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RESEARCH ARTICLE

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Beliefs, motives and gains associated with physical activity in people with osteoarthritis

Alice Berry[1] | Candy S. McCabe[1,2] | Serena Halls[1] | Sarah Muir[3] | Nicola Walsh[1]

[1]Centre for Health and Clinical Research, Faculty of Health and Applied Sciences, University of the West of England, Bristol, UK

[2]Dorothy House Hospice Care, Winsley, UK

[3]Research Centre for Behaviour Change, Psychology Department, Bournemouth University, Bournemouth, UK

Correspondence
Alice Berry, Room 5-077, Rheumatology Research B502, Bristol Royal Infirmary, BS2 8HW Bristol, UK.
Email: alice.berry@uwe.ac.uk

Funding information
University of the West of England

Abstract

Objectives: Osteoarthritis (OA) affects approximately 8.75 million people in the United Kingdom. Physical activity is recommended as a core treatment, yet 44% of people with OA are inactive. Motivation and self-efficacy for exercise are considered to be key factors contributing to sustained engagement with physical activity. The aim of this study was to explore the beliefs, motives (what an individual aims to attain through participating in physical activity) and gains (what people feel they might get from participation) associated with physical activity engagement in a group of people with OA.

Design and method: This study adopted a cross-sectional survey research design, using two validated questionnaires: the Exercise Motives and Gains Inventory and the Exercise Self-Efficacy Scale.

Results: Data were gathered from 262 people with OA between August 2015 and January 2016.

Those who were most active reported higher levels of both motivation and self-efficacy and were active for enjoyment, to avoid negative health, and for health and fitness reasons. A comparison of motives and gains revealed higher gain scores for social engagement and enjoyment, compared with associated motive scores.

Conclusion: This study provides evidence of the central role that motives, gains and self-efficacy play in facilitating engagement with physical activity in this population. Future interventions should aim to foster increased self-efficacy for physical activity and promote autonomous forms of motivation by emphasising the importance of choosing activities which are enjoyable, as well as highlighting the value of social engagement.

KEYWORDS

exercise, motivation, osteoarthritis, physical activity, self-efficacy

1 | INTRODUCTION

Osteoarthritis (OA) is the most common form of arthritis, affecting approximately 8.75 million people in the United Kingdom (Arthritis Research UK, 2018), and one of the leading causes of pain and disability worldwide (Murray, 2018). Those affected present with a range of physical impairments such as pain, joint stiffness and muscle weakness, as well as psychological and emotional limitations such as depression

and anxiety (Bennell, Dobson, & Hinman, 2014; Hurley, Walsh, Bhavnani, Britten, & Stevenson, 2010). National guidelines support the effectiveness and safety of exercise and physical activity (PA) for OA, recommending that this should be an integral part of condition management (Rausch Osthoff et al., 2018; Walsh, Pearson, & Healey, 2017).

It is widely recognised that a complex array of factors influence a person's decision to engage with, and maintain, participation in PA (Bennell & Hinman, 2011). Multiple studies have explored these determinants in people with arthritis (Gyurcsik et al., 2009; Holden, Nicholls, Young, Hay, & Foster, 2012; Stubbs, Hurley, & Smith, 2015) with a number of psychological, social and environmental factors being reported, including social support, self-confidence, exercise beliefs, past experiences, knowledge and attitudes about PA and levels of pain (Hurley et al., 2018; Kanavaki et al., 2017). Motivation and self-efficacy (SE) are two key psychological factors considered crucial in sustaining engagement with PA (Teixeira, Carraça, Markland, Silva, & Ryan, 2012).

Motivation represents one's will or determination to act and is defined as the psychological energy that initiates and continuously directs behaviour (Slovinec D'Angelo, Pelletier, Reid, & Huta, 2014). Previous research has recognised that motivation can act as a facilitator to PA in people with OA (Brittain, Gyurcsik, McElroy, & Hillard, 2011; Holden et al., 2012; Petursdottir, Arnadottir, & Halldorsdottir, 2010). It is most comprehensively defined by self-determination theory (SDT; Deci & Ryan, 2000), a broad theory of motivation which draws a distinction between intrinsic (or autonomous) motivation (engaging in a behaviour for its own sake, i.e., for enjoyment), and extrinsic forms of motivation (doing an activity because of external reward, i.e., 'I exercise because my doctor tells me to'). SDT has frequently been used in PA research (Teixeira et al., 2012), and it maintains that three innate psychological needs when satisfied, yield enhanced motivation: autonomy (being fully engaged and feeling in control of one's actions), relatedness (being connected and valued by others) and competence: (having a mastery over one's actions; Deci & Ryan, 2000).

SE is defined as one's belief in the ability to successfully organise and implement a specific task, such as PA (Bandura, 1977). Research has established the importance of SE on levels of PA in healthy adults (Williams & French, 2011) and older adults (McAuley, Lox, & Duncan, 1993). The positive effect that increased SE might have on levels of PA specifically in people with OA has also been demonstrated (Hammer, Bieler, Beyer, & Midtgaard, 2015; Marks, 2014; Peeters, Brown, & Burton, 2014). Gecht, Connell, Sinacore, and Prohaska (1996) studied the influence of beliefs on exercise participation among people with arthritis and demonstrated that the stronger one's belief in the benefits of exercise and the higher one's SE for exercise, the greater the frequency and intensity of exercise participation (Gecht et al., 1996).

Given the value of PA for people with OA, understanding specific motives associated with different levels of PA in this population could provide useful information and guidance for intervention developer about the optimum ways to motivate people with OA to become and stay active. As such, the aim of this study was to explore what different beliefs, motives and gains were associated with PA engagement in a group of people with OA.

2 | METHODS

Questionnaire distribution and completion took place between August 2015 and January 2016. Participants had a clinical or self-reported diagnosis of OA and were recruited via postal survey and online. Access was available to participants who had previously taken part in a research study at the University of the West of England (UWE), Bristol, UK, and had consented to be contacted about future research. To increase the number of participants, the questionnaire was also advertised online via a number of national arthritis charitable organisations and arthritis patient groups. A pragmatic approach was taken with regards to sample size, as the reach of the online questionnaire was unclear. Therefore, a minimum sample size was not assigned, but rather a period for which the online questionnaire would remain live and accessible (five months).

2.1 | Ethical approval

Ethical approval was granted in August 2015 (UWE Faculty REC HAS/15/06/184). Informed consent was assumed if participants chose to respond.

2.2 | Measures

The Exercise Motives and Gains Inventory (EMGI; a complementary version of the Exercise Motivations Inventory (EMI-2; Markland & Ingledew, 1997) was used to explore the role of perceived exercise gains (what people feel they might get from exercise) and exercise motives (what an individual aims to attain [or avoid] through participating in PA; Strömmer, Ingledew, & Markland, 2015). Fifty-one questions are grouped into 14 subscales, which can be further aggregated into the following 'higher orders': appearance/weight management, social engagement, enjoyment/revitalisation, negative health and health/fitness. The questions attempt to gain insight into which types of motives are present by using questions, such as 'personally, I exercise (or might exercise) to stay slim, … to avoid ill-health, … because I enjoy the feeling of exerting myself.' Answers are given using a five-point Likert scale (ranging from 0 [*not at all true for me*] to 4 [*very true for me*]). Higher scores (3 or 4) indicate stronger agreement, and lower scores (0–1) indicate less agreement with the question. We were unable to identify any previous study where the EMGI had been used in this population; however, it was developed from the widely used EMI-2 questionnaire (Markland & Ingledew, 1997), which has been tested in a range of different populations (Teixeira et al., 2012).

The Exercise Self-Efficacy Scale (ESE; Gecht et al., 1996) was used to measure how SE affects participation in PA and is divided into four subcategories: beliefs about one's ability to exercise (SE for exercise), barriers to exercise, benefits of exercise and impact of exercise on arthritis.

Both the EMGI and ESE questionnaires have demonstrated discriminant internal validity and reliability (Gecht et al., 1996; Strömmer et al., 2015).

2.3 | Physical activity

Level of PA was gathered by asking participants the average number of days per week they were active. Additional data were collected to gain a broader picture of PA in the sample, including average minutes of activity per day, length of time active at current level and specific activities carried out (i.e., walking and swimming).

2.4 | Demographic data

Demographic data collected included sex, age, marital status, highest level of education and comorbidities. These data were chosen to understand to what extent the sample represented the wider population.

2.5 | Patient and public involvement

A patient insight partner (JA) was recruited to give advice regarding the design of the questionnaire. The patient insight partner trialled the questionnaire on a number of occasions and commented on ease of use, interpretation of the questions, flow of the questionnaire and length of time that it took to complete (this was around 15–20 min). Minor adjustments were made prior to widespread distribution, such as changes in wording on the participant information sheet. A number of questions within the questionnaire were described as being repetitive; however, no changes could be made as this would have invalidated the questionnaire.

2.6 | Data analysis

All data were examined (using IBM SPSS version 22) to check that continuous variables were within an expected range, means and standard deviations (*SD*s) were plausible and that all discrete variables were within range (Tabachnick & Fidell, 2014). Distribution of data was checked for normality. Means and *SD*s were used to describe the data, and ANOVA tests were used to look for differences between the means of the different PA subgroups (variation between conditions).

3 | RESULTS

There were 262 respondents; mean age of 64 years, and mean disease duration of 11 years. Knee and hip OA were most commonly reported (Table 1). Most were active on four or more days per week (Table 2).

3.1 | Overview of results

Participants were categorised into three subgroups according to current level of PA: nonactive (no current PA, n = 51), low-active (active between 1 and 3 days per week, n = 38) and and high-active (active on 4 or more days per week, n = 154). Participants in the 'high-active' subgroup had higher motive scores across all five categories of the EMGI, compared with low and nonactives. The greatest differences were seen between the nonactive and high-active subgroups, with ANOVA tests reporting significant differences across all subcategories

TABLE 1 Sample characteristics of participants

Number in sample		*N* = 262
Sex	Female	209 (80%)
	Male	53 (20%)
Age (years)	Mean (*SD*)	64 (11)
	Minimum	33
	Maximum	92
Marital Status	Single	26 (9.9%)
	Married/partner	177 (67.6%)
	Divorced/separated	28 (10.7%)
	Widowed	30 (11.5%)
	Other	1 (0.4%)
Highest level of education	GCSEs or equivalent	48 (18.3%)
	College diploma or equiv.	61 (23.3%)
	University degree or equiv.	68 (26.0%)
	Post-graduate qualification	57 (21.8%)
	None	26 (9.9%)
	Missing	2 (0.8%)
Comorbidities	Hypertension	56
	Diabetes	21
	Mental health condition	17
	Heart disease	16
	Lung disease	8
	Other	72
Osteoarthritis Symptoms		
Duration of OA (years)	Mean (*SD*)	11 (10)
	Minimum	1
	Maximum	61
Joints affected by OA (n = 164 online participants only)	Knee	117
	Hip	84
	Spine	65
	Hand	72
	Other	58
VAS (OA severity; 0–100)	Mean (*SD*)	49 (23)
	Minimum	0
	Maximum	100

Abbreviations: GCSE, General Certificate of Secondary Education; OA, osteoarthritis; *SD*, standard deviation; VAS, Visual Analogue Scale.

TABLE 2 Physical activity history

Sample (n = 262)	Currently active 199 Currently not active 51 Missing 12	
Currently not active (n = 51)		
Time since last active	<6 months	7
	6–12 months	8
	1–2 years	7
	2–5 years	10
	5–10 years	5
	>10 years	6
	Never	8
Currently active (n = 199)		
Days per week when active (n = 199)	Mean (*SD*)	5 (2)
	Low-active (1–3 days)	38 (19%)
	High-active (4–7 days)	161 (81%)
Minutes per day (n = 193)	Mean (*SD*)	70 (60)
	Minimum	10
	Maximum	420
Time active at this level	<6 months	11
	6–12 months	15
	1–2 years	13
	2–5 years	33
	5–10 years	35
	>10 years	92
Activities	Walking	178
	Gardening	122
	Swimming	58
	Exercises from a health care professional	50
	Cycling	42
	Exercise classes	37
	Gym	25
	Dancing	15
	Tai Chi	4

of the EMGI between these two subgroups. Importantly, significant differences were also seen between the nonactive and low-active subgroups, in both the enjoyment/revitalisation and health and fitness categories.

A comparison of motives and gains scores revealed that participants reported a significantly higher gain score for social engagement and enjoyment/revitalisation, when compared with their corresponding motive score for the same question, suggesting they gained more than expected from participation.

SE scores were higher for participants who reported being the most active. ANOVA tests revealed significant differences between PA subgroups for all categories of the ESE questionnaire, except 'benefits of exercise.'

3.2 | Motives for PA

Table 3 shows the means and *SD*s for the three PA subgroups (nonactive, low-active and high-active). Results of the ANOVA tests (see Table 3) showed a statistically significant difference between PA subgroups across all categories of the EMGI. Tukey post-hoc tests revealed significant differences between the 'nonactive' and high-active subgroups for all categories of the EMGI questionnaire. Significant differences were also seen between the nonactive and 'low-active' subgroups in two categories: enjoyment and health/fitness.

3.3 | Motives versus gains

The second part of the EMGI asked participants (those active over the last 12 months) about any gains they might have experienced associated with PA. Table 4 compares the differences between motive and gain scores.

Cronbach's alpha was above 0.80 for most of the Motive items, with the exceptions being Health Pressures (0.53), Ill-health Avoidance (0.72) and Strength and Endurance (0.78). Gain items also showed high internal consistency, ranging between 0.93 and 0.81. In line with lower-scored Motive items, the exceptions included Health Pressures (0.55) and Ill-health Avoidance (0.79).

Independent sample *t*-tests were performed to explore the difference in mean scores between motives and gains. Gain scores were significantly higher than motive scores for the social engagement and enjoyment/revitalisation subgroups. Conversely, gain scores for the negative health and fitness scores (i.e., health pressures ['Being active has helped me to recover from an injury'] and ill-health avoidance ['Being active has helped me to avoid ill-health']) were significantly lower than motive scores.

3.4 | Exercise SE

ANOVA tests showed a significant difference between groups (see Table 5). Tukey post hoc tests revealed statistically significant differences between the subgroups nonactives and high-actives, and low-actives and high-actives for 'self-efficacy for exercise,' 'barriers to exercise' and 'impact of exercise on arthritis'. Differences between subgroups for benefits of exercise were not significant.

4 | DISCUSSION

The aim of this study was to explore what different beliefs, motives and gains were associated with PA engagement in a group of people with OA. Those who reported being most active (active on four or more days per week) had higher levels of SE and were motivated to be active for enjoyment, to avoid negative health, and for health and fitness reasons. Currently active participants also reported higher than expected gains for social engagement and enjoyment/revitalisation.

TABLE 3 Motives for physical activity (mean [*SD*])

(*n* = 244 complete data sets)	Nonactive (*n* = 51)	Low-active (*n* = 38)	High-active (*n* = 154)	ANOVA (*F*)	*p* value
Appearance/weight management	1.28 (0.75)	1.39 (0.74)	1.65 (0.68)	6.25	0.002*
Social engagement	1.59 (0.78)	1.81 (0.67)	2.01 (0.60)	8.38	0.000*
Enjoyment/revitalisation	1.48 (0.88)	1.89 (0.79)	2.05 (0.78)	11.19	0.000*
Negative health	0.99 (0.79)	1.25 (0.75)	1.61 (0.93)	10.60	0.000*
Health/fitness	1.53 (1.00)	2.04 (0.95)	2.22 (0.89)	10.85	0.000*

Note. df = 2.
*sig = significant at p <0.05.

TABLE 4 A comparison of motive and gains (mean/*SD*)

	Motives (*n* = 196)	Gains (*n* = 211)	*T* test	*p* value
Appearance/weight management	1.87 (1.05)	1.72 (1.07)	1.46	0.15
Social engagement	1.08 (0.81)	1.25 (0.91)	−1.95	0.05*
Enjoyment/revitalisation	2.07 (1.05)	2.30 (1.06)	−2.19	0.03*
Negative health	2.32 (0.77)	1.99 (0.83)	4.15	0.00*
Health fitness	3.02 (0.81)	2.68 (0.93)	3.82	0.00*

*sig = significant at p <0.05.

TABLE 5 SE for exercise (means [*SD*])

	Nonactive (*n* = 51)	Low-active (*n* = 38)	High-active (*n* = 161)	ANOVA (*F*)	*p* value
SE for exercise	3.01 (0.90)	3.87 (0.88)	4.08 (0.88)	28.41	0.00*
Barriers to exercise	3.41 (1.03)	4.04 (0.71)	4.07 (0.91)	10.53	0.00*
Benefits of exercise	3.64 (0.85)	3.86 (0.54)	3.92 (0.77)	2.65	0.07
Impact of exercise on arthritis	3.50 (0.67)	3.93 (0.46)	4.06 (0.58)	17.84	0.00*

Abbreviation: SE, self-efficacy.
*sig. at p < 0.05.

Significant differences were seen across all categories of the EMGI questionnaire when nonactive and high-active groups were compared. These findings are in line with previous research which supports the positive association of social support and PA (Dacey, Baltzell, & Zaichkowsky, 2008; Damush, Perkins, Mikesky, Roberts, & Dea, 2005) and being motivated for health and fitness reasons (Petursdottir et al., 2010). The findings from this study suggest that being active with others and being active to maintain good health and flexibility, are highly valued in this population and align with findings from similar studies (Hurley et al., 2010; Ledingham et al., 2019).

Further analysis revealed significant differences between the nonactive and low-active subgroups, specifically in the areas of enjoyment (e.g., 'I exercise because I find exercise satisfying in and of itself') and health/fitness reasons (e.g., 'I exercise because I want to maintain good health'). This subgroup analysis highlights both the importance of identifying activities that are enjoyable (and avoiding those that are not) and the potential health benefits of being active. It provides evidence to suggest that a small change from nonactive to being active on just one day per week could change how people feel and are motivated to be active over the long term. These findings align well with literature reporting similar findings (Holden et al., 2012; Petursdottir et al., 2010), are consistent with intrinsic forms of motivation and concur with previous literature which has found associations between these motive areas and increased participation in PA (Ingledew, Markland, & Strömmer, 2013; Teixeira et al., 2012). Conversely, these findings also highlight the potential drawbacks of attempting to design interventions where one size fits all, and provide evidence against using this approach, despite its on-going use in many existing healthcare interventions.

In this study, a higher gain score compared with motive score for the same question (i.e., motive ['I might exercise to build up my strength'] and gain ['my experience of exercise has been that it has helped me to get stronger']) suggests that participants gained more than they originally expected. This is an important implication when considering specific content for behaviour change interventions and strategies (i.e., success stories about unexpected gains and from active people). Enhancing positive outcome expectations might motivate those with OA to maintain their PA participation, therefore it could be worthwhile educating participants about potential positive outcomes early on in an intervention (Damush et al., 2005). In this study, people

with OA who were physically active felt that they gained more than originally anticipated in the areas of social engagement and enjoyment/revitalisation. A similar study adopting the EMGI to measure motives and gains for a sample attending community dance fitness classes also reported enjoyment/revitalisation as being a top perceived gain (Kimbrough, Rosselli, & Crutcher, 2017). According to SDT, enjoyment and social engagement are important for fostering autonomous and intrinsically focused motivation. Gain scores for appearance/weight management, negative health and health/fitness were lower than corresponding motive scores, suggesting that in this sample, not all motives were met with positive outcomes. Further research might focus on the reasons why motives were not met with more positive gains in these categories, particularly around the area of health/fitness (i.e., maintaining good health, building up strength and maintaining flexibility). Learning more about this mismatch between motives and gains might help our understanding of why people with OA may discontinue an activity and provide additional insight into the expectations and values held by people with long-term musculoskeletal (MSK) conditions.

In line with previous research in people with arthritis (Gecht et al., 1996), in this sample, those who were most active believed in the positive benefits of exercise and had higher SE for exercise. The greatest difference in scores between the nonactives and high-actives was in the 'self-efficacy for exercise' category, suggesting that the most active in the sample had the greatest confidence about their ability to exercise. Previous research support these findings. Hurley et al. (2010) and Petursdottir et al. (2010) found that believing in exercise as a beneficial part of OA treatment was a facilitator. Other studies have described how having positive expectations about the benefits of exercise influences exercise motivation and therefore participation (Damush et al., 2005), and equally that uncertainty about the benefits of exercise is linked with a lack of activity (Holden et al., 2012).

The findings in this study, however, do not tell us if higher levels of SE encouraged people to become more active, or if being more active, resulted in higher levels of SE. The data show a correlation of the two variables in this instance, but causal assumptions cannot be made. It is less clear how the two variables interact over a period of time and how any changes in one variable might affect the other. The additional subgroup analysis was able to highlight where significant differences were present, notably between those who were low-active and high-active: beliefs were stronger for those who reported higher levels of activity. Surprisingly, the subcategory 'benefits of PA' was not significantly different across PA subgroups, with mean scores very similar across groups (3.64 [nonactives] to 3.92 [high-actives]). This suggests that the whole sample had positive beliefs in the potential benefits of PA, but what differentiates the subgroups is the finding that only those who were currently active held the belief that they were capable of carrying out a specific activity. This important finding highlights that belief in your own ability to carry out a specific activity (SE) might be more important than having more general beliefs in the potential benefits of PA for OA. Again, this is a key consideration for intervention developers.

4.1 | Strengths and limitations

Two aspects of this study distinguish it from previous motivation and SE research in the OA population. To our knowledge, this is the first time that the EMGI questionnaire has been used in this population, making this study unique in providing us with information about what motives, and importantly, gains from PA, are present in a group of people with OA. It also evaluated how these motives and gains varied across different PA levels. Second, the additional analysis of SE included a comprehensive assessment of the subcategories of the ESE scale, producing new evidence about specific elements of SE and how these might affect levels of PA in this population.

Limitations of the study include the self-reported nature of PA levels, as well as data being collected at one point in time. Additionally, the majority of the sample was highly active, (active on four or more days per week); it would have been advantageous to have a more balanced sample in this respect. The education level within the sample was high, with over 70% having attended college, university or graduate school. A sample with a more balanced level of education would have been more representative of the general OA population. Future studies should attempt to gain a more representative sample, with regards to both education and PA level. Finally, socioeconomic status was not measured in this study. This would be a highly valuable addition to future studies, particularly given the importance of focusing on mechanisms which can help to narrow health inequalities across the wider population.

5 | CONCLUSION

This study has produced new knowledge about which motives, gains and levels of SE are present in a group of people with OA, highlighting key areas to focus on when developing and delivering interventions and strategies for facilitating engagement with PA in this population. Future behaviour change interventions should aim to foster increased SE for PA and promote autonomous forms of motivation by emphasising the importance of choosing activities which are enjoyable, as well as highlighting the value of social engagement and being active with others.

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CONFLICTS OF INTEREST

The authors report no conflict of interest.

ORCID

Alice Berry https://orcid.org/0000-0002-3863-6835
Candy S. McCabe https://orcid.org/0000-0002-3593-0027
Serena Halls https://orcid.org/0000-0002-0737-8255
Nicola Walsh https://orcid.org/0000-0002-0499-4829

REFERENCES

Arthritis Research UK. (2018). State of Musculoskeletal Health *2018*.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215. https://doi.org/10.1037//0033-295x.84.2.191

Bennell, K. L., Dobson, F., & Hinman, R. S. (2014). Exercise in osteoarthritis: moving from prescription to adherence. *Best Practice & Research Clinical Rheumatology*, *28*(1), 93–117. https://doi.org/10.1016/j.berh.2014.01.009

Bennell, K. L., & Hinman, R. S. (2011). A review of the clinical evidence for exercise in osteoarthritis of the hip and knee. *Journal of Science and Medicine in Sport/Sports Medicine Australia*, *14*(1), 4–9.

Brittain, D. R., Gyurcsik, N. C., McElroy, M., & Hillard, S. a. (2011). General and arthritis-specific barriers to moderate physical activity in women with arthritis. *Women's Health Issues*, *21*(1), 57–63. https://doi.org/10.1016/j.whi.2010.07.010

Dacey, M., Baltzell, A., & Zaichkowsky, L. (2008). Older adults' intrinsic and extrinsic motivation toward physical activity. *American Journal of Health Behavior*, *32*(6), 570–582. https://doi.org/10.5555/ajhb.2008.32.6.570

Damush, T. M., Perkins, S. M., Mikesky, A. E., Roberts, M., & Dea, J. O. (2005). Motivational factors influencing older adults diagnosed with knee osteoarthritis to join and maintain an exercise program. *Journal of Aging and Physical Activity*, *13*, 45–60.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Gecht, M. R., Connell, K. J., Sinacore, J. M., & Prohaska, T. R. (1996). A survey of exercise beliefs and exercise habits among people with arthritis. *Arthritis Care and Research*, *9*(10), 82–88.

Gyurcsik, N. C., Brawley, L. R., Spink, K. S., Brittain, D. R., Fuller, D. L., & Chad, K. (2009). Physical activity in women with arthritis: Examining perceived barriers and self-regulatory efficacy to cope. *Arthritis Care and Research*, *61*(8), 1087–1094. https://doi.org/10.1002/art.24697

Hammer, N., Bieler, T., Beyer, N., & Midtgaard, J. (2015). The impact of self-efficacy on physical activity maintenance in patients with hip osteoarthritis—A mixed methods study. *Disability and Rehabilitation*, *17*(March), 1–14. https://doi.org/10.3109/09638288.2015.1107642

Holden, M. A., Nicholls, E. E., Young, J., Hay, E. M., & Foster, N. E. (2012). Role of exercise for knee pain: What do older adults in the community think? *Arthritis Care & Research*, *64*(10), 1554–1564. https://doi.org/10.1002/acr.21700

Hurley, M., Dickson, K., Hallett, R., Grant, R., Hauari, H., Walsh, N., … Oliver, S. (2018). Exercise interventions and patient beliefs for people with hip, knee or hip and knee osteoarthritis: A mixed methods review. *Cochrane Database of Systematic Reviews*, *2018*(4). https://doi.org/10.1002/14651858.CD010842.pub2

Hurley, M. V., Walsh, N., Bhavnani, V., Britten, N., & Stevenson, F. (2010). Health beliefs before and after participation on an exercised-based rehabilitation programme for chronic knee pain: Doing is believing. *BMC Musculoskeletal Disorders*, *11*, 31. https://doi.org/10.1186/1471-2474-11-31

Ingledew, D. K., Markland, D., & Strömmer, S. T. (2013). Elucidating the roles of motives and gains in exercise participation. *Sport Exercise and Performance Psychology*, *3*(2), 116–131. https://doi.org/10.1037/spy0000004

Kanavaki, A. M., Rushton, A., Efstathiou, N., Alrushud, A., Klocke, R., Abhishek, A., & Duda, J. L. (2017). Barriers and facilitators of physical activity in knee and hip osteoarthritis: A systematic review of qualitative evidence. *BMJ Open*, *7*(12), 1–11. https://doi.org/10.1136/bmjopen-2017-017042

Kimbrough, S., Rosselli, A. C., & Crutcher, T. (2017). Use of the exercise motives and gains inventory in dance fitness. *Physical Activity Review*, *5*, 188–195.

Ledingham, A., Cohn, E. S., Baker, K. R., Keysor, J. J., Ledingham, A., Cohn, E. S., … Keysor, J. J. (2019). Exercise adherence: Beliefs of adults with knee osteoarthritis over 2 years. *Physiotherapy Theory and Practice*, *17*, 1–16. https://doi.org/10.1080/09593985.2019.1566943

Markland, D., & Ingledew, D. K. (1997). The measurement of exercise motives: Factorial validity and invariance across gender of a revised Exercise Motivations Inventory. *British Journal of Health Psychology*, *2*, 361–376.

Marks, R. (2014). Self-efficacy and arthritis disability: An updated synthesis of the evidence base and its relevance to optimal patient care. *Health Psychology Open*, *1*. https://doi.org/10.1177/2055102914564582

McAuley, E., Lox, C., & Duncan, T. D. (1993). Long-term maintenence of exercise, self-efficacy, and physiological change in older adults. *Journal of Gerontoloy: Psychological Sciences*, *48*(4), 218–224.

Murray, C. (2018). Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: A systematic analysis for the Global Burden of Disease Study 2017. *Lancet*, *392*, 1789–1858. https://doi.org/10.1016/S0140-6736(18)32279-7

Peeters, G. G., Brown, W. J., & Burton, N. W. (2014). Psychosocial factors associated with increased physical activity in insufficiently active adults with arthritis. *Journal of Science and Medicine in Sport/Sports Medicine Australia*, *18*(5), 558–564. https://doi.org/10.1016/j.jsams.2014.08.003

Petursdottir, U., Arnadottir, S. A., & Halldorsdottir, S. (2010). Facilitators and barriers to exercising among people with osteoarthritis: A phenomenological study. *Physical Therapy*, *90*(7), 1014–1025. https://doi.org/10.2522/ptj.20090217

Rausch Osthoff, A. K., Niedermann, K., Braun, J., Adams, J., Brodin, N., Dagfinrud, H., … Vliet Vlieland, T. P. M. (2018). 2018 EULAR recommendations for physical activity in people with inflammatory arthritis and osteoarthritis. *Annals of the Rheumatic Diseases*, *77*(9), 1251–1260. https://doi.org/10.1136/annrheumdis-2018-213585

Slovinec D'Angelo, M. E., Pelletier, L. G., Reid, R. D., & Huta, V. (2014). The roles of self-efficacy and motivation in the prediction of short- and long-term adherence to exercise among patients with coronary heart disease. *Health Psychology*, *33*(11), 1344–1353. https://doi.org/10.1037/hea0000094

Strömmer, S. T., Ingledew, D. K., & Markland, D. (2015). Development of the exercise motives and gains inventory. *Measurement in Physical Education and Exercise Science*, *19*(2), 53–68. https://doi.org/10.1080/1091367X.2015.1036162

Stubbs, B., Hurley, M., & Smith, T. (2015). What are the factors that influence physical activity participation in adults with knee and hip osteoarthritis? A systematic review of physical activity correlates. *Clinical Rehabilitation*, *29*(1), 80–94. https://doi.org/10.1016/j.archger.2014.06.006

Tabachnick, B., & Fidell, L. (2014). *Using mulitvariate statistics* (6th ed.). Pearson Education Limited.

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity*, *9*(1), 78. https://doi.org/10.1186/1479-5868-9-78

Walsh, N. E., Pearson, J., & Healey, E. L. (2017). Physiotherapy management of lower limb osteoarthritis. *British Medical Bulletin*, *122*(1), 151–161. https://doi.org/10.1093/bmb/ldx012

Williams, S. L., & French, D. P. (2011). What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour—And are they the same? *Health Education Research*, *26*(2), 308–322. https://doi.org/10.1093/her/cyr005

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