NONPHARMACOLOGIC TREATMENT OF MODALITIES IN THE TREATMENT OF ARTHRITIS: PATIENT EDUCATION, EXERCISE AND SOCIAL SUPPORT

Prepared by

Renée Elsbett-Koeppen, MSc
Elizabeth M. Badley, PhD

ACREU  The Arthritis Community Research and Evaluation Unit
The Arthritis and Immune Disorder Research Centre
The Toronto Hospital

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SUMMARY

Introduction: Nonpharmacologic treatment modalities are now increasingly being recognized as integral part of a treatment for arthritis. This report synthesizes literature on the effectiveness of:
- patient education programs
- exercise programs and exercise recommendations, including physiotherapy and occupational therapy as it pertains to exercise, and
- social support from family, friends, health professionals and support groups

Objective: The purpose of this report is to collate and to demonstrate by review of the literature the effectiveness of patient education, exercise (including PT and OT), and social support, as measured by a range of outcomes.

Methods: A literature search was performed using MEDLINE, EMBASE, CINAHL, HealthSTAR, and AgeLine databases. Additional articles were identified by examining reference lists of review articles and meta-analyses and hand searching 22 journals. The databases were searched for English language articles from 1986 to 1997. The findings were collated for 9 types of outcomes. These were: pain, functional disability, depression/anxiety/psychological impact, self-efficacy, physical activity level, tender joint count, health status, knowledge and health care utilization. Findings relating to the outcomes were recorded as positive, negative or no change.

Results: Patient education programs: 65 studies assessing arthritis patient education, 5 meta-analyses and 14 major review articles were found. Patient education programs based on the Arthritis Self-Management Program or based on behavioral theories appeared to reduce pain, improve functional ability and depressive symptoms, and promoted physical activity. The results suggest that patient education is beneficial as an adjunct therapy in the management of arthritis.

Exercise programs: Sixty-two articles were found evaluating exercise programs. Additionally, one meta-analysis and 24 major reviews were found about exercise programs for patients with arthritis. Evidence shows that in general exercise is beneficial in reducing pain, reducing functional disability and depression. Although the efficacy of exercise in general has been presented in a number of reviews, the consensus for one specific type of exercise program applicable to patients with arthritis was not found. However, current evidence suggests that exercise in any form is efficacious.

Social support programs: Thirty-five articles were found that investigated social support programs available to patients with arthritis. Only a few structured review articles discussing social support were found. No meta-analysis was available. Research in the efficacy of social support programs is very sparse. The results suggest that social support does not result in significant improvements in pain, functional ability or tender joint count, although there were some improvements in depression. Social support seemed to be most effective when combined with other treatment modalities as for example education programs or cognitive-behavioral therapy.

Conclusion: The results have shown that although there is some evidence of the efficacy of these treatment modalities much more work is needed to develop, standardize and evaluate programs so that their full potential can be realized.
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NONPHARMACOLOGIC TREATMENT MODALITIES IN THE TREATMENT OF ARTHRITIS: PATIENT EDUCATION, EXERCISE AND SOCIAL SUPPORT

Renée H. Elsbett-Koeppen and Elizabeth M. Badley

1. INTRODUCTION

Non-pharmacologic treatments such as patient education, exercise and weight loss programs, occupational and physical therapy, as well as social support programs are now generally accepted as part of the multidisciplinary approach to the treatment of patients with arthritis. This report synthesizes literature on the effectiveness of a) patient education programs, b) exercise programs and exercise recommendations, including physiotherapy (PT) and occupational therapy (OT) as it pertains to exercise and rehabilitation, and c) social support from family, friends, health professionals and support groups. The topics of alternative/complementary medicine or treatments recommended by health professionals and non-traditional treatments and remedies that are used by arthritis patients without prescription are beyond the scope of this paper.

2. OBJECTIVE

The purpose of this report is to collate and to demonstrate the effectiveness on a range of outcome measures of generally accepted alternative treatments such as patient education, exercise (including PT and OT as well as rehabilitation), and social support by review of the literature.

3. METHODS

A literature search was performed using MEDLINE, EMBASE, CINAHL, HealthSTAR, and AgeLine databases to retrieve studies that dealt with the three major nonpharmacologic treatment modalities for arthritis patients: patient education, exercise and social support. Relevant PT and OT were either included in the patient education (e.g., teaching patients how to use assistive devices) or in the range of motion (ROM) and strengthening exercise sections as applicable.

The search strategies employed were combinations of arthritis (e.g., arthritis, rheumatoid arthritis, rheumatic diseases, osteoarthritis, fibromyalgia) with patient education, social support (group, family, spousal), exercise programs and any type of exercise forming part of rehabilitation therapy recommended to patients with arthritis (e.g., PT, OT), alternative or complementary medicine or therapies, weight loss recommendations, including diet and nutrition, and obesity. The articles found were divided into individual papers, review articles and meta-analyses and grouped according to treatment modality. Reference sections of meta-analyses, review articles and other primary research articles were cross-checked with the individual trials retrieved through the database searches. The majority of the articles that had not already been identified were added to the applicable modality listings.

The literature search was restricted to articles published between 1986 to 1997, and to articles under local holdings. Journal articles that could be obtained through inter-library loans were also included. Non-English publications were excluded. To include articles not listed in the searched databases, the following journals were

Individual studies, review articles and meta-analyses that are included in this report are listed separately (Appendix A, B, and C). Individual studies/papers assessed by the meta-analyses or examined in the review articles were flagged when listed in the tables.

Evidence of effectiveness was based on the papers found through the literature searches. The conclusions drawn by the authors' of the reviews and/or meta-analyses were used to support the evidence when applicable. It should be noted that the reviews and meta-analyses published from 1986 to 1997 utilized articles that were published prior to 1986.

For reporting on the effectiveness of the modalities nine types of relevant outcome measures were chosen: pain, functional disability, depression/anxiety/psychological impact, self-efficacy, physical activity level, tender joint count, health status, knowledge, and health care utilization. The selection of the outcome measures reflected the outcome measures used in the individual papers. Health status, as an overall type of outcome, was added since some of the individual studies selected health status as their main outcome measure without giving any subscale results. Knowledge was measured by the majority of the individual studies assessing patient education, thus it was included in this report, although no standardized knowledge measurement tools were used.

Health care utilization was added as an important type of outcome even though it was assessed by a small number of studies (less than 15%). Health status and knowledge measures were excluded when reporting the findings of the meta-analyses and knowledge measures were excluded for reviews. Only a few reviews and none of the meta-analyses covered health care utilization and cost savings in any detail. Only studies that assessed at least one type of outcome were included. The majority of outcomes were based on proven measurement tools such as visual analog scales for pain and the Center for Epidemiologic Studies Depression Scale (CES-D scale) or Beck Depression Inventory (BDI) for measuring depression. Outcome measures for functional disability the relevant subscales of established measures such as the Arthritis Impact Measurement Scales (AIMS) or the Health Assessment Questionnaire (HAQ). The reliability and validity of these scales have been well established.

Physical activity level was operationalized as improvements in walking distance, or a measurable increase in activities such as exercise. We have attached a footnote when additional explanations were required. Health care utilization was operationalized as cost savings (in S or %), or as a percentage decrease in physician visits or medication use.

To assist in managing the papers found, subcategories were made under the major headings, although these subcategories are not discussed in detail. Studies assessing education programs were summarized within each of the following categories: a) Arthritis Self-Management Program (ASMP) and ASMP type programs (Table A1.1), b) programs based on behavioral, psychosocial, and/or cognitive theories (Table A1.2), and c) other patient
education or self-care programs (Table A1.3). Papers for the exercise modality were grouped and summarized into aerobic conditioning exercise programs (Table B1.1), or strengthening and range of motion exercises programs (Table B1.2). Summaries of individual papers for social support and social support programs are shown in Table C1.1.

The synthesis is presented by the findings of 1) the individual articles/papers, 2) meta-analyses, and 3) review articles. Summary conclusions of the primary research articles are presented first, giving evidence to the level of effectiveness (Table 1-5). Meta-analyses, to quantify effectiveness, and reviews were used as a secondary source (Table A2, A3, B2, B3, & C2).

Tables listing the results of the meta-analyses (Table A2, B2) give the estimated effect size for each type of outcome (where applicable) and their confidence intervals (where available). Table content for the review articles (Table A3, B3, & C2) includes the approximate number of articles referenced in the main body of the review. The direction of change is depicted by an up arrow indicating an increase (may indicate improvement or deterioration depending on outcome measure) or down arrow indicating a decrease (again may indicate improvement or deterioration depending on outcome measure). Both arrows together indicate mixed results. Percentage change, if available, and the direction of change are shown in the tables for each individual trial.

It should be noted that the published papers/studies were not ranked according to any pre-defined ranking system (e.g., ranking system used by the Cochrane Collaboration). Nevertheless, we tried to present the papers in the order based on generally accepted 'scientific evidence' rules. Randomized controlled trials (RCTs) represented the strongest evidence, non-randomized controlled trials and intervention trials that provided baseline and post intervention data (pre/post) formed the next evidence level, and all others were categorized into the lowest level. Consequently, this report is not a critical or systematic evaluation of the presented studies.

The results and discussion sections are divided into sub-sections that present the results applicable to each modality. For each of the treatment modality covered, we list the proportion of each type of outcome: we counted the number of studies using the type of outcome by significant and non-significant positive as well as negative results. Additionally, we give the number of studies where the outcome did not change or the result was inconclusive (Tables 1-5). Figures 1-8 depict the proportion of studies that measure the type of outcome and the proportion of studies that show a significant improvement. The results of meta-analyses (where available) and reviews are given for each treatment modality and each type of outcome (Table A2, A3, B2, B3, C2).

4. RESULTS

4.1 Patient Education

Arthritis patient education programs include for example teaching self-management, self-care, and pain coping strategies based on different types of models (e.g., behavioral therapy model, biofeedback models). Looking at recent publications, arthritis patient education programs cover a range from community-based arthritis education programs to multi-modal pain management and relaxation/visualization techniques (Lorig et al, 1993; Taal et al, 1996).

In total 65 individual studies examining patient education as their main focus were found. The studies and the type of outcomes that were examined are given in appendix A. Thirty-nine of the studies (60%) were RCTs, eight (12%) were controlled trials (CT), and the remainder (28%) of the trials had a pre/post design.
Five meta-analyses and 14 major review articles about patient education were found in total. The meta-analyses and review results and type of outcome are listed in Appendix A. Most of the meta-analyses and reviews covered pain, functional disability and depression; one meta-analysis excluded depression and another excluded functional disability. Additionally, all reviews discussed other outcomes such as self-efficacy and physical activity level. However, health care utilization was not examined by any of the meta-analyses, and only one review (Wegener et al, 1996) indicated cost savings with regards to health care utilization.

As previously stated, improvements in physical activity levels were based on improvements in walking distance or in a measurable increase in activity such as exercise. Symptom indicators, as for example tender joint count, were discussed in terms of improvements, or maintaining, health status at post intervention by the majority of review articles. Some reviews addressed health care utilization and associated cost savings in general terms.

4.1.1 Pain

Forty-eight (74%) studies examined pain as one of their primary outcomes, and 52% of studies showed that pain decreased significantly (Table 1; Figure 1). When percent estimates were given, pain was reduced by 14 to 27%. Three papers reported non-significant reductions in pain, 11 reported that pain had not changed and none of the studies found an increase in pain measurements. It can be concluded that patient education is successful in pain reduction.

Table 2 presents the number of studies showing significant improvements in pain measurements based on Arthritis Self-Management Program (ASMP), behavioral, and other patient education interventions. Figures 2, 3 and 4 show the differences (in %) in significant improvements according to the type of intervention: ASMP and behavioral interventions have similar positive outcomes (80% and 86% respectively) compared to other education programs (28%). Lorig et al (1987) found 79% of the ASMP studies assessing pain were successful.

These conclusions are supported by the results of the meta-analyses. Pain measurements were used by all the meta-analyses in order to calculate mean effect sizes (Table A2). The mean effect sizes of arthritis patient education intervention for pain fell between 0.13 (Hawley et al, 1995) and 0.48 (Basler et al, 1993), and the most recent meta-analysis published (Superio-Cabuslay et al, 1996) showed a mean effect size of 0.21. No clear tendency was found whether the intervention was more efficacious for RA patients or for patients with OA. For example, the effect sizes for RA patients were as low as 0.13 and as high as 0.48, and the overall effect size for OA patients was found to be 0.44 (Hawley et al, 1995).

This is in accordance with the results shown by Goeppinger and Lorig (1997) and Taal (1996) (Table A3) that Arthritis Self-Management Programs and pain management based on cognitive-behavioral treatments have shown to result in a significant reduction of pain. This was also supported by Wegener et al (1996), citing that the studies with the largest effect sizes were studies utilizing cognitive-behavior therapy and self-management and/or support interventions.

Summaries of patient education intervention studies by Hirano et al (1994) indicated that patient education interventions improved pain outcome measures in 86% of the studies, with 50% of the studies reaching significance. In one of the earlier reviews (DeVellis & Blalock, 1993), the evidence was already mounting about the utility of cognitive-behavioral techniques used as the basis for patient education in bringing about positive changes in pain measurements.
4.1.2 Functional Disability

Thirty-seven articles (57%) assessed functional disability as outcome. Although the improvement in functional ability was about 30 percent overall, examination of ASMP and behavioral programs indicated that improvements for both programs were close to 40 percent. Other education programs had less than 20 percent significant improvements in functional ability (Figure 1-4; Table 1. 2).

A decrease in functional disability or no change in disability (13 studies out of 65), as shown in Table 1, is in itself an indication that patient education is an effective intervention (in over 50% of the studies) since functional disability is expected to increase over time. Only two papers indicated an increase in disability for RA patients. Percentage decreases, when given, were from 9% to 18%.

The mean effect size for functional disability was stated as low as -0.16 for RA patients and as high as 0.28 for patients with OA (Hawley et al, 1995) (Table A2). Most of the mean effect size values fell into the low, positive range (Mullen et al, 1987; Superio-Cabuslay et al, 1996). While a slow deterioration associated with disease progression can be expected, both improving disability or maintaining the same level of disability can be considered a success and the low values (Kazis et al, 1989) of the presented mean effect sizes may be clinically significant (Taal et al, 1996).

Of the 10 studies cited by Hirano et al (1994), 70% of the studies showed positive changes in functional disability and 30% of the studies (3 studies) had significant improvements indicating that patient education interventions can improve health status in general and disability in specific cases and/or patients (Table A3). Our findings, with a larger number of studies, are not as optimistic (Table 1; Figure 1).

4.1.3 Depression/Psychological

Thirty-five (54%) articles listed depression as one of their primary outcomes. Almost two thirds of the studies showed a decrease in depression, with one study reporting this improvement to be as much as 14% (Table A1.1).

The observed mean effect sizes ranged from 0.01 for RA and 0.56 for OA patients (Hawley et al, 1995), and an effect size of 0.28 (95% CI (0.15, 0.42)) for arthritis overall (Mullen et al, 1998; Kol et al, 1997). Estimated effect sizes for community samples were 0.12 (Hawley, 1995) and 0.59 for AS patients (Basler, 1993) (Table A2).

Wegener et al (1996) found that a 22% improvement in depression at post education intervention was not uncommon (Table A3). A summary listing of patient education studies, listed according to their main program goals (e.g., changing behavior, changing psychosocial status, and/or changing health status), showed 63% of the studies measuring depression had significant positive changes, and all (100%) of the studies had positive changes in depression measurements (Hirano et al, 1994). The numbers quoted by DeVellis & Blalock (1993) were more moderate with 53% of studies reporting success in changing depression.

4.1.4 Self-Efficacy

Only 25 (38%) papers assessed self-efficacy. Of those 25 papers, 80% showed an increase in self-efficacy; two papers indicated increases in self-efficacy of 17% and 22% (Table 1; Figure 1).

Hawley et al (1995) found the mean effect size at post patient education intervention for self-efficacy to be in the range of -0.03-0.41 (0.04-0.64 at follow-up) (Table A2). Although no causal effect could be established, Taal (1996) remarked that health status was significantly correlated with self-efficacy, thus indicating that
health status (pain, disability and depression) may be influenced by self-efficacy (Table A3). Adding a component to a self-management program directed to enhance self-efficacy may result in a more effective education program in terms of health status improvements (Wegener et al., 1996).

4.1.5 Physical Activity Level

Physical activity level was examined by 20 (31%) of the articles (Table 1; Figure 1). Activity levels increased overall, by as much as 39% in some cases.

Effect sizes for physical activity levels were not available because they were not examined or calculated by the authors of the meta-analyses. However, some of the educational interventions included an exercise component: mean effect sizes for exercise interventions will be covered later in this report when the efficacy of individual exercise programs are examined.

Overall, at long-term follow-up (14 months) the positive effects on the practice of physical exercise had remained (Taal et al., 1996) (Table A3). Of the 11 studies measuring changes in behavior about activity levels (e.g., exercise), 91% resulted in positive behavioral changes with 6 out of the 11 studies (55%) reaching significance (Hirano et al., 1994). In comparison, our findings indicate that 75% of the studies assessing physical activity level showed a significant improvement (Table 1).

4.1.6 Tender Joint Count

Only 14 (22%) of the individual studies counted tender or swollen joints. In general, tender joint count decreased (50%) or were not changed by patient education intervention (Table 1; Figure 1).

One meta-analysis determined the mean effect size for tender joint count (Superio-Cabuslay, 1996) (Table A2). The mean effect size calculated for tender joint count at post intervention reached 0.28 but the wide confidence interval (95% CI) of -0.93 to 1.49 indicated a heterogeneity that may have been based on either a small number of trials or a number of different study populations.

Taal (1996) found that cognitive-behavioral therapy (with family support) resulted in greater reductions in joint swelling and number of swollen joints (Table A3). Positive impact of patient education on the count of painful joints was also cited by Wegener et al (1996). Hirano et al (1994) showed that out of 6 studies, 83% (5 studies) had a significant improvement in the number of painful joints.

4.1.7 Health Status

Three out of nine studies indicated a significant improvement in health status. The remaining articles stated that health status had not changed (Table 1; Figure 1). It should be noted that only 14% examined health status as their primary outcome.

4.1.8 Knowledge

When knowledge was tested as part of the outcome measures it increased significantly as reported in 26 out of 29 papers. However, only 21% (14 papers) assessed knowledge.

4.1.9 Health Care Utilization

Fourteen articles (21%) covered health care utilization as part of their assessment, with 64% of these studies reporting significant cost savings. Medication use (30%) as well as physician/GP visits decreased significantly. The cost savings associated with health care ranged from 34 to 40% (Table 1; Figure 1).

The meta-analyses did not cover health care utilization in terms of cost savings or percentage changes in either physician visits, medication use
or any other utilization measurement (Table A2).

Wegener et al (1996) (Table A3) used a number of examples to demonstrate the impact of arthritis education on health care utilization and suggested further research concerning health care utilization so that the economic benefits of patient education for arthritis patients can be documented in more detail.

4.2 Exercise Programs

Sixty-two articles were found that evaluated exercise programs or exercise instructions as part of their therapy. Thirty RCTs (48%), 9 CTs (15%), I7 pre/post (27%), 3 (5%) cross-sectional, and 3 (5%) case studies are listed in the tables (Appendix B).

Thirty-six studies evaluated aerobic conditioning and 22 studies assessed ROM and strengthening exercises. ROM and strengthening exercise programs used fewer types of outcome compared to aerobic conditioning programs. Aerobic conditioning concentrated on pain (78%) and physical activity (83%) whereas ROM and strengthening exercises seem to concentrate less on pain (50%), physical activity level (50%) and depression (4%). Functional disability and tender joint count however were examined by both in almost equal proportion of studies (81%, 73% and 44%, 42% respectively). Overall, improvement in all areas were seen as the result of exercise interventions.

In total, one meta-analyses and 24 major review articles about exercise programs for arthritis patients were collated (Appendix B, Table B2, B3).

Most of the reviews covered physical and psychosocial health status assessments such as pain, disability, depression measurements, and activity levels (operationalized in terms of aerobic capacity, walking distance, or overall increase in exercise). Additionally, some reviews discussed topics such as self-efficacy and physical activity levels represented by improvements in strength or a measurable increase in ROM.

Health status at post intervention was discussed by the majority of review articles. Symptom indicators such as tender joint count were examined in terms of improvements in health status or in maintaining it. Some reviews addressed health care utilization and associated cost savings (Table B2).

4.2.1 Pain

How exercise interventions affects pain was assessed by 66% of the studies. Pain measures decreased significantly overall (in just over half of the studies). Others indicated that the pain measurements had not changed as result of exercise intervention or improvements were positive but not significant. One study suggested a 13% decrease in pain (Table 3; Figure 5). Table 4 gives comparisons between aerobic conditioning and strengthening and ROM exercise programs: 58% of studies had a significant improvement in pain after the aerobic conditioning program and 23% improvement was achieved after ROM and strengthening exercises. Significant improvements based on type of exercise program are presented in figure 6 and 7.

Rogers' meta-analysis (1996) did not evaluate or calculate the estimated effect size of exercise on pain (Table B2).

Most of the reviews indicated that there was an overall decrease in pain in the short term, stating that exercise has a positive impact on arthritic pain (Table B3). Puett & Griffin (1994) have estimated the decrease in pain to be between 6 to 14%. However, the long term effects of exercise programs have not been studied in detail so far and if studied are inconclusive.
4.2.2 Functional Disability

Forty-eight studies (77%) examined functional disability. The improvement in functional ability was significant in 36 of those studies and the improvement in functional ability ranged from 4.8% to 35%. Six study results showed a slight increase in functional ability and one study indicated that functional disability significantly increased. Five study outcomes stated that the status of functional disability was undetermined (Table 4, Figure 5).

Rogers (1996) assessed the functional disability in her meta-analysis and found an effect size of exercise of 0.4 (Table B2). This indicates a moderate improvement in functional ability (as for example, walking distance) as a result of an exercise program. Puett & Griffin (1994) estimated a 12-18% improvement in functional ability, other studies indicated a general improvement after an exercise program (Table B3).

4.2.3 Depression/Psychological

Only 17% of the studies examined the effect of exercise therapy on depression. Nine out of the 11 studies measuring depression or psychological effects showed a positive significant effect; two interventions resulted in a decrease that did not reach significance (Table 3; Figure 5).

Overall, exercise seems to have a small but positive effect on depression and other psychological symptoms, although there was considerable variation between studies (Table 3; Figure 5).

The effect size of exercise on depression was estimated as 0.3 (Rogers, 1996) (Table B2). Puett & Griffin (1994) estimated the decrease in psychological symptoms between 5 to 12% for arthritis (Table B3).

4.2.4 Self-Efficacy

Self-efficacy was rarely included in the exercise intervention strategy, but five out of the 7 papers indicated a significant increase in self-efficacy for the study participants (Table 3; Figure 5).

The meta analysis performed by Rogers did not look at self-efficacy and reviews mentioned self-efficacy associated with exercise only briefly (Stenstrom, 1994; Galloway & Jokle, 1993; Brander et al, 1992) (Table B3).

4.2.5 Physical Activity Level

Forty-three intervention studies (69%) investigated aerobic capacity or improvements in physical activity levels. As expected, the physical activity level increased significantly in most of the studies (32 studies), since increasing aerobic capacity or ROM and improvements in strength may be one of the goals of an exercise program (Table 3; Figure 5). Improvements ranged from 20 to 100% as stated in five studies (Table B1.1).

However, Rogers (1996) found only a moderate estimated effect size (effect size of exercise was 0.3) (Table B2). This was supported by other reviews (Table B3). The ranges for aerobic capacity increases and/or increases in the activity levels were stated as 12% minimum to 27% maximum. Increases of around 20% were most common.

4.2.6 Tender Joint Count

Tender joint count seemed to improve by exercise. Forty-four percent of the studies counted the number of joints affected by arthritis and in 27% of the studies the tender joint count decreased significantly. A minor decrease in tender joints was found in five studies and two studies found that the number of tender joints had increased, but the increase did not reach significance (Table 3; Figure 5).
These results are supported by the estimated effect size of 0.3. (Table B2). Ytterberg (1994) as well as Lyngberg et al (1988) found a decrease of 33% in tender joint count (Table B3).

4.2.7 Health Status

Only 14 (23%) studies investigated health status as one of their primary outcome measures and eight showed significant improvement (Table 3; Figure 5).

4.2.8 Health Care Utilization

Five studies (8%) investigated whether exercise intervention had an effect on health care utilization. Of the four studies, two showed a decrease in medication use, another one determined cost savings that did not reach significance and two studies showed results that were inconclusive (Table 3; Figure 5).

Health care utilization was not measured by Roger’s meta-analysis. But, health care utilization in terms of reduced medication use was found by Feinberg et al (1992) and others (Minor & Lane, 1996; Perrot & Menkes, 1996; La Mantia & Marks, 1995; Puett & Griffin, 1994; Minor & Sanford, 1993) (Table B3).

4.3 Social Support and Support Programs

Social support, such as information provision, emotional reassurance and assisting in tasks associated with the everyday ‘living with a chronic disease’ activities, has been accepted as an important link between the patient’s mental health, coping strategies (coping with the mental and physical symptoms of the disease), and the stressors associated with arthritis (Revenson & Gibofsky, 1995). Thus, social support provided by spouses, family members and friends as well as support services available through community initiatives (Elliot-Gibson et al, 1998) and The Arthritis Society have been found to be of fundamental importance to the well-being of a person with arthritis.

The range of social support services to facilitate better well-being range from telephone information/support lines, structured community-based programs and peer support groups to elaborate social support models.

Thirty-five articles were found that investigated social support. There are only 6 RCT trials (17%) and 2 (6%) pre/post trials listed in Table C1.1 (Appendix C). Most of the results presented were based on cross-sectional or cohort data.

Meta-analyses that evaluated studies dealing with social support issues were not available and only a few structured reviews specifically discussing social support groups or social support programs for arthritis patients were found (Appendix C, Table C2). Other reviews discussed social support as a fringe (or peripheral) benefit of other modalities such as patient education and exercise.

4.3.1 Pain

Of the 25 (71%) articles eight showed a significant improvement in pain measures or a decrease in pain. However, the remainder of the studies indicated that social support had made no difference (Table 3; Figure 8).

Reisine (1995) examined studies that assessed pain coping skills as well as health status as they relate to social support and found that family environment and positive family dynamics resulted in a reduction of pain and an increase in health status (Appendix C, Table C2). Krol (1993) also suggested that increased social support had a positive effect on pain. Conversely, other reviews did not show any impact of social support on pain (Revenson, 1993).

4.3.2 Functional Disability

It is documented that arthritis patients have functional limitations and social support may be
effective in alleviating some of these disabilities. Of the 25 (71%) studies assessing functional disability as part of their intervention evaluation, seven social support interventions resulted in a significant decrease. Two studies indicated a significant increase in functional disability and the remaining studies showed no difference (15 studies) or were inconclusive (1 study) (Table 5; Figure 8).

Reisine (1995) examined the family role and household functioning (being a major part of the family dynamics) of women with arthritis and have found that being part of a supportive social network improved functional ability and consequently improved family role functioning (Table C2). However, Revenson (1993) did not find any relationship between functional disability and social support. Krol's (1993) review found some impact of social support on disability but the overall results seemed to be inconclusive.

4.3.3 Depression/Psychological

Since there is a higher rate of depression among RA patients due to the inability to perform valued activities (Reisine, 1995), the support in these functions by the spouse, main caregiver, or family members is considered an important contribution to the general well-being of the RA patient (Appendix C, Table C2). Twenty-six (74%) studies assessed social support interventions, with 19 successfully reducing depression/anxiety (one study showed a non-significant decrease). The remaining studies did not change the depression/anxiety scores (Table 5; Figure 8).

As documented by Reisine (1995), Krol (1993) and Revenson (1993), depression decreased as RA patients received greater perceived social support. This is supported by Revenson & Gibofsky’s (1995) review results (Table C2).

4.3.4 Self-Efficacy

Nineteen (54%) studies examined self-efficacy. But, only seven social support interventions were successful in significantly increasing self-efficacy whereas for the remainder of the studies the outcome measure remained unchanged (Table 5; Figure 8).

However, Lanza and Revenson (1993) as well as Revenson (1993) examined several non-intervention studies and found that arthritis patients receiving more social support do exhibit greater self-esteem, report better psychological adjustment and seemed in general to cope more effectively with their illness (Table C2). Reisine's (1995) review showed that a supportive family and social network improved general illness coping skills. These findings are supported by Krol (1993).

4.3.5 Physical Activity Level

Out of four studies, only one showed an increase in physical activity, one indicated inconclusive results and the other two social support intervention did not show any difference in activity levels (Table 5; Figure 8).

Physical activity level in terms of increase in exercise was not reviewed, although it was briefly mentioned that physical and social activity decreased as the disease progresses towards disability (Table C2).

4.3.6 Tender Joint Count

Twenty (57%) studies investigated tender joint count as part of their intervention evaluation and only six showed an improvement whereas nine studies indicated no change. Five studies were inconclusive (Table 5; Figure 8).

Reviews covering the effect of social support on disease activity briefly reviewed tender joint count measurements (Revenson & Gibofsky,
1995; Lanza & Revenson, 1993; Revenson, 1993) (Table C2). Only Revenson (1993) and Krol (1993) found some evidence that social support has a positive effect on the number of tender joints (i.e., decrease).

4.3.7 Health Status

In nine papers (out of 19) health status significantly improved, with the remainder showing no difference in health status (Table 5; Figure 8).

4.3.8 Health Care Utilization

Three (9%) studies examined the cost savings and the costs involved in providing social support. Only one study showed a significant decrease in physician visits (Table 5; Figure 8).

None of the reviews assessed the impact of social support on health care utilization. However, Reisine (1995) briefly discussed the impact of arthritis on family dynamics and the cost implications pertaining to lost productivity in paid work and paid disability insurance (Table C2).

5. DISCUSSION

This report collated studies on individual modalities of patient education, exercise and social support published since 1986.

We found an almost equal number of studies that assessed the patient education and exercise programs (65 vs 62), but only half of the number of studies were available examining social support interventions (35 studies).

Patient education programs mainly concentrated on pain. Only half of the studies concentrated on functional disability, knowledge and/or depression. The other types of outcome measures were evaluated by less than 25% of the studies each (Table 1). In contrast, exercise programs were more likely to look at pain, functional disability and physical activity level (66%, 77%, 69% respectively). For social support programs, however, pain, functional disability, and depression were represented equally (71%, 71%, 74% respectively), with self-efficacy being assessed in 54%, health status in 54%, and tender joint count in 57% of the studies (Table 5).

It should be noted here that the types of outcome measures used, even for the same area of outcome, were rarely the same between different studies. This severely limits the capacity for meta-analyses or even comparisons.

5.1 Patient Education

Patient education programs based on the Arthritis Self-Management Program in general appeared to reduce pain, functional disability, and depressive symptoms. They also promoted physical activities thus increasing the physical activity level. This may be based mainly on the program’s structure, since the program includes exercise as one of their main goals/targets.

Clinical research indicates that treatment (including medication) can result in a 20-50% reduction of arthritis symptoms. An additional improvement in symptoms of 15-30% can be achieved through patient education programs in addition to standard medical care (HIRANO et al., 1994). More recent research shows that patient education interventions provide benefits that are 20-30% as effective in reducing pain as treatment by medication, 40% as effective in improving disability, and 60-80% as effective as NSAID treatment in reduction in tender joint count, leading to less physician consultations (Superior-Cabuslay, 1996). The data of the reviewed studies assessing patient education suggests that patient education is beneficial as adjunct therapy in the management of arthritis. It has also been suggested that these results provide a strong support for establishing patient education
programs as part of the standard arthritis care (Wegener et al, 1996).

The efficacy of arthritis patient education has officially been recognized by health care professionals. The U.S. National Arthritis Advisory Board agreed to initiate the development of arthritis patient education standards and to finalize them by the end of 1991 (Burckhardt et al, 1994).

In an extensive review of community-based Arthritis Patient Education Programs, Goepfinger and Lorig (1997) came to the conclusion that patient education in its standardized form are most effective when a) interventions are directed towards problems identified by patients, and b) were developed within theoretical and established frameworks as shown by the effectiveness of ASMP and behavioral programs.

Other patient education programs were difficult to evaluate because they were combined with other treatment modalities and it was difficult to establish which components of the program were more effective. As one of the authors stated: "...dissimilar programs may achieve their effects because of certain elements they share." (DeVellis & Blalock, 1993) and different programs may contain the same components and thus achieving the same effect in health status improvements.

It should be noted that, although there is some evidence for the effectiveness of arthritis patient education programs, the effect sizes were much smaller than those achieved by diabetes patient education. For diabetes programs teaching self-monitoring resulted in an estimated effect size of 0.50, diet education resulted in an effect size of 0.62, whereas diabetes education for compliance reached an effect size of 0.43 and enhanced patient education reached an effect size of 0.36 (Kok et al, 1997). These effect sizes may be the direct result of the structured and centered approach that is used to educate diabetes patients. Our results do not indicate which basic patient education program or module or which underlying theory was most effective. The components of each education program module need to be investigated separately, particularly to disentangle the passive and active components (i.e., increased activities). Basic patient education modules may have to be designed that provide a standardized patient education program for patients with arthritis. That module may be enhanced by additional, efficacious program modules to improve arthritis patient education even further. Consequently, it is imperative that the research studies assessing arthritis patient education be designed with a more focused approach. It is hoped that such programs may approach an efficacy similar to the diabetes education.

5.2 Exercise

Attitude towards exercise for people with arthritis has changed over the last 10 years. Evidence shows that in general exercise is beneficial in reducing pain and reducing functional disability. As the results presented in Table 3 and 4 show, exercise programs for people with arthritis have shown to result in significant improvements in pain (13%), functional disability (from 7 - 35%), and depression.

Current research suggests that exercise, for example ROM and flexibility exercises, muscular conditioning, as well as maintaining or achieving aerobic fitness, at any level or intensity, may be advantageous to the arthritic patients. Which exercise program is more applicable to which patient may depend on a number of factors associated with the patient's disease progression, age, and physical conditioning.

Although the efficacy of exercise in general has been presented in a number of review articles, the consensus for the efficacy of one specific exercise program or a specific type of exercise for people with arthritis was not found. Weak study designs
of some of the clinical trials prevented the endorsement of many of the proposed exercise programs (Bell et al, 1997). Also, there appeared to be a lack of evidence that effects of exercise can be sustained over longer periods of time.

Three exercise categories, based on their functional domain, were suggested by Minor and Lane (1996): 1) ROM and flexibility, 2) muscle strengthening, and 3) aerobic conditioning. These three groups of exercises may be applicable to people with arthritis.

ROM and muscle strengthening exercises have shown to improve or maintain joint flexibility and ROM. These exercises are low-intensive, active, self-assisted, use dynamic motion, and when performed daily will strengthen muscles, improve muscle endurance and power. Muscle capacity may also be improved with this type of exercise. This is supported by the results listed in Table 4. There is limited to moderate research-based evidence supporting the efficacy of ROM and stretching exercises, strength training and aerobic conditioning for patients with OA of the hip and/or knee. These types of activities were recommended as a key component of exercise programs for people with arthritis (Bell et al, 1997).

Aerobic conditioning exercises increased physical activity level, showed improvements in functional ability, and significantly reduced pain (Table 4). A small number of study results showed reduced tender joint count and a decrease in depression.

Walker and Helew (1996) stated that physical fitness is a useful concept for everyone and exercise can have the function of either to maintain physical health or to improve physical fitness. Since arthritis patients are often deconditioned and less fit than their healthy counterparts (Dexter & Broman, 1992), improving physical functions through fitness programs such as muscle strength exercises, flexibility exercises, muscle endurance and cardiovascular exercises as well as improving body composition, should be one of the goals for the arthritis patient.

Unfortunately, people with arthritis are a very heterogenous group and an exercise program designed for one patient may not be applicable to another. Some patients may not be in the best position or condition of participating in exercise programs, or performing some of the exercises may be too painful, whereas others may have the capability to exercise but do not show any interest. Which exercise program is the best for each arthritis patients depends largely on the exercise goals, the impairment and physical limitations, as well as the availability of community and/or financial resources. Thus, an exercise program should address each individual’s disease-related needs (Walker and Helew, 1996). In conclusion, there seems to be a division of opinion among researchers whether an exercise program needs to be individualized or a general exercise program can be advantageous for the arthritis patient as a whole. Current evidence suggests that exercise in any form is efficacious.

5.3 Social Support Programs

Social support, as for example providing information, emotional reassurance, and assisting in tasks associated with the everyday ‘living with a chronic disease’ activities, has been accepted as an important link between the patient’s mental health, coping strategies (coping with the mental and physical symptoms of the disease), and the stressors associated with arthritis (Revenson & Gibofsky, 1995).

Research in the efficacy of social support are very sparse. Results presented in Table C1.1 indicate that social support did not result in significant improvements in pain, functional disability or tender joint count. Improvements in depression were not as convincing as we might have
expected. However, no changes in any of the symptoms may indicated that social support may have a minor effect on outcome measures.

Meta-analyses that evaluated studies dealing with social support issues regarding arthritis patients were not available and only a few structured reviews specifically discussing social support were found. The review results indicated a positive impact of social support on depression and self-efficacy. However, the results also indicated that social support or social support programs are not as effective as education or exercise programs in terms of improving functional disability, pain, tender joint count, and physical activity level (if assessed).

Social support combined with patient education and/or cognitive-behavioral strategies, however, resulted in improvements in some of the health status measures and disease activity. Lanza & Revenson (1993) concluded that social support interventions may be used to enhance other treatment modalities, since social support as an adjunct to programs such as cognitive-behavioral therapy resulted in significant positive effects post-intervention and at follow-up (< 1 year).

Revenson & Gibofsky (1995) suggested that family members may have to be actively involved in the education and treatment process and social networks and their support function may be equally important to the arthritis patients as well as to their spouses or main caregiver. Also, strong support systems, including family members and friends, help in the rehabilitation process and result in better treatment adherence.

Results regarding family and social support were mixed. However, social support seemed to be the most effective when the support was combined with other treatment modalities as for example with education programs or cognitive-behavioral therapy. Revenson & Gibofsky (1995) concurred with this conclusion. They found that family support coupled with behavior therapy improved disease status at post treatment.

5.4 General limitation of this report:

The results presented in this report are based on a selection of primary research articles, meta-analyses and reviews published in the literature. Our synthesis as well as the meta-analyses and reviews may have been based on studies, and we have not been able to take into account any methodological weaknesses that limited the strength of the presented evidence. These weaknesses may include high attrition rates, small sample sizes, ambiguous or conflicting outcome measures, and/or lack of rigorous evaluation as well as the lack of stringent control over the measurement of the intervention effect and of intervening factors. This may be especially true for social support programs.

Not all published and eligible papers were included in this report because some of the papers were not available for review or examination. In addition, the more general concept of publication bias (the tendency to publish significant results) may be applicable. Some reviews may have been excluded since judgement was used in both the selection and interpretation of the review papers. Also, we did not assess the methodology and design of the meta-analyses or the reviews.

Finally, it is interesting to note that evidence from RCTs is lacking for social support as a treatment modality: most of the results were based on cross-sectional data. This may be the reason why no meta-analyses were found when conducting the literature search.

5.5 Implications for Future Work and Policy

5.5.1 The need for further work/research:

In a climate of economic constraint, it is imperative to examine the effectiveness of the three modalities covered in this report in terms of cost savings. The latter could relate both to
decreased health care utilization or to increased productivity.

More structured research is necessary so that the cost effectiveness can be documented. This would be facilitated by designing studies that use comparable outcome measures so that meta-analyses can be performed and efficacy established.

5.5.1.1 Patient Education:
It is recommended that research into patient education programs should be more focused. This research may produce evidence to indicate which patient education programs and underlying theories are most effective.

5.5.1.2 Exercise Programs:
Better quality research designs and longer follow-up periods are necessary for this modality. Exercise programs have to be designed and evaluated with specific goals concerning the progression of arthritis and disease type. Further work is needed to answer questions regarding the frequency, intensity, time and type of exercise that would be of maximum benefit at different stages of arthritis.

5.5.1.3 Social Support Programs:
Additional and more structured scientific research (e.g., RCTs) is needed for this treatment modality. To date the limited evaluation of the impact of social support has been more in terms of psychological well-being rather than symptom alleviation. Assessing the impact of social support on the reduction of pain associated with arthritis as well as the improvement of functional ability may be an area of great importance. The impact of arthritis on the family unit has largely been ignored so far. Research into the impact of arthritis on all family members including the primary caregiver has been neglected and must be included in the future.

5.5.1.4 Policy implications:
Health promotion and health education initiatives related to arthritis are currently not well coordinated and not universally available. Increased use of modalities such as health education and combined programs such as patient education and exercise, has the potential to reduce the burden in the population, together with associated health and community care costs. Therefore, a range of community support and rehabilitation services needs to be in place both for formal treatment and to facilitate ‘self-management’.

An important community-level provision is the availability of appropriate classes or other facilities that offer exercise programs appropriate for people with rheumatic disorders, including exercise in water.

5.5.1.5 Summary:
The purpose of this report was to collate and to document existing evidence of treatment modalities such as patient education, exercise programs (including OT and PT) as well as social support. The results have shown that there is some evidence of the efficacy of these treatment modalities, but it is clear much more work is needed using standardized outcomes and sound methodologies so that their full potential can be realized.
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kineestics during locomotor activities of daily living in subjects with knee arthroplasty and in 

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training in the management of osteoarthritic knee pain: A comparative study. *Behavior 
Therapy, 21*, 49-62.


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TABLES AND FIGURES
Table 1: Patient Education - All Programs (n=65)

<table>
<thead>
<tr>
<th>Type of Outcome</th>
<th>Number of Studies (%)</th>
<th>Positive Sign.</th>
<th>Non-sign.</th>
<th>Outcome No Change/No Difference</th>
<th>Negative Sign.</th>
<th>Non-sign.</th>
<th>Outcome inconclusive</th>
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<td>1.5*</td>
<td>0.5**</td>
<td>0</td>
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<td>Tender Joint Count</td>
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<tr>
<td>Health Care Utilization</td>
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<td>2</td>
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</table>

* Increase for OA, decrease for RA
** Non-sign. increase/decrease

---

Table 2: Patient Education Programs: Self-Management Programs (ASMP) (n=15), Behavioral (n=14) and Other Education Programs (n=36)

<table>
<thead>
<tr>
<th>Type of Outcome</th>
<th>ASMP Number of Studies (%)</th>
<th>Positive Sign. Outcome</th>
<th>Behavioral Number of Studies (%)</th>
<th>Positive Sign. Outcome</th>
<th>Other Number of Studies (%)</th>
<th>Positive Sign. Outcome</th>
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<td>13 (93)</td>
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</table>

* Increase for OA, decrease for RA
** Non-sign. increase/decrease
Table 3: Exercise Programs - All Programs (n=62)

<table>
<thead>
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<th>Outcome Measure</th>
<th>Number of Studies (%)</th>
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<th>No Change/ No Difference</th>
<th>Negative</th>
<th>Outcome inconclusive</th>
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<td>Functional Disability</td>
<td>48 (77)</td>
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<tr>
<td>Depression/ Psychological</td>
<td>11 (17)</td>
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</tr>
<tr>
<td>Self-Efficacy</td>
<td>7 (11)</td>
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<td>Physical Activity Level</td>
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Table 4: Exercise Programs - Aerobic Conditioning (n=36) and ROM & Strengthening Exercises (n=26)

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<th>Aerobic Conditioning</th>
<th>ROM &amp; Strengthening</th>
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</thead>
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<td></td>
<td>Number of Studies (%)</td>
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<td>Sign.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of Studies (%)</td>
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<td>Self-Efficacy</td>
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<td>Physical Activity Level</td>
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<td>Type of Outcome</td>
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</tr>
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<td>----------------------</td>
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<td>--------------------------</td>
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<td>Health Care Utilization</td>
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Type of Outcome - Patient Education Programs

% of significant positive changes (total studies n=65)

Figure 1
Type of Outcome - ASMP

% of studies measuring specified outcome and % of studies with significant positive outcome (total studies n=15)

Figure 2
Type of Outcome - Behavioral Programs

% of studies measuring specified outcome and % of studies with significant positive outcome (total studies n= 14)

Figure 3
Type of Outcome - Other Education Programs

% of studies measuring specified outcome and % of studies with significant positive outcome (total studies n= 36)

Figure 4
Type of Outcome - All Exercise Programs

% of significant positive changes (total studies n=62)

Figure 5
Type of Outcome - Aerobic Conditioning Programs

% of significant positive changes (total studies n=36)

Figure 6
Type of Outcome - ROM & Strengthening Exercises

% of significant positive changes and % of studies with significant positive outcome (total studies n=26)

Figure 7
Type of Outcome - Social Support

% of studies measuring specified outcome and % of studies with significant positive outcome (total studies n=35)

Figure 8
APPENDICES
### Table A1.1: Patient Education: Arthritis Self-Management Program (ASMP) and ASMP Type Programs

**Individual Studies: Examining/Assessing Outcome Measures**

<table>
<thead>
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<th>Study Design</th>
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<th>Functional Disability</th>
<th>Depression/ Psychological</th>
<th>Self-Efficacy</th>
<th>Physical Activity Level</th>
<th>Tender Joint Count</th>
<th>Health Status</th>
<th>Knowledge</th>
<th>Health Care Utilization</th>
<th>Flag (paper was incl. in meta-analyses or review)</th>
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<td>i</td>
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<td>—</td>
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= With non-concurrent control group  
** = Cross-over for the control group only  
*** = 4 year follow-up of a cross-over for the control group trial  
CT = Non-randomized controlled trial  
++ = Pilot testing of program  

<p>| i  = Decrease  | i+ = Non-sign. differences between groups  | i  = Increase  | i+ = Increase  | NC = No change  | i NS = Non-sign. decrease  |
| i = Increase | i = Conclusive  | i = Conclusive  | i = Conclusive  | i = Conclusive  | i = Conclusive  |
| i* = Increase for OA  | i** = Decrease for RA  | NG = Not covered in detail not covered  | NG = Not covered in detail not covered  | NG = Not covered in detail not covered  | NG = Not covered in detail not covered  |
| + = Improvement in walking distance/time or decrease in functional disability  | + = Improvement in walking distance/time or decrease in functional disability  | + = Improvement in walking distance/time or decrease in functional disability  | + = Improvement in walking distance/time or decrease in functional disability  | + = Improvement in walking distance/time or decrease in functional disability  | + = Improvement in walking distance/time or decrease in functional disability  |</p>
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* = Improvement in walking distance/time or decrease in functional disability  
** = Physician blinded to treatment  
*** = 6-months follow-up of RCT (Keefe et al, 1990)  
CT = Non-randomized controlled trial  
# = Groups combined - pre/post
Table A1.3: Patient Education: Other Patient Education or Self-care Programs
Individual Studies: Examining/Assessing Outcome Measures

<table>
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<tr>
<th>Study Design</th>
<th>Author(s)</th>
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* = Improvement in walking distance/time or decrease in functional disability
** = Single-blind to treatment
*** = Pilot study
**** = 5 year follow-up - of a non-randomized controlled trial
1 = Increase
11+ = Non-significant differences
ND = No change
= Not covered
1 = Decrease
meds = Medication use
CT = Non-randomized controlled trial
NC = No difference
Table A1.3 (cont.): Patient Education: Other Patient Education or Self-care Programs
Individual Studies: Examining/Assessing Outcome Measures

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* = improvement in walking distance/time or decrease in functional disability
** = Program impact evaluation - post only
*** = One group - post only
CT = Non-randomized controlled trial

I = Increase
I I = Inconclusive
I I+ = Non-significant difference
I NS = Non-significant decrease
— = Not covered
Table A1.3 (cont.): Patient Education: Patient Education Coupled with Physiotherapy/Physical Therapy, Occupational Therapy, Exercise or Social Support
Individual Studies: Examining/Assessing Outcome Measures

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* = Improvement in walking distance/time or decrease in functional disability
** = Also included in the social support modality
CT = Non-randomized controlled trial
Pre/Post = Medication use
RCT = Randomized controlled trial

1 = Decrease
1+ = Increase
1+ = Non-significant difference
-- = Not covered
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<th>Depression/ Psychological</th>
<th>Self-Efficacy</th>
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<td>↑</td>
<td>—</td>
<td>↓</td>
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* = Improvement in walking distance/time or decrease in functional disability  
** = Pilot study  
*** = Blind assessment  
**** = But increased capacity related to work and leisure  
— = Not covered  
ND = No difference  
+ = Self-perceived attitude change  
++ = Morning stiffness  
++++ = Walking time  
↓ = Decrease  
↑ = Increase  
↑ NS = Non-significant increase  
↓ NS = Non-significant decrease
Table A2: Patient Education - Meta-Analyses: Mean Effect Size Values

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<th>Effect Size for Depression/ Psychological (95%CI)</th>
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* = RA studies had an effect size of 0.18 whereas OA had -0.02
** = Effect size values are for follow-up, for post treatment the effect sizes are 0.31(RA) and 0.06(AS)
*** = Effect size values are for follow-up, for post treatment the effect sizes are 0.26(RA) and 0.51(AS)
† = Effect size values are for follow-up, for post treatment the effect sizes are -0.03 to 0.41
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<th>Publication Type</th>
<th>Author(s)</th>
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<th>Depression/ Psychological</th>
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* = Improvement in walking distance/time or decrease in functional disability  
1 = Increase  
1 = Decrease  
1! = Inconclusive  
? = Undetermined/general discussion only  
ND = No difference  
NC = No change
<table>
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* = Improvement in walking distance/time or decrease in functional disability  
** = Short term only  
*** = Improvement in movement  
— = Not covered  
↓ = Decrease  
↑ = Increase  
ND = No difference  
? = Undetermined  
Imeds = Medication use  
↓1 = Inconclusive
### Table B1.1 (cont.): Exercise Programs

*Individual Studies: Examining/Assessing Outcome Measures*

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<th>Functional Disability</th>
<th>Depression Anxiety Psychological</th>
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<th>Self-Efficacy</th>
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* = Improvement in walking distance/time or decrease in functional disability
** = Joint tenderness only
— = Not covered
NC = No change
### = Double-blind
## = Improvements in strength measures
meds = Medication use

CT = Non-randomized controlled trial
NS = Non-significant
? = Undetermined
I = Increase
I = Decrease
II = Inconclusive
Table B1.1 (cont.): Exercise Programs:
Individual Studies: Examining/Assessing Outcome Measures

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<td>† **</td>
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* = improvement in walking distance/time or decrease in functional disability
** = increased physical work capacity
? = Undetermined
— = Not covered
NC = No change
† = Decrease
† = Increase
<table>
<thead>
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<th>Pain</th>
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<th>Depression/Anxiety/Psychological</th>
<th>Self-Efficacy</th>
<th>Physical Activity Level (Aerobic Capacity)</th>
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<td>—</td>
<td>NS</td>
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<td>Andersson &amp; Ekdahl, 1996</td>
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<tr>
<td>RCT</td>
<td>Hakkinen et al, 1994</td>
<td>—</td>
<td>↓###</td>
<td>—</td>
<td>↑###</td>
<td>↑ NS</td>
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<td>↑#</td>
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<td>RCT (blind assessment)</td>
<td>Kraag et al, 1990</td>
<td>ND</td>
<td>↑</td>
<td>—</td>
<td>↑#</td>
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<tr>
<td>RCT</td>
<td>Sylvester, 1989</td>
<td>↓</td>
<td>↓</td>
<td>—</td>
<td>—</td>
<td>NS**</td>
<td>↑</td>
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<tr>
<td>CT</td>
<td>Fisher et al, 1997</td>
<td>↓ 13%</td>
<td>↓###</td>
<td>—</td>
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</table>

CT = Non-randomized controlled trial
* = Improvement in walking distance/time or decrease in functional disability
? = Undetermined
** = Strength measurements
— = Not covered
### = Improvement in functional ability 13% / walking time 21%
↓ = Decrease
↑ = Increase
NS = Non-significant increase
ND = No difference
Table B1.2 (cont.): Exercise Programs: Strengthening and Range of Motion Exercises - PT
Individual Studies: Examining/Assessing Outcome Measures

<table>
<thead>
<tr>
<th>Design Type</th>
<th>Author(s)</th>
<th>Pain</th>
<th>Functional Disability*</th>
<th>Depression/Anxiety/Psychological</th>
<th>Self-Efficacy</th>
<th>Physical Activity Level (Aerobic Capacity)</th>
<th>Tender Joint Count (Function)</th>
<th>Health Status</th>
<th>Health Care Utilization</th>
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<td>↑ **</td>
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<tr>
<td>CT</td>
<td>Hakkinen et al, 1995+</td>
<td>—</td>
<td>↓ #</td>
<td>—</td>
<td>—</td>
<td>↑ #</td>
<td>↑ NS</td>
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<tr>
<td>CT</td>
<td>Jevsevar et al, 1993</td>
<td>—</td>
<td>↓ ****</td>
<td>—</td>
<td>—</td>
<td>↑ **</td>
<td>—</td>
<td>—</td>
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</tr>
<tr>
<td>Pre/post</td>
<td>Fisher et al, 1994</td>
<td>—</td>
<td>↓ #</td>
<td>—</td>
<td>—</td>
<td>↑</td>
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<tr>
<td>Pre/post</td>
<td>Lyngberg et al, 1994</td>
<td>NC ****</td>
<td>↓ NS ++</td>
<td>—</td>
<td>—</td>
<td>↑ 21%+++</td>
<td>—</td>
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</tr>
<tr>
<td>Pre/post</td>
<td>Fisher et al, 1993</td>
<td>—</td>
<td>↓ *****</td>
<td>—</td>
<td>—</td>
<td>↑ ****</td>
<td>—</td>
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</table>

CT = Non-randomized controlled trial
* = Improvement of walking distance/time or decrease in functional disability
# = ROM measurements
+++ = Significant increase
+++ = Patient's own assessment - functional improvements
++ = Mean gain in strength
? = Undetermined
ND = No difference
— = Not covered

↓ = Decrease
↑ = Increase
↑ NS = Non-significant increase
↑ NS = Non-significant decrease
↑ = Improvement in strength measurements
Table B1.2 (cont.): Exercise Programs: Strengthening and Range of Motion Exercises - PT
Individual Studies: Examining/ Assessing Outcome Measures

<table>
<thead>
<tr>
<th>Design Type</th>
<th>Author(s)</th>
<th>Pain</th>
<th>Functional Disability*</th>
<th>Depression/ Anxiety/ Psychological</th>
<th>Self-Efficacy</th>
<th>Physical Activity Level (Aerobic Capacity)</th>
<th>Tender Joint Count (Function)</th>
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<th>Health Care Utilization</th>
<th>Flag (paper was incl. in meta-analyses or review)</th>
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<tr>
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<tr>
<td>Pre/post</td>
<td>Leivseth et al, 1989</td>
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<td>↓ +</td>
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<td>Pre/post</td>
<td>Schank et al, 1986</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>↓ +</td>
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<tr>
<td>Cross-sectional</td>
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<td>↓ 35-25%+++</td>
<td>-</td>
<td>-</td>
<td>↓ 20%+++</td>
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<tr>
<td>Cross-sectional</td>
<td>Dexter, 1992++</td>
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<td>↓ 60%+++</td>
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<td>Marks, 1994</td>
<td>I</td>
<td>↓ 7%</td>
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<tr>
<td>Case report</td>
<td>Marks, 1993</td>
<td>I</td>
<td>↓ 7-20%</td>
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</tbody>
</table>

CT = Non-randomized controlled trial
* = Improvement in walking distance/time or decrease in functional disability
** = Function increased
- = Not covered
↓ = Increase
+ = ROM increase
+++ = Comparisons between healthy and arthritic subjects
++ = Reduction in % for arthritis patients vs healthy subjects
<table>
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<th>Author(s)</th>
<th>Pain</th>
<th>Functional Disability*</th>
<th>Depression/Anxiety/Psychological</th>
<th>Self-Efficacy</th>
<th>Physical Activity Level (Aerobic Capacity)</th>
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<tr>
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<td>Vliet Vlieland et al., 1997</td>
<td>↓ NS</td>
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<td>↓ NS</td>
<td>I NS</td>
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<td>↓ NS</td>
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<tr>
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<td>Moratz et al., 1986</td>
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* = Improvement in walking distance/time or decrease in functional disability
** = Stiffness only
- = Not covered
NS = Non-significant
ND = No difference
↓ = Decrease
↓ NS = Non-significant decrease
↓ NS = Non-significant increase
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<th>Self-Efficacy</th>
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* = ES=r-index (Cooper, 1989)
** = Converting r-index to an U_j score (Cooper, 1989)
*** = Overall ES=parameter effect sizes synthesized into one overall effect size.
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<th>Self- Efficacy</th>
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<td>Minor &amp; Lans, 1996</td>
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<td>1</td>
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<td>3 RCTs (4 in total)</td>
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<td>29</td>
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<td>133%</td>
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<td>Panush &amp; Holtz, 1994</td>
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<td>6***</td>
<td>1-6-14%</td>
<td>112-18%</td>
<td>15-12%</td>
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</table>

* = Improvement in walking distance/time or decrease in functional disability  
** = Work in progress  
*** = 15 publications in total - 6 exercise related  
**** = 3 for RA, 3 for OA patients  
***** = Studies assessing RA patients (1 study mixed OA/RA)  
meds = Medication use  
1 = Increase  
< = Decrease  
? = Inconclusive  
- = Not covered  
1+ = Non-significant differences
Table B3 (cont.): Exercise Programs - Reviews: Examining/Assessing Outcome Measures

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<th>Publication Type</th>
<th>Author(s)</th>
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<th>Depression/Anxiety/Psychological</th>
<th>Self-Efficacy</th>
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<tr>
<td></td>
<td>Minor &amp; Sanford, 1993</td>
<td>Approx. 50</td>
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<td></td>
<td>Galloway &amp; Jokl, 1993</td>
<td>Approx. 12</td>
<td>—</td>
<td>—</td>
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<td></td>
<td>Daly &amp; Berman, 1993</td>
<td>8****</td>
<td>—</td>
<td>↑+</td>
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* ↑ = Increase, ↓ = Decrease, ↓ = Not covered, ↑+ = Non-significant differences
* ↑ = Improvement in walking distance/time or decrease in functional disability
* ↑ = Work in progress
* ↑ = 15 publications in total - 6 exercise related
* ↑ = Studies assessing RA patients
* ↑ = Study mixed OA/RA
Table C1.1 (cont.): Social Support Intervention
Individual Studies: Examining/Assessing Outcome Measures

<table>
<thead>
<tr>
<th>Design Type</th>
<th>Author(s)</th>
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<th>Functional Disability (Walking Distance/Time)*</th>
<th>Depression/Anxiety/Psychological</th>
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<th>Physical Activity Level (Aerobic Capacity)</th>
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* = Improvement in walking distance/time or decrease in functional disability
** = Main concerns of callers/change of behavior in caller
ND = No difference
−− = Not covered

I = Decrease
↑ = Increase
↓ = Undetermined
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* = Improvement in walking distance/time or decrease in functional disability
** = Main concerns of callers/change of behavior in caller
ND = No difference
--- = Not covered
# = Took medication more often

II = Undetermined
↓ = Decrease
↑ = Increase
### Table C1.1 (cont.): Social Support Intervention

**Individual Studies: Examining/Assessing Outcome Measures**

<table>
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<tr>
<th>Design Type</th>
<th>Author(s)</th>
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<th>Functional Disability (Walking Distance/ Time)*</th>
<th>Depression/ Anxiety/ Psychological</th>
<th>Self-Efficacy</th>
<th>Physical Activity Level (Aerobic Capacity)</th>
<th>Tender Joint Count (Function)</th>
<th>Health Status</th>
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* = Improvement in walking distance/time or decrease in functional disability
** = Assessed 'social network' only
*** = Main concerns of callers/change of behavior in caller
ND = No difference
— = No covered
Table C1.1: Social Support Intervention
Individual Studies: Examining/Assessing Outcome Measures

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<th>Design Type</th>
<th>Author(s)</th>
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* = Improvement in walking distance/time or decrease in functional disability
** = Assessed 'social network' only
*** = Listed in patient education modality as well
= No difference
□ = Not covered
+= Between group effects sizes
++ = Blind assessment
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† = Decrease
†† = Increase
‡ ‡ = Inconclusive
ND = No difference
NC = No change
NS = Change but not sign.
* = Improvement in walking distance or decrease in functional disability
** = Self-esteem, coping well, psychological well-being
‡ ‡ = Review included meta-analysis by Mullen et al., as well as the review by Long and other reviews.
NA = Not applicable