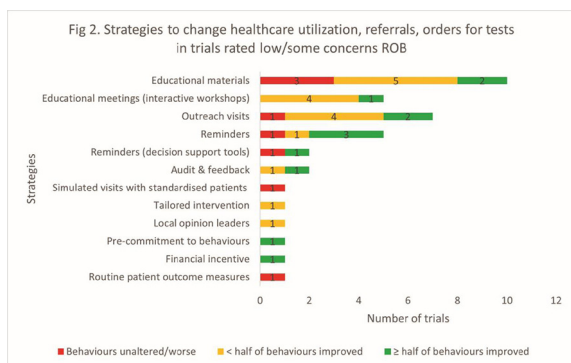
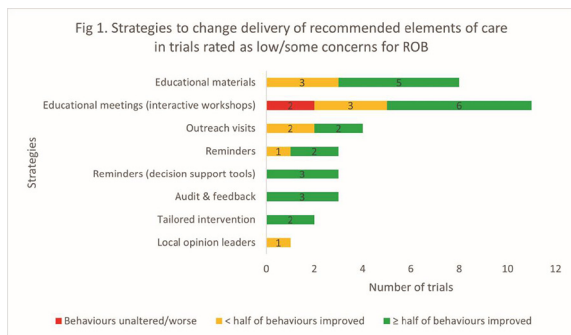


interventions that featured several different types of strategies to change professional behaviours. There were 22 different combinations of strategies used in multifaceted interventions across the 28 RCTs. Five trials assessed the effects of one strategy alone (three trials assessed educational meetings, one assessed reminders). The measures of HP behaviours varied widely across the studies, including referrals for service providers and investigations, healthcare utilisation, performance indicators, patient/practitioner-reported use of best-evidence care. ROB assessment rated 8 trials as low, 15 some concerns and 5 with high ROB. Of the 23 trials rated low or some concerns for ROB, 5 reported no effects on HP behaviours. There was high between-trial heterogeneity for the strategies used and outcomes assessed, making comparisons across the trials challenging. Figures 1 and 2 summarize the results of the 23 trials rated as low and some concerns for ROB. The results were categorised into three outcome groups: most HP behaviours improved ($\geq 50\%$), some HP behaviours improved ($< 50\%$), and no HP behaviours improved (same or worse). These results were mapped to the types of strategies used according to the EPOC taxonomy. Figure 1 shows the results of strategies that aimed to change the delivery of elements of recommended care (e.g., provision of patient education, advice, exercise programs). Figure 2 summarizes the results associated with strategies that aimed to change healthcare utilization, referrals and orders for tests (e.g., increased referrals for physiotherapy, reduced referrals to specialists and orders for imaging). Overall, the strategies most frequently associated with improved HP behaviours were educational materials, educational meetings, outreach visits, reminders and audit and feedback. There was very little evidence available regarding the effects of:

HP focused behaviours- pre-commitment to behaviours, tailored interventions;
 organisational strategies- local opinion leaders, standardised patients with feedback;
 system/policy incentives- financial incentives.

Conclusions: Most strategies designed to change HP behaviors associated with non-pharmacological, non-surgical management of OA and SP had some effects, but it was unclear which strategies were most successful in creating change. A range of different strategies demonstrated effects on HP behaviors, including educational materials, educational meetings, outreach visits, reminders, and audit and feedback but there remains a paucity of evidence for the effects of some other strategies and how best to select strategies to optimize outcomes.



V-532

MODERATORS OF THE EFFECT OF THERAPEUTIC EXERCISE FOR PEOPLE WITH KNEE AND/OR HIP OSTEOARTHRITIS: AN INDIVIDUAL PARTICIPANT DATA META-ANALYSIS

M.A. Holden¹, M. Hattle¹, J. Runhaar², R. Riley¹, E. Healey¹, J. Quicke¹, D. van Der Windt¹, K. Dziedzic¹, M. van Middelkoop², D. Burke¹, J. Brown¹, C. Ingram¹, R. Taylor¹, C. Walker¹, N. Corp¹, A. Legha¹, S. Bierma-Zeinstra², N.E. Foster³, the OA Trial Bank Exercise Collaborative¹ Keele Univ., Keele, United Kingdom; ²Erasmus MC, Rotterdam, Netherlands; ³Univ. of Queensland, Brisbane, Australia

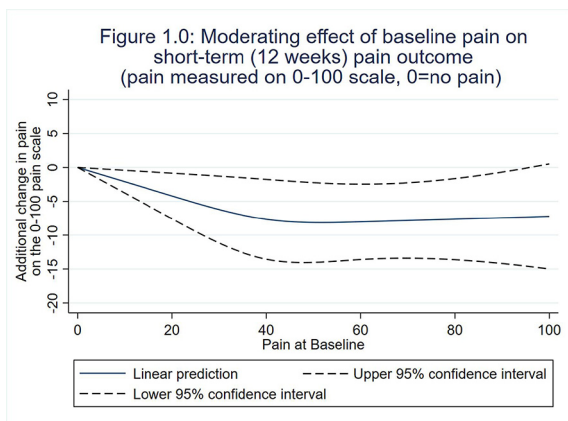
Purpose: International clinical guidelines consistently recommend therapeutic exercise as a core treatment for people with osteoarthritis (OA). However, the average effect sizes for pain and physical function observed within randomised controlled trials (RCTs) are small to moderate compared to non-exercise controls. This may be due to insufficient targeting of exercise to specific subgroups of people who are most likely to respond. This study aimed to identify moderators of the effect of therapeutic exercise for reducing pain and improving physical function in people with knee and/or hip OA.

Methods: Systematic review update and individual participant data (IPD) meta-analyses (PROSPERO: CRD42017054049). To identify RCTs that compared therapeutic exercise to a non-exercise control in people with knee and/or hip OA, the search strategy of a previous relevant systematic review was re-run to February 2019 in 10 electronic databases. Identified titles, abstracts and subsequent full texts were reviewed against inclusion/exclusion criteria by two independent reviewers. A third reviewer resolved disagreements. Risk of bias was assessed using the Cochrane Collaboration's tool (version 1.0). In collaboration with the international OA Trial Bank, trial leads were contacted and IPD requested. Consensus was gained among collaborators (trial leads who shared data and 5 patient representatives) on the most important potential moderators to investigate. Those available (including age, education, pain severity, physical function, duration of symptoms, radiographic OA severity, number of co-morbidities, mental well-being, arthritis self-efficacy, strength, and physical activity) were explored within IPD meta-analyses to determine whether they were associated with short- (12 weeks), medium- (6 months) and long-term (12 months) effects of therapeutic exercise on pain and physical function, in comparison to non-exercise controls. All meta-analyses used a two-stage approach, where estimates were obtained from a longitudinal model for each trial and then synthesised using a random-effects multivariate meta-analysis model that accounts for correlation across time-points. Continuous potential moderators were analysed in the longitudinal model using restricted cubic splines with three knot positions, to allow for non-linear relationships. All analyses were on intention-to-treat principle, with summary meta-analyses estimates reported as standardised mean differences with 95% confidence intervals.

Results: Of the ninety-two eligible RCTs, 37 IPD datasets were obtained. Following data checking, 31 IPD datasets (n=4089 participants) were included in our analyses. RCTs predominantly included participants with knee OA (n=18 RCTs, n=3125 participants), and tested heterogeneous therapeutic exercise interventions (in terms of exercise type, duration, and setting) versus heterogeneous non-exercise controls (education alone, usual general practitioner care, waiting list/ no treatment). Risk of bias varied; 13 (41.9%) RCTs were deemed low risk of bias across all domains assessed. Summary meta-analysis results showed that on average, compared to non-exercise controls, therapeutic exercise reduced pain on a standardised 0-100 scale (100 = worst pain), with a difference of -5.87 (95% CI: -8.19 to -3.55) in the short-term, -3.53 (95% CI: -5.78 to -1.29) in the medium-term and -3.29 (95% CI: -5.04 to -1.54) in the long-term. It also improved physical function on a standardised 0-100 scale (100 = worst physical function) (short term: -3.82, 95% CI: -5.56 to -2.08; medium-term: -2.21, 95% CI: -4.26 to -0.15; long-term: -2.92, 95% CI: -4.67 to -1.17). Baseline pain severity and physical function was found to moderate the effect of exercise on pain and physical function in comparison to non-exercise controls, although differences were small. Non-linear analysis revealed that people with baseline pain of 40/100 or higher, and those with baseline physical function limitations of 40/100 or higher had the greatest additional improvements from exercise in both pain and physical function compared to somebody who received exercise with a baseline score of 0 (see Figure 1.0 as an example for pain in the short-term). There was no evidence to suggest that any of the other

individual-level characteristics explored moderated the effect of exercise on pain or physical function at short-, medium-, and long-term follow-up.

Conclusions: This is the first IPD meta-analysis of RCTs of therapeutic exercise for people with knee and/or hip OA. Summary results showed small statistically significant overall improvements from therapeutic exercise for pain and physical function in the short-, medium-, and long-term in comparison to non-exercise controls. When investigating individual-level effect modifiers, we found a differential response to therapeutic exercise among some characteristics. Those with higher baseline pain and physical function limitations responded slightly better to therapeutic exercise compared to non-exercise controls. Other important moderators of exercise may exist, but were not detected within this study, in part due to lack of consistent measures of these in included RCTs and subsequently a low statistical power. Despite extensive effort, IPD from 53 RCTs was not obtained. Many included IPD datasets were small, and risk of bias was variable. Due to the heterogeneity of included therapeutic exercise interventions additional research is needed to further examine and compare the different characteristics of therapeutic exercise programmes in an IPD network meta-analysis accounting for the effect modifiers identified.



V-533

RANDOMIZED-CONTROLLED TRIAL TO EVALUATE A 12-WEEK APP- AND BRACE-ASSISTED EXERCISE INTERVENTION IN PATIENTS WITH KNEE OSTEOARTHRITIS

V. Dieter^{1,2}, G. Haupt^{1,2}, P. Janssen^{1,2}, I. Krauss^{1,2}. ¹Univ. Hosp. Tuebingen, Dept. of Sports Med., Tuebingen, Germany; ²Interfaculty Res. Inst. for Sports and Physical Activity, Tuebingen, Germany

Purpose: Exercise therapy is recommended by the international guidelines as a core treatment in patients with knee osteoarthritis (OA). However, there is a significant gap between recommendations and practice in health care. In this context, fully automated, digital applications (apps) could be increasingly used to allow participation in exercise programs independent of time and space. As knee braces increase the functional stability of the knee joint, they may be valuable as an exercise supportive device.

The aim of the study therefore was to evaluate the efficacy of a 12-week app-assisted exercise intervention with and without supporting knee brace compared to a control group without intervention in patients with knee OA. For the primary outcome, superiority of exercises versus control in terms of patient-reported pain reduction was examined. Secondary outcomes included further OA-specific complaints. An explorative sub-analysis was used to explore whether a brace may be useful as a treatment-supporting device.

Methods: Subjects with moderate or severe unicompartmental painful knee OA were included. Randomization was 1:1:2 into an intervention group (IG) with two subgroups (IG-A: app-assisted training, IG-AB: app-assisted training and axis-correcting knee brace) and a wait-list control (C). IG-AB had to wear the brace during training, further use was optional. The intervention included a 12-week home training program with three sessions per week. A total of five exercises including strengthening, mobilization, stretching and balance were performed in each session. Exercises were guided via an app and movement performance was monitored with two accelerometers placed below and

above the affected knee joint. OA-specific complaints were recorded using the Knee Osteoarthritis Outcome Score (KOOS, score range 0-100). Intervention effects were calculated using baseline-adjusted analysis of covariance (ANCOVA). In addition, effect sizes were calculated and interpreted according to Cohen.

Results: N=61 subjects (IG: n=30 thereof IG-A: n=15 and IG-AB: n=15; C: n=31; ♂=31; ♀=30; Ø age: 62.9 ± 8.5 years; Ø BMI: 27.7 ± 4.5 kg/m²) were included in the study. Baseline-adjusted post intervention scores indicated statistically significant differences for the primary outcome pain (F(1,52)=20.01, p=.000, η²=.278, see Image 1 and Table 1) as well as for the secondary outcomes (see Table 1) symptoms (F(1,52)=7.01, p=.011, η²=.119), activities of daily living (F(1,52)=15.56, p=.000, η²=.230), sports and leisure (F(1,52)=5.98, p=.018, η²=.103) and quality of life (F(1,52)=19.87, p=.000, η²=.277) in favor of the intervention group. Mean differences ranged from 10.0 to 13.2 points compared to the control group. According to Cohens d, effect sizes of 0.76 (pain and quality of life) indicate a moderate to large effect and 0.47 (sports and leisure), 0.53 (symptoms) as well as 0.64 (activities of daily living) a small to moderate effect. The subgroup comparison between IG-A and IG-AB demonstrated baseline-adjusted mean differences ranging from 4.7 to 12.1 points more in favor of the IG-AB group regarding the five KOOS categories, but without statistical between-group significance. Yet, the subgroup analysis provided a first indication for superiority of IG-AB vs. IG-A.

Conclusions: The study was able to demonstrate positive treatment effects of a fully automated, digital health app to guide a 12-week exercise program in terms of pain reduction as well as further OA-specific complaints. Comparable studies in the area of digital exercise therapy also showed statistically significant health effects regarding the outcomes of pain and physical functioning, but with a smaller effect size (0.2) and smaller absolute differences in baseline-adjusted post measures of the intervention group compared to control (3.5 to 7.7 points). It therefore seems promising to include digital apps in the treatment of knee OA and to support patients in their autonomous home training. Complementary studies should be conducted to examine the robustness of the results based on larger sample sizes. This is also important for first indications of an effective treatment support by wearing a supportive knee brace during training. Funding: The project was conducted in cooperation with the company Spornastic GmbH and was funded by this party.

V-534

THE EFFECTIVENESS OF EXERCISE BASED DIGITAL HEALTH INTERVENTIONS (REQUIRING INTERNET) IN MANAGEMENT OF HIP AND KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS.

I. Fan¹, D. Govil², A. Semciw^{3,1}. ¹Northern Hlth., Epping, Australia; ²Bass Coast Hlth., Wonthaggi, Australia; ³La Trobe Univ., Bundoora, Australia

Purpose: Osteoarthritis (OA) has a disproportionately significant effect on social, economic and healthcare domains. Systematic reviews and clinical guidelines indicate strong evidence for the management of OA through targeted exercise and education interventions. Throughout the COVID-19 pandemic, there has been a rapid increase in digital health utilization which has the potential to provide accessible, cost-effective and time-effective care. The aim of this study is to investigate the effectiveness of digitally delivered exercises in management of OA of the hip or knee.

Methods: Databases of PubMed, PEDro, EMBASE & CINAHL were searched with the concepts of "Osteoarthritis", "Digital" & "Randomised Controlled trials". Synonyms within each concept were search with the OR operator, and combined between concepts with the AND operator. Titles and abstracts were screened for eligibility by two reviewers [AS1] and conflicts were resolved by consensus, or a third reviewer. Articles were screened according to the following criteria: Participants- people with hip or knee OA; Intervention- had to include a form of exercise prescription being delivered digitally (requiring internet); Comparison- no intervention or comparison intervention; Outcome- pain was the primary outcome for this review. Full-texts of potentially eligible articles were screened by one reviewer and checked by a second. Means, standard deviations or 95% Confidence Intervals (CI) of post-test results were used to calculate standardised mean differences (SMDs). Data was stratified by time points, mode of delivery and OA type (knee or hip).