L., de Oliveira, R.,de Almeida Pres-Oliveira, D. (2014). Effects of Pilates method in physical fitness on older adults. A systematic review. European Review of Ageing and Physical Activity, **11,** 143.

Choon Wyn Lim, E. Li Choo Poh, R.Ying Low, A. Pong Wong, W. (2011). Effects of Pilates-Based Exercises on Pain and Disability in Individuals with Persistent Nonspecific Low Back Pain: A Systematic Review with Meta-analysis. *Journal of Orthopaedic & Sports Physical Therapy*, 41, 70–80 **DOI:** 10.2519/jospt.2011.3393.

Delitto, A., George, S., van Dillen, L., Whitman, J. Sowa, G., Shekelle, P., Godges, J. (2012). Low back pain clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association. *Journal of Orthopaedic and Sports Physical Therapy*, 42, 1-57.

de Oliveira, L. de Oliveira, R. de Almeida Pres-Oliveira, D. (2015). Effects of Pilates on muscle strength, postural balance and quality of life of older adults: a randomized, controlled, clinical trial Journal of Physical Therapy Science, 27, 871-876.

Donzeli Viera N., Testa, D., Ruas PC de FatimaSalvini T Catai, AM and Melo RC. (2017). The effects of 12 weeks Pilates-inspired exercise training on functional performance in older women: A randomized clinical trial Journal of Bodywork and Movement Therapies, 21, 251-258.

Ekelund, U., Steene-Johannesson, J., Brown, W., Fagerland, M., Owen, N., Powell, K., Bauman, A and Lee, I. (2016). Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. Lancet Physical Activity Series 2. Executive Committee; Lancet Sedentary Behaviour Working Group Lancet, 24, 1302-1310.

Ferreira, A. Jorge, F. Dulce, G. Bernardo, L. Kirkcaldy, B. Barbosa, T and Silva, A. (2011). Effects of Pilates-Based Exercise on Life Satisfaction, Physical Self-Concept and Health Status in Adult Women, Women & Health, 51, 240-255.

Fourie, M. Gildenhuys, G. Shaw, I. Shaw, B. Toriola, A. Goon, D. (2013). Effects of a mat based Pilates programme on body composition in elderly women. West Indian medical journal, 62, 545-553.

Guest, G. Namey, E. and McKenna, K. (2016). How Many Focus Groups Are Enough? Building an Evidence Base for Nonprobability Sample Sizes. Field Methods. Review Article, 29, 3-22.

Hill, J., Dunn, K., Lewis, M., Mullis, R., Main, C. Foster, N & Hay, E. (2008). A primary care back pain screening tool: identifying patient subgroups for initial treatment. Arthritis and Rheumatism, 59, 632-641.

Holth, H., Burchardt, H., Wepen, H., Zwart, J., and Hagan, K. (2008). Physical inactivity is associated with chronic musculoskeletal complaints 11 years later: Musculoskeletal disorders, 9, (159).

Hoy, P. Brooks, F. Blyth, R. Buchbinder, D. (2010). The Epidemiology of low back pain. Clinical Rheumatology, 24, 769–781.

Justine, M. Azizan A. Hassan, V. Salleh, Z. Manaf, H. (2013). Barriers to participation in physical activity and exercise among middle-aged and elderly individuals. Singapore Medical Journal, 54, 581-586.

Krueger, RA and Casey, MA. (2000). Focus groups a practical guide for Applied Research. Third Edition. Thousand Oaks CA Sage Publications.

Lugo-Larcheveque, N., Pescatello, L.S., Dugdale, T.W. et al. (2006). Management of lower extremity malalignment during running with neuromuscular retraining of the proximal stabilizers. Current Sports Medicine Reports, 5, 137.

Macfarlane, GJ, Jones, GT, Hannaford, PC. (2006). Managing low back pain presenting to primary care: where do we go from here? Pain, 122, 219–222.

Mailloux, J; Finno, M; Rainville, J. (2006). Long-Term Exercise Adherence in the Elderly with Chronic Low Back Pain. American Journal of Physical Medicine & Rehabilitation, 85, 120-126.

McPhail, S., Schippers, M, Marshall, A. (2014). Age, physical inactivity, obesity, health conditions, and health-related quality of life among patients receiving conservative management for musculoskeletal disorders. Clinical Interventions for Ageing, 10, 1069-80.

Miyamoto, G. C., Costa, L. O., Galvanin, T., & Cabral, C. M. (2013). Efficacy of the addition of the Pilates method over a minimal intervention in the treatment of chronic nonspecific low back pain: a randomized controlled trial. Physical Therapy, 93, 310-320.

National Collaborating Centre for Primary Care (UK). Low Back Pain: Early Management of Persistent Non-specific Low Back Pain [Internet]. London: Royal College of General Practitioners (UK); 2009 May. (NICE Clinical Guidelines, No. 88.) 2, Introduction. Available from: https://www.ncbi.nlm.nih.gov/books/NBK11709/

National Institute for Health and Care Excellence. (2016). Low back pain: early management of persistent non-specific low back pain. Low back pain and sciatica in development [GID-CGWAVE0681]

National Institute for Health and Care Excellence. (2014). Osteoarthritis: care and management. Clinical Guideline [CG177] Published date: February 2014.

Natour, J. de Araujo Cazotti, L. Ribeiro, L. Baptista, A. S. & Jones, A. (2014). Pilates improves pain, function and quality of life in patients with chronic low back pain: a randomized controlled trial. Clinical Rehabilitation, 29, 59-68.

Newell, D., Shead, V., and Sloan, L. (2012). Changes in gait and balance parameters in elderly subjects attending an 8-week supervised Pilates programme. Journal of Bodywork and Movement Therapies, 16, 549–554.

NHS Choices.(2015). Physical activity Guidelines for older adults https://www.nhs.uk/Livewell/fitness/

Owen, N. Healy, N. Matthews, C. and Dunstar, D. (2010). Too Much Sitting: The Population-Health Science of Sedentary Behaviour. Exercise and Sport Science Review, 38, 105–113.

Pata, RW., Lord K and Lamb, J. (2014). The effect of Pilates based exercise on mobility, postural stability and balance in order to decrease fall risk in older adults. Journal of Bodywork and Movement Therapies, 18, 361-367.

Paterson, D., Jones, G., Rice, C. (2007). Ageing and physical activity: evidence to develop exercise recommendations for older adults. Applied Physiological Nutritional Metabolism, 32 (2E), 69–108.

Prince, M. Wu, F. Guo, Y. Robledo, L. O'Donnell, M. O'Sullivan, R and Yusuf, S. (2015). The burden of disease in older people and implications for health policy and practice. The Lancet, 385, (9967), 549-562.

Pynoos, J. Liebig, P. (2009). Changing work, retirement, and housing patterns. Generations, 33, 20-26.

Quinn, K., Barry, S., & Barry, L. (2011). Do patients with chronic low back pain benefit from attending Pilates classes after completing conventional physiotherapy treatment? Physiotherapy Ireland, 32, 5-12.

Reeves, S., and Hodges, P. (2008). Qualitative research methodologies: ethnography British Medical Journal.

Segar, M., Guerin, E., Phillips, E and Fortier, M. (2016). From a Vital Sign to Vitality: Selling Exercise So Patients Want to Buy It. Current Sports Medicine Report, 15, 276-81.

Smith J and Osbon M (2015). Interpretive phenomenological analysis as a useful methodology for research on the lived experience of pain, Br J Pain, 9 (1): 41–42.

Taylor, D. (2014). Review article. Physical activity is medicine for older adults. Postgraduate Medical Journal, 90, 26-32, 131366.

Valdes, AM and Stocks, J. (2018). Osteoarthritis and ageing. European Medical Journal Rheumatology, 3, 116-123. ISSN 2056-6395.

Wall, B. Dirks, M and van Loon, L. (2013). Skeletal muscle atrophy during short-term disuse: Implications for age-related sarcopenia. Ageing Research Reviews, 12, 898-906.

Wells, C., Kolt, G. S., Marshall, P., Hill B., Bialocerkowski, A (2014). The Effectiveness of Pilates Exercise in People with Chronic Low Back Pain: A Systematic Review.

Code	Age	Gender	Condition	Duration (years)	Work	Physical Activities
1	36	M	Post discectomy	3	FT builder	Returned to gym / cycling
2	36	F	Low back and thoracic pain	2	PT bar manager	Returned to gym / walking
3	38	F	Low back pain	2	FT Admin	Walks regularly
4	40	F	Low back pain	5	FT showjumper	Show jumping and running 5k
5	48	M	Low back pain / sciatica	10	FT building manager	Golf and resumed running 5k
6	45	F	Low back pain	5	Admin / manager	Badminton and running 5k
7	43	F	Symphysis pubis dysfunction	18	Admin / manager	Returned to running 5k and trampoline
8	51	F	Neck and low back pain	20	Admin / secretarial	Walks the dog
9	53	M	Low back pain / hamstring injury	10	IT manager	Easier Regular Running 10k
10	58	M	Low back pain	18	Builder / manager	Walking / physical job
11	57	F	Low back pain	15	Admin	Walking ski holidays
12	50	M	Low back pain / sciatica	20	BT Engineer	Walking
13	64	F	Low back and neck pain	10	Retired	Badminton weekly club
14	63	F	Low back and neck pain	25	Retired	Walking skiing and starting to jog again
15	67	F	Low back pain COPD	37	Dog groomer	Crown green Bowling
16	66	F	Hip replacement	20	Retired	Increasing amount of walking
17	61	F	Low back pain	25	Part time secretary	Walks daily
18	72	F	Hip OA Knee OA	30	Retired	Golf
19	73	M	Hip OA Knee replacement	40	Retired	Golf
20	74	F	Generalised OA	20	Retired	Walking
21	76	M	Hip replacement	36	Retired	Walks with stick
22	83	F	Generalised OA	33	Retired	Walking

Table 1. Participant Characteristics.