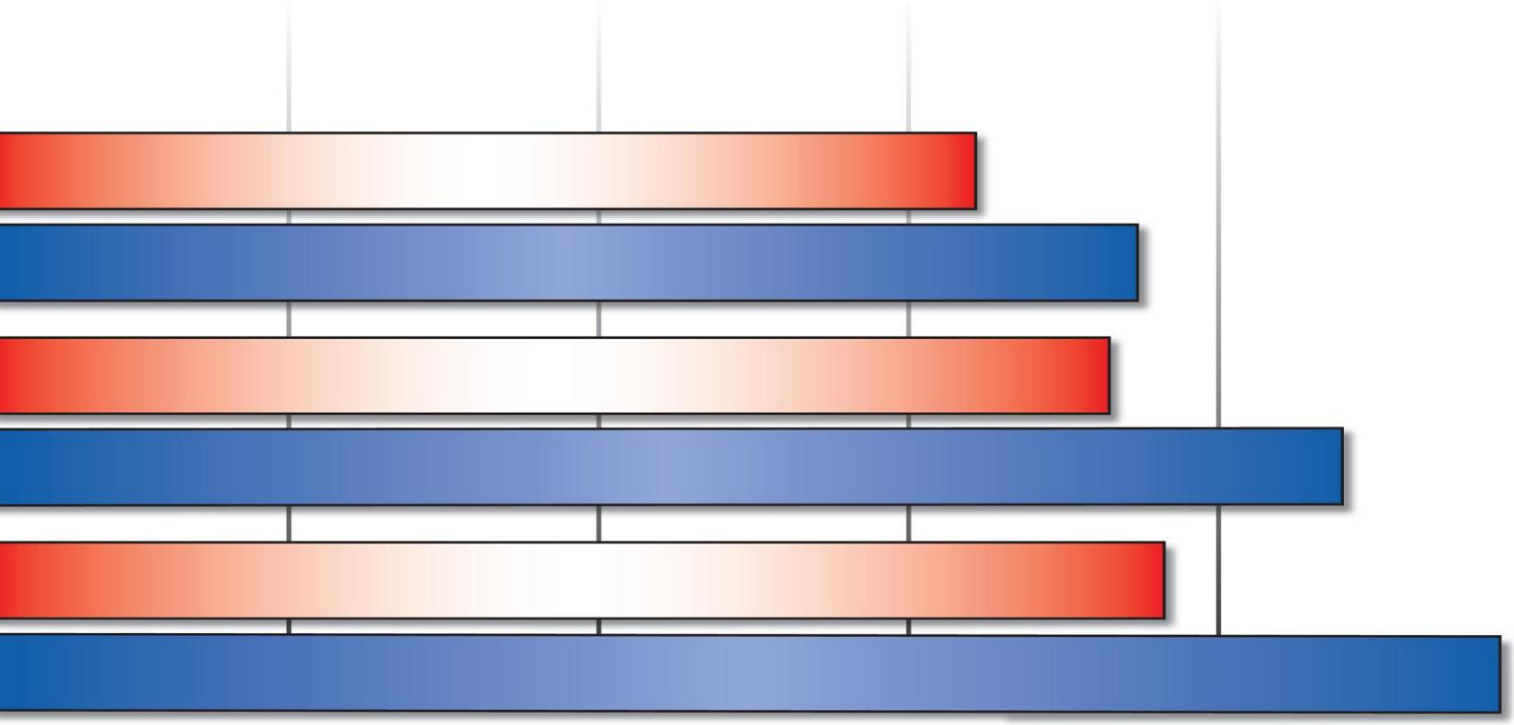
Sorting Through the Evidence for the Arthritis Self-Management Program and the Chronic Disease Self-Management Program

Executive Summary of ASMP/CDSMP Meta-Analyses

May 2011



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Background

Previous meta-analyses of chronic disease self-management programs studied multiple types of self-management programs combined, examined a limited number of outcomes, and were restricted to randomized controlled trials (RCTs). Results of the previous meta-analyses generally showed small to moderate short-term effect sizes (ES).

Purpose

Meta-analyses were conducted to examine the specific effects of two self-management education programs developed at Stanford University. The programs, which were designed to help people with chronic conditions gain confidence in their ability to control their symptoms and the impact of their conditions on their lives, are (1) the Chronic Disease Self-Management Program (CDSMP), a 6-week series of classes, and (2) the Arthritis Self-Management Program (ASMP), a similar series of classes designed specifically for people with arthritis. These investigations included all eligible and available studies of the effects of these two programs (both RCTs and longitudinal program evaluations) and examined multiple outcomes that reflected physical and psychological health status (including self-efficacy), health behaviors, and health care utilization. An additional meta-analysis examined whether the effects of the interventions varied by participant characteristics or implementation factors.

Hypotheses

For each intervention, the hypothesis was that participation in the intervention improved health status, health behavior, and health care utilization outcomes.

A further hypothesis was that the effects of the interventions differed by participant characteristics (age, race or ethnicity, education level) and implementation factors (intervention setting, leader characteristics, recruitment methods, delivery fidelity).

Methods

Search Strategy

A literature search was conducted for the period January 1, 1984–September 30, 2009. Eight electronic databases, including Cochrane, CINAHL, ERIC, EMBASE, Medline, and PsycINFO, were searched to identify relevant studies published in peer-reviewed journals, online publications, and grey literature (such as dissertations, conference abstracts, and unpublished reports). Subject matter experts and stakeholders convened to provide feedback on the project and to identify additional grey literature. The reference lists of all studies located were hand searched to identify other relevant studies. This search strategy identified 297 articles and reports.

Inclusion and Exclusion Criteria: Studies were included if they met all of the following inclusion and exclusion criteria.

- Inclusion Criteria:
  - Intervention was CDSMP or ASMP, regardless of mode of delivery.

- Intervention was implemented in an English-speaking country (United States, United Kingdom, Australia, Canada, New Zealand) regardless of language of implementation.
- Study contained at least one primary outcome measure (defined as energy, fatigue, self-rated health, pain, self-efficacy, health distress, physician visits, or emergency room visits) and outcomes were from an RCT or program evaluation with pre- and posttest measures.
- Study or evaluation report was available in English.

- Exclusion Criteria:
  - Intervention was implemented in combination with another intervention.
  - Intervention did not take place in a native English–speaking country.
  - Instructors did not use program manual provided at leader training.
  - New content (beyond the program manual) was introduced at intervention sessions.

ELIGIBILITY REVIEW AND DATA COLLECTION

A two-person team reviewed each article or report and determined that 61 studies were eligible. Data on the outcomes, participants' characteristics, and implementation factors were abstracted from these studies by the same reviewers. Following abstraction, principal investigators (PIs) were contacted to provide missing data for 55 of the studies (three PIs could not be located). Additional data were received for 51 studies (93% response rate).

DATA ANALYSIS

Unless otherwise noted, ASMP and CDSMP were analyzed separately. Because the majority of eligible studies for both interventions were conducted in an English-speaking small-group setting, the meta-analyses focused on that intervention delivery mode and other intervention delivery modes were analyzed separately. All outcomes were examined at two follow-up times (the time elapsed between baseline and follow-up): short term (4–6 months) and long term (9–12 months). Following the primary analysis, an exploratory analysis was conducted to examine the potential moderating effects of participants' characteristics and implementation factors. That analysis combined all ASMP and CDSMP studies of small-group delivery modes (in English, Spanish, or translated into another language).

Meta-Analytic Procedures: For each meta-analysis of outcomes, pooled ES were generated by combining the results of all eligible studies. For results from longitudinal evaluation studies, the ES was the net difference between baseline and follow-up measures. For RCTs, the ES was the net difference between the intervention and control groups. Pooled ES were derived using a random effects model, which allowed for both within-study and across-study variation of the intervention effects. The sign of the ES was standardized to the direction associated with positive impact. For each outcome, the number of studies analyzed differed depending on the number of studies in which that outcome was reported. All analyses were conducted using Comprehensive Meta-Analysis (Version 2) software. Using the convention established by Cohen for social and behavioral science studies, ES of less than $\pm$ 0.20 were considered small, $\pm$ 0.20–0.80 were considered medium, and greater than $\pm$ 0.80 were considered large.

Evaluation of Heterogeneity: Heterogeneity was tested to determine whether or not there was a statistically significant difference in ES of outcomes across studies. Both the Q-statistic and the I-squared statistic were used; a significant Q-statistic ($p \leq 0.05$) indicated significant heterogeneity (i.e., a statistically significant difference in ES across studies). Heterogeneity was tested for the following:

- To determine whether there was variation in ES by study design (RCT versus longitudinal evaluation). Statistically significant differences in ES by design would suggest that at least some of the change in outcome was attributable to the study design.
- To assess variation in the overall ES for each outcome across studies of the small-group English-speaking mode of delivery.

KEY FINDINGS

ARTHRITIS SELF-MANAGEMENT PROGRAM (ASMP)

Characteristics of Studies

- ***Studies Included:*** A total of 24 studies were included in the analysis of the ASMP.
  - Most (19 of 24) of the ASMP studies used English-speaking small-group delivery mode , so these studies were used for the majority of the analyses.
  - One to two studies used each of the remaining intervention delivery modes (Spanish-speaking small group, French translation of English-speaking small group, Internet, self-tailored self-study, and computer-tailored self-study). Those studies were included in the analysis of heterogeneity by delivery mode.
- ***Demographics***: The 24 ASMP studies included 6,812 participants (1,962 were enrolled in RCTs and 4,850 were enrolled in longitudinal studies).
  - Of the participants, 82% were women.
  - In studies where age was reported, participants were primarily aged 65 years or younger in 21 study arms and aged 65 years or older in 9 study arms.
- ***Publication Bias:*** Funnel plots revealed no evidence of publication bias.

Heterogeneity by Study Design

The analysis of heterogeneity by study design (RCT and longitudinal) was based on data from the short-term follow-up (4–6 months) of English-speaking small-group interventions. Only 2 of 16 variables showed statistically significant heterogeneity, indicating that it was statistically sound to analyze the overall ES for each outcome by combining the effects of RCTs and longitudinal studies.

- Significant Heterogeneity:
  - Pain: Pain reduction was significantly higher in the longitudinal studies (ES = -0.225, $p < 0.001$) than in RCTs (ES = -0.039, $p = 0.495$).

- Physician visits: There was a small significant decrease in physician visits in longitudinal studies (ES = -0.120, $p < 0.001$) but a non-significant (ns) increase in physician visits (ES = 0.141, $p = 0.148$) for RCTs.

RCT-Only Results

In the analysis of the six English-speaking small-group intervention RCTs (4–6 months), significant ES were small to moderate. Self-efficacy (for pain and other symptom management, both ES = 0.340) and communication with physician (ES = 0.277) increased and fatigue (ES = -0.210), anxiety and depression (both ES = -0.200) decreased.

Overall Effects at 4–6 Months and 9–12 Months

- ***Self-Efficacy:*** Whether measured across multiple dimensions or specific to managing pain and other symptoms, and whether measured in RCTs or longitudinal studies, self-efficacy increased moderately (statistically significant) in the short term and persisted longer term (9–12 months).
  - General self-efficacy: ES = 0.240 (4–6 months) and ES = 0.200 (9–12 months)
  - Self-efficacy for pain management: ES = 0 .383 and ES = 0.325
  - Self-efficacy for management of other symptoms: ES = 0.353 and ES =0.336
- ***Psychological Health Status:*** Outcomes (for health distress, depression, and anxiety) showed consistent small to moderate improvements in overall analysis, RCTs, and longitudinal studies. These benefits persisted at 9- to 12-month follow-up.
  - Health distress: ES = -0.359 (4–6 months) and ES = -0.304 (9–12 months)
  - Depression: ES = -0.171 and ES = -0.210
  - Anxiety: ES = -0.200 and ES = -0.224
- ***Physical Health Status:*** Changes (in fatigue, pain, and functional disability) were less consistent than the changes in psychological health status outcomes.
  - Fatigue was reduced significantly in the overall analysis at 4–6 months. The reductions persisted at 9–12 months but ES were small (ES = -0.146 at 4–6 months and ES = -0.214 at 9–12 months).
  - Functional disability was significantly reduced at 4–6 months but the reduction was very modest (ES = -0.049) and did not persist at 9–12 months.
  - There was not a significant reduction in pain in the overall analysis (at 4-6 and 9-12 months), although a moderate change was seen in longitudinal studies at 4–6 months (ES = -0.225).

- ***Health Behaviors:*** Outcomes (exercise, cognitive symptom management, and communication with physician) all showed statistically significant moderate improvements at 4–6 months that persisted at 9–12 months for all but exercise behaviors. Only one RCT measured health behaviors so these results were based primarily on the longitudinal studies.
  - Cognitive symptom management: ES = 0.533(4-6 months) and ES = 0.402 (9-12 months)
  - Communication with physician: ES = 0.255 and ES = 0.313
  - Aerobic exercise: ES = 0.209 and ns
  - Stretching/strengthening exercises: ES = 0.179 and ns
- ***Health Care Utilization:*** Limited data were available on ASMP. Only physician visits were measured. Physician visits did not decrease significantly in the 4- to 6-month overall analysis but there was a small and significant decrease (ES = -0.12) for the longitudinal studies.
- ***Self-Rated Health*** *and* ***Social/Role Limitations:*** Measures did not change significantly.

Effects by Mode of Intervention Delivery at 4–6 Months

- ***Studies included:*** All 24 studies were included in the analysis of effects at 4–6 months by ASMP delivery mode. The analyses included19 small-group English-speaking studies; 2 small-group Spanish-speaking ASMP studies; and 1 study each for French translation, Internet delivered, computer-tailored self-study, and self-tailored self-study. Because of the small number of studies, results of the analysis for the other delivery modes should be considered exploratory only. The number of outcomes evaluated for each intervention mode is indicated in parentheses.
- ***Spanish-Speaking Small Group*** (7 outcomes): Two outcomes showed significant change: a large reduction in pain (ES = -0.740) and an increase in overall self-efficacy (ES = 0.733). The ES for pain and self-efficacy were significantly larger than for any other intervention mode.
- ***Self-Tailored Self-Study Intervention*** (11 outcomes): Significant moderate positive effects were reported for all but four outcomes (self-rated health, health distress, physician visits, and social/role limitations). Of the outcomes measured in this delivery mode, significant positive effects were reported for all the same outcomes as the English-speaking small-group intervention except health distress and physician visits.
- ***Internet Delivered*** (11 outcomes): Two outcomes showed significant positive effects: pain (ES = -0.277) and functional disability (ES = -0.203). The Internet-delivered intervention was not effective for any of the same outcomes as the English-speaking small-group intervention with the exceptions of pain and functional disability.
- ***Computer-Tailored Self-Study*** (4 outcomes): Overall self-efficacy (ES = 0.393) and functional disability (ES = -0.204) showed significant and moderate positive effects. The effects for pain and physician visits were not significant.

- ***French Translation Delivered in Small Group*** (8 outcomes): The intervention was not effective for any of the same outcomes as the English-speaking small-group delivery mode except for stretching/strengthening exercises (moderate and statistically significant positive effect [ES = 0.340]).

CHRONIC DISEASE SELF-MANAGEMENT PROGRAM (CDSMP)

Characteristics of Studies

- ***Studies included***: A total of 23 studies were included in the analysis of the CDSMP.
  - 18 of the 23 used the English-speaking small-group mode of delivery.
  - The studies included two each for Spanish-speaking small-group and Internet-delivered interventions and one for the each of the remaining delivery modes (translations of English small group and home-based peer led).
- ***Demographics:*** The 23 studies included 8,688 participants (2,902 were enrolled in RCTs and 5,779 in longitudinal studies).
- ***Publication Bias:*** Funnel plots revealed no evidence of publication bias.

Heterogeneity by Study Design

There was no heterogeneity in effects by study design for any of the 16 outcomes at short-term follow-up (4–6 months) for the English-speaking small-group interventions. Therefore, it was statistically valid to analyze overall ES for RCTs and longitudinal studies combined.

RCT-Only Results

In the short-term follow-up of the English-speaking small-group studies, the analysis of the five RCTs demonstrated significant small to moderate ES for self-efficacy (ES = 0.427), health distress (ES = -0.215), social/role limitations (ES = -0.209), aerobic exercise (ES = 0.197), cognitive symptom management (ES = 0.312), and days or nights hospitalized (ES = -0.138).

Overall Effects at 4–6 Months and 9–12 Months

- ***Self-Efficacy:*** When measured across multiple dimensions or specific to managing pain and other symptoms, and whether examined overall or by study design, self-efficacy showed moderate and significant increases in the 4- to 6-month and 9- to 12-month analyses.
  - General self-efficacy: ES = 0.345 (4-6 months) and ES = 0.204 (9-12 months)
  - Self-efficacy for disease management: ES = 0.260 and ES = 0.377
  - Self-efficacy for management of other symptoms: ES = 0.283 and ES = 0.450
- ***Psychological Health Status:*** Outcomes (for health distress and depression) showed consistent small to moderate improvements in both the 4- to 6-month and 9- to 12-month follow-up in both overall effects and by study design.
  - Health distress: ES = -0.282 (4-6 months) and ES = -0.227 (9-12 months)

- Depression: ES = -0.216 and ES = -0.210

- ***Physical Health Status:*** Changes (in energy, fatigue, pain, functional disability, and shortness of breath) were less consistent than changes in the psychological health status variables.
  - Energy and fatigue showed small but significant improvements at 4–6 months (ES = 0.158 and ES = -0.138, respectively) but they did not persist at 9–12 months.
  - There were non-significant changes in pain and shortness of breath at 4–6 months but small and significant changes at 9–12 months (ES = -0.126 and ES = 0.102, respectively). In the 4- to 6-month analyses, both outcomes had small but statistically significant changes in the longitudinal studies but not in the RCTs and hence the changes are of questionable importance.
  - Functional disability showed no significant changes in overall effects in the analyses at 4–6 months and 9–12 months.

- ***Health Behaviors***: Of the four behaviors evaluated (aerobic exercise, cognitive symptom management, communication with physician, and stretching/strengthening exercise), three showed small to moderate significant improvements in the overall analysis at 4–6 months. Most improvements persisted at 9–12 months.
  - Cognitive symptom management: ES = 0.261 (4-6 months) and ES = 0.374 (9-12 months)
  - Aerobic exercise: ES = 0.118 and ES = 0.098
  - Communication with physician: ES = 0.256 and ns
  - Stretching/strengthening exercise: ES = ns and ES = 0.153

- ***Health Care Utilization:*** Changes were minimal. Three of the four variables measured showed no significant effect sizes at 4–6 months or 9–12 months. There was a small but significant change in the fourth measure, days in the hospital, at 4–6 months (ES = -0.088) that did not persist at 9–12 months. Of note, the small but significant effect was seen in both RCTs and longitudinal studies at 4–6 months.

- ***Self-Rated Health:*** Measures improved modestly but significantly at 4–6 months (ES = 0.143) but did not persist at 9–12 months.

- ***Social/Role Limitations:*** Measures showed a small but significant effect at 4–6 months that persisted at 9–12 months (ES = -0.167 and ES = -0.141, respectively). These significant effects were found in both RCTs and longitudinal studies at 4–6 months.

Effects by Mode of Intervention Delivery at 4–6 Months

- ***Studies Included:*** Analysis included 15 English-speaking small-group studies and 2 Spanish-speaking small-group studies; 1 study conducted in Europe in four different languages; 2 studies of Internet-delivered interventions; and 1 home-based peer-led intervention study (one arm delivered over the telephone and one arm delivered in person at home). Similar to the ASMP analysis by mode of intervention delivery, because of the small number of studies,

results of the analysis for other delivery modes should be considered exploratory only. The number of outcomes evaluated for each intervention mode is indicated in parentheses.

- ***Spanish-Speaking Small Group*** (12 outcomes): For the Spanish-speaking small-group intervention, six outcomes showed statistically significant benefits: self-rated health (ES = 0.308), pain (ES = -0.279), self-efficacy (ES = 0.372), health distress (ES = -0.549), social/role limitations (ES =-0.301), and aerobic exercise (ES = 0.329).

- ***English Small-Group Translation*** (12 outcomes): Four outcomes showed statistically significant improvements: energy (ES = 0.385), fatigue (ES = -0.237), self-rated health (ES = 0.385), and cognitive symptom management (ES = 0.385).

- ***Internet Delivered*** (15 outcomes): Only three outcomes were significant: fatigue (ES = -0.143), pain (ES = 0.141), and health distress. (ES = -0.261)

- ***Home-Delivered Peer Led*** (3 outcomes): None of the outcomes in the home-based peer-led intervention showed statistically significant benefits.

- For one outcome, the ES between modes of delivery were significantly different. For pain, the Spanish-speaking small-group intervention showed a moderate reduction (ES = -0.279), whereas the English-speaking small-group and the Internet modes of delivery showed only small reductions (ES = -0.160 and ES = -0.114, respectively). For all other outcomes, there were no significant differences in the ES across modes of delivery.

ANALYSIS OF PARTICIPANT AND IMPLEMENTATION FACTORS

Studies Included

All ASMP and CDSMP small-group interventions, regardless of language of delivery, that reported 4- to 6-month outcomes were combined for the moderator analysis which examined whether the intervention effects varied by participant characteristics and implementation factors. This analysis comprised 34 studies with 44 study arms. Results from this moderator analysis should be interpreted as exploratory because of limited reporting of participant characteristics and implementation factors and lack of differentiation among the categories in some of the variables of interest.

Socio-demographics

- ***Number of Participants Studied:*** 10,792 participants were studied (5,111 in RCTs and 5,681 in longitudinal evaluations).

- ***Age:*** In the 64% of the study arms reporting age, participants were predominantly aged 65 years or younger.

- ***Education:*** In the two-thirds of studies reporting education level, the majority of participants had more than 12 years of education.

- ***Race or Ethnicity:*** Both interventions were conducted in primarily white populations, although three study arms focused on primarily black populations and four were conducted in primarily Hispanic populations.

Differential Effects by Participant Characteristic

There was a sufficient number of studies to examine four participant characteristics. The number of outcomes available for study for each factor is indicated in parentheses, and only statistically significant differences in effect sizes are reported.

- ***Age*** (17 outcomes): There were no significant differences found between participants in studies where the majority of participants were aged 65 years or younger compared with participants in studies where the majority of participants were aged 65 years or older.

- ***Race (Blacks and Whites)*** (9 outcomes): Participants in studies that were conducted in primarily black populations showed less improvement in social/role limitations (ES = -0.087), days in the hospital (ES = -0.020), and cognitive symptom management (ES = 0.153), when compared with participants in studies that were conducted in primarily white populations (ES = -0.283, ES = -0.139, and ES = 0.492, respectively). There were no significant differences in the six remaining outcomes analyzed.

- ***Race or Ethnicity (Hispanics and Whites)*** (10 outcomes): Participants in studies that were conducted in primarily Hispanic populations showed more improvement for self-rated health (ES = 0.310) and health distress (ES = -0.532) compared with participants in studies that were conducted in primarily white populations (ES =0.075 and ES = -0.266, respectively). There were no significant differences in the eight remaining outcomes analyzed.

- ***Education*** (14 outcomes): Participants in studies where the highest level of educational attainment was 12 years or more showed greater improvement in depression (ES = -0.204) when compared with participants in studies where the highest level of educational attainment was less than 12 years (ES = -0.066). There were no significant differences in the remaining 13 outcomes analyzed.

- ***Diagnosis*** (14 outcomes): Participants who had a physician-confirmed diagnosis at study enrollment showed more improvement in fatigue (ES = -0.207) and cognitive symptom management (ES = 0.576) compared with participants with a self-reported diagnosis (no physician confirmation) (ES = -0.124 and ES = 0.255 respectively). There were no significant differences in the 12 remaining outcomes analyzed.

Differential Effects by Implementation Factors

Analysis was possible for 6 of 12 implementation factors. As with participant factors, the number of outcomes available for study for each factor is indicated in parentheses, and only statistically significant differences in effect sizes are reported.

- ***Setting (Urban or Rural)*** (11 outcomes): There were no significant differences in ES for all outcomes for studies conducted in primarily urban and studies conducted in primarily rural settings. Studies conducted in mixed urban-rural settings were not included in this analysis.

- ***Participant Compensated or Paid*** (11 outcomes): In studies where participants were paid, there was a slight decline in self-rated health (ES = -0.019) compared with a slight improvement in studies where they were not paid (ES = 0.164). For stretching/strengthening exercises, more improvement was shown in studies where participants were paid (ES = 0.294)

compared with studies where participants were not paid (ES = 0.107). There were no significant differences in the nine remaining outcomes analyzed.

- ***Leader Compensated*** (16 outcomes): For four outcomes (general self-efficacy, health distress, depression, and aerobic exercise), participants improved more in studies with unpaid leaders than in studies with paid leaders (paid as part of their job or receiving a stipend). There were no significant differences in the 12 remaining outcomes analyzed.

- ***Leaders' Chronic Disease Status*** (3 outcomes): The ES for pain, physician visits, and functional disability did not differ in studies where at least one leader in the majority of leader pairs had arthritis or another chronic disease compared with those where the majority of leader pairs did not include a leader with arthritis or another chronic disease.

- ***Leaders' Training*** (10 outcomes): In studies where the leaders received less training than the minimum required, participants improved more for three outcomes—fatigue (ES = -0.239), general self-efficacy (ES = 0.491), and cognitive symptom management (ES = 0.544) compared with studies where the leaders received at least the minimum training (ES = -0.110, ES = 0.266, and ES = 0.187, respectively). There were no significant differences in the seven remaining outcomes analyzed.

- ***Program Fidelity*** (8 outcomes): Participants in studies where the requirements for program fidelity were not met showed more improvement in fatigue (ES = -0.265), general self-efficacy (ES = 0.565), and cognitive symptom management (ES = 0.555) compared with participants in programs where the requirements for program fidelity were met (ES = -0.100, ES = 0.289, and ES = 0.223, respectively). There were no significant differences in the five remaining outcomes analyzed.

Strengths, Limitations, and Discussion

Implications

This study provided a quantitative synthesis of patterns across empirical studies to determine the effectiveness of ASMP and CDSMP interventions on health status, health behaviors, and health care utilization in both short-term and longer-term follow-up. Another purpose was to determine whether or not participant characteristics and contextual and implementation factors influenced the interventions' effectiveness. These meta-analyses used data from 24 studies of ASMP and 23 studies of CDSMP. The findings suggested that ASMP and CDSMP contribute to improvements in psychological health status, self-efficacy, and select health behaviors and that many of those improvements are maintained over 12 months. While the effects are modest, they have great public health significance when the cumulative impact of small changes across a large population is considered. Furthermore, if sustained, these shifts may have a substantial effect on health-related quality of life and the physical, psychological, and social impact of chronic health conditions.

At the population level, these interventions could have a considerable public health effect due to the potential scalability of the interventions, the relative low cost to implement them, wide application across various settings and audiences, and the capacity to reach large numbers of people. In addition to health care professionals' medical management, these interventions

provide individuals with chronic diseases opportunities to develop the knowledge, skills, and confidence to appropriately address, or self-manage, disease-related problems. Self-management, as well as the self-management supports that communities and health systems provide, are essential components of the chronic-care model that is reshaping how care is delivered to people with chronic health conditions.

Several limitations are inherent in these meta-analyses. The significant heterogeneity found in pooled ES for some outcomes across studies was not accounted for by study design. It was not possible to examine some obvious sources of variation, such as medication use, co-morbidities, or severity of disease or symptoms. The inability to evaluate by disease type or to evaluate subgroups on the basis of symptom severity may have masked the true effects of the interventions. Subjects who did not report a symptom at baseline and did not report a change over time attenuated the change for those who had the symptom and reported a change, which resulted in smaller ES. Not every study included each outcome so the strength of the pooled ES varied, which needs to be taken into account when interpreting results for those outcomes where few studies contributed to the analysis. Finally, because these analyses focused on studies conducted in English-speaking countries and limited data were available on men or racial or ethnic groups other than Whites, the results are not generalizable to these populations.

This study also has several strengths. First, it is the first comprehensive investigation of all studies—RCTs and longitudinal evaluations—that have assessed the effectiveness of ASMP and CDSMP interventions. This study is the only systematic review to have examined these two interventions alone and not in combination with other self-management or self-management education programs. The meta-analyses examined a wide variety of outcomes to identify the domains that were most affected by ASMP and CDSMP interventions and was not limited to just a few outcomes, as has been done in the past. The analyses evaluated follow-up at both 4-6 months and 9-12 months post-intervention to examine persistence of effects. The inclusion of both RCT data and longitudinal data from program evaluations conducted in the field (following the sensitivity analysis that showed limited heterogeneity due to study design) further strengthened the overall results and their generalizability to those populations most likely to enroll in ASMP and CDSMP when the programs are offered in non-research settings.

STRATEGIES FOR MOVING FORWARD

The findings from the meta-analyses have implications for policymaking, health care and public health practice, and future research related to ASMP and CDSMP; these results have been used to identify strategies to move forward in these areas.

Policy

- ***Include the small-group English versions of CDSMP and ASMP in comprehensive chronic disease management and self-management support initiatives.***

  The robust findings of small to moderate improvements in self-efficacy, psychological health status, and select health behaviors that persisted through 12 months suggest that ASMP and CDSMP create health benefits for the individuals who participate in the small-group English versions of the programs. The combined evidence from RCTs (with strong interval validity) and longitudinal program evaluations (with strong external validity) increases confidence that benefits will occur as programs are delivered in practice.

The limited number of studies available on the alternative modes of CDSMP and ASMP delivery (i.e., the culturally tailored Spanish small-group intervention, translation of the English small-group intervention, delivery via home-based self-study or via the Internet) prevents formulation of recommendations. However, some alternative modes appear promising and have the potential to reach large and diverse populations.

- ***Invest public and private resources (financial and human capital) to support wide-scale delivery of CDSMP and ASMP to reach large population groups with chronic disease. Appropriate financing systems need to be identified.***

  To make these low-cost programs available to the more than 125 million Americans who have chronic diseases, wide-scale implementation will be necessary and will likely require both public and private financing. Although very limited reductions in health care utilization were documented, health care organizations may incorporate CDSMP and ASMP into the services offered by their patient-centered medical home or accountable care organizations. The CDSMP and ASMP interventions could also be incorporated into the services offered by community-based aging services; adult education programs; and health promotion and wellness programs offered by communities, employers, and faith-based organizations.

- ***Incorporate CDSMP and ASMP recommendation or referral into standards of care, care protocols, and other policies that guide the provision of high-quality chronic disease care.***

  The chronic-care model recognizes self-management support as an essential element of high-quality chronic care. Self-management education programs, such as CDSMP and ASMP, can be a standard part of self-management support services. These meta-analyses clearly documented health benefits from participation in CDSMP and ASMP, and structured care protocols that incorporate them as routine part of chronic disease care can offer all people with chronic diseases access to these beneficial interventions.

- ***Use CDSMP, and possibly ASMP, as strategies to help people with chronic disease become more physically active.***

  The importance of increasing physical activity for general health benefits, health protection, and chronic disease management is becoming more evident. Some people with chronic disease may have additional barriers to increasing their physical activity. Although CDSMP and ASMP do not incorporate exercise into class sessions, they give much attention to increasing physical activity in the context of managing chronic disease. Results of these meta-analyses indicated that CDSMP creates a small but significant increase in aerobic exercise, which persists at 9- to 12-month follow-up. ASMP also produces a short-term significant increase in aerobic exercise, although it does not persist at 9- to 12-month follow-up.

Public Health and Clinical Practice

- ***Support wide-scale implementation of CDSMP and ASMP to produce meaningful public health impact. Service delivery systems, in both community and health care settings, should consider adding these ready-to implement programs to their menu of services.***

  Wide-scale implementation is critical to expanding public health impact by increasing the number of people reached by the intervention. By their nature, self-management education

interventions, along with other individual behavior change interventions, have a smaller reach than a policy or environmental change. However, full penetration of the population—that is, making attendance at self-management education programs a population norm—can have far-reaching public health impact. At this time, no evidence suggests that such interventions are more or less effective when they are delivered in a health care organization or in a community setting. Substantial population penetration will require wide-scale implementation through a variety of venues and organizations.

- ***Encourage participation in CDSMP or ASMP as part of routine care of individuals with chronic disease.***

  The provision of strong self-management support to their patients who have chronic diseases can be particularly challenging to health care practitioners amid the competing demands of clinical practice. Patients with chronic diseases can be encouraged to attend CDSMP or ASMP as a useful adjunct to the self-management support provided in the clinical visit. Such encouragement can also be an assurance that patients receive consistent background information about chronic disease self-management. On the basis of the robust findings of these meta-analyses, health care practitioners can confidently recommend CDSMP and ASMP to their patients with the expectations that persistent improvements in self-efficacy, psychological health status or well-being, and other quality-of-life factors will result.

- ***Provide both generic and disease-specific interventions to meet the needs of individuals with multiple chronic diseases and those with a single dominant chronic condition.***

  CDSMP is likely to appeal to the widest number of people, including people with multiple chronic conditions. However, some individuals, particularly those with a single predominant chronic condition, may prefer to attend a disease-specific intervention. In these meta-analysis, ASMP produced improvements similar to CDSMP in self-efficacy, psychological health status, and select health behaviors. Although ASMP also produced persistent improvements in fatigue, the persistent decreases in social/role limitations seen with CDSMP were not evident in ASMP participants. Stanford University has developed diabetes- and HIV-specific interventions, similar in structure to CDSMP and ASMP that were not studied in these meta-analyses.

Research

- ***Explore differential effectiveness by participant characteristics (demographics, diagnosis, and disease or symptom severity), as well as implementation factors (setting and leader characteristics and recruitment methods).***

  One study objective was to examine differential effectiveness by participant characteristics (such as race, gender, age, education level) or implementation characteristics (such as intervention settings, recruitment methods, and leader characteristics). Limited diversity in participants' characteristics (most were White women) and lack of differentiation between categories of implementation factors made only an exploratory analysis possible. Post-hoc analyses of large data sets of participant characteristics, or analyses with predefined subgroups, would help to determine whether these interventions are more effective with select population groups. Systematic investigation of various contextual and implementation

factors would enhance our knowledge of effective implementation strategies and help to determine whether specific implementation factors influence effectiveness.

- ***Conduct ongoing program evaluation, using standardized outcome measures and data definitions, and individual rather than group level data, to identify populations most likely to benefit from these programs.***

  Program evaluation, with data collected as CDSMP and ASMP are offered in the field, can also help to answer questions about differential effectiveness. To be most useful, program evaluation would need to collect standard participant-level data across multiple implementation sites and use the same data definitions for each data-collection site.

- ***Identify core or essential elements of interventions and use them to guide fidelity recommendations. Identify which elements need to remain constant and which can be tailored to meet specific population needs.***

  Implementation with fidelity is essential to assure that the intervention continues to produce consistent effects. At the same time, adaptation to meet the needs of specific populations may make CDSMP or ASMP more relevant to those specific groups. This investigation assessed the fidelity to essential elements, as identified by the intervention developer. In this exploratory analysis, minimal significant differences were found between those studies that met fidelity requirements and those that did not, suggesting that the crucial fidelity elements are yet to be identified.

- ***Conduct additional studies to explore the effects of alternative modes of CDSMP and ASMP delivery (e.g., Spanish-language, Internet-delivered, self-study versions).***

  Alternative modes of delivery (such as the small-group intervention developed to be culturally appropriate for Spanish-speaking people, translation of the English small-group intervention into other languages, delivery via home-based self-study or via the Internet) can make CDSMP and ASMP available to much larger and diverse populations. Unfortunately, only an exploratory analysis was possible because each alternative mode of delivery had only one or two studies documenting their effects. Additional studies are necessary to reach any definitive conclusions about the equivalence of these alternative modes of intervention delivery to the small-group English delivery mode.

- ***Explore strategies to prolong effects of interventions, particularly exercise behaviors, symptom management, and physical health status.***

  While the majority of health benefits observed in the analysis at 4–6 months persisted at the analysis at 9–12 months, some short-term gains were lost. While CDSMP improved energy, fatigue, self-rated health, and communication with physicians in the short-term analysis, these effects were no longer significant in the 9- to 12-month analysis. Similarly, ASMP produced short-term increases in aerobic and stretching/strengthening exercise that did not persist. Identification of strategies to prolong these benefits would increase the usefulness of ASMP and CDSMP.

- ***Explore effects of these interventions beyond 12 months.***

Only three ASMP studies and one CDSMP study reported outcomes past 1 year, so those results were not analyzed in these meta-analyses. While many of the health benefits achieved persisted in the analysis at 9–12 months, it would be useful to evaluate even longer-term effects to fully gauge the long-term impact of CDSMP and ASMP on quality of life.

- ***Explore effects on health care utilization through direct measurement.***

  The majority (16 of 19) of ASMP studies and one-half of the CDSMP studies (9 of 18) reported some health care utilization data (number of physician visits, number of emergency room visits, number of times hospitalized, and number of days or nights in the hospital). However, all such measures were self-reported and subject to recall and other biases. Direct measurement of health care utilization, through administrative claims data, would provide a more definitive examination of the impact of ASMP and CDSMP on health care utilization.

- ***Explore impact of CDSMP and ASMP on biometric chronic disease measures such as hemoglobin A1c, systolic and diastolic blood pressure, and blood lipid levels.***

  Previous meta-analyses of self-management interventions (which combined various intervention programs) included studies that captured direct biometric measures of disease markers such as hemoglobin A1c and diastolic and systolic blood pressure and reported small to moderate improvements. These objective measures have not been studied in ASMP or CDSMP but would be useful in characterizing the impact of ASMP and CDSMP on clinical measures of disease status.

- ***Conduct studies to evaluate the relative advantages of CDSMP and ASMP through comparative effectiveness and economic evaluations.***

  - Explore comparative effectiveness of CDSMP or ASMP used alone or paired with other self-management activities such as physical activity or weight control interventions.
  - Conduct economic evaluations of CDSMP and ASMP.

  To examine the specific effects of ASMP and CDSMP, these analyses excluded any studies that looked at the effects of either program combined with another self-management activity such as physical activity or weight control. However, there may be benefits to sequencing or pairing self-management education interventions with other health-enhancing evidence-based interventions. This form of comparative effectiveness could enhance our understanding of how best to utilize these interventions. While the meta-analyses did not address economic evaluations of CDSMP and ASMP, cost-effectiveness and cost-benefit analyses would also be useful to understand societal return on investment in both financial and quality-of-life terms.

- ***Invest the financial and human resources need to address these research-oriented strategies for moving forward, recognizing that both rigorous scientific trials and longitudinal program evaluations are needed.***

  Although a significant body of research has accumulated on the effects of the ASMP and CDSMP, most of that research has focused on answering the initial question: Do these interventions work? These meta-analyses provide substantial data to conclusively state that the small-group English versions of these interventions produce important health improvements.

The priority research questions now move beyond that initial question to focus on more complex questions: Which populations benefit most? What are the ideal implementation conditions? How can benefits be maximized? What impact is found by using objective measures of disease status and health care utilization? How well do the alternative delivery modes of ASMP and CDSMP work? Answering the complex questions will require a commitment of financial and human resources, as well as a combination of rigorous controlled trials and longitudinal observational studies as the interventions are implemented in the field.

Excerpts From the Full Technical Report

Arthritis Self-Management Program (ASMP) English-Speaking Small Group

Table 5: Effects by Study Design at 4–6 Months

	RCT			Longitudinal			Between Groups *P*-Value
	N	ES	95% CI	N	ES	95% CI	
Primary Outcomes							
Fatigue ↓	2	-0.214*	(-0.412, -0.016)	10	-0.146***	(-0.225, -0.067)	0.531
Self-Rated Health ↑	2	0.121	(-0.087, 0.330)	5	-0.040	(-0.146, 0.066)	0.176
Pain ↓	6	0.039	(-0.152, 0.073)	17	-0.225***	(-0.280, -0.171)	0.004
Self-Efficacy (SE) ↑	0	na	na	3	0.240***	(0.165, 0.316)	na
SE — Pain ↑	4	0.338***	(0.159, 0.517)	10	0.400***	(0.287, 0.513)	0.566
SE — Other Symptoms ↑	4	0.335***	(0.177, 0.493)	10	0.360***	(0.261, 0.459)	0.787
Health Distress ↓	0	na	na	4	-0.359**	(-0.632, -0.086)	na
Physician Visits ↓	4	0.141	(-0.050, 0.333)	12	-0.120***	(-0.185, -0.054)	0.011
Secondary Outcomes							
Functional Disability ↓	6	-0.023	(-0.103, 0.058)	13	-0.058**	(-0.104, -0.012)	0.451
Social/Role Limitations ↓	0	na	na	3	-0.144	(-0.501, 0.213)	na
Anxiety ↓	2	-0.204***	(-0.311, -0.097)	4	-0.199***	(-0.274, -0.123)	0.933
Depression ↓	5	-0.201***	(-0.302, -0.100)	11	-0.158***	(-0.224, -0.093)	0.486
Aerobic Exercise ↑	0	na	na	4	0.209***	(0.143, 0.274)	na
Stretching/Strengthening ↑	1	0.195	(-0.098, 0.487)	4	0.177**	(0.064, 0.291)	0.914
Cognitive Symptom Management ↑	1	0.486	(-0.017, 0.988)	7	0.540***	(0.347, 0.733)	0.844
Communication With Physician ↑	1	0.277***	(0.106, 0.448)	6	0.251***	(0.182, 0.320)	0.782

RCT = randomized controlled trial; ES = effect sizes; CI = confidence interval; na = not applicable; arrow indicates direction of a positive impact

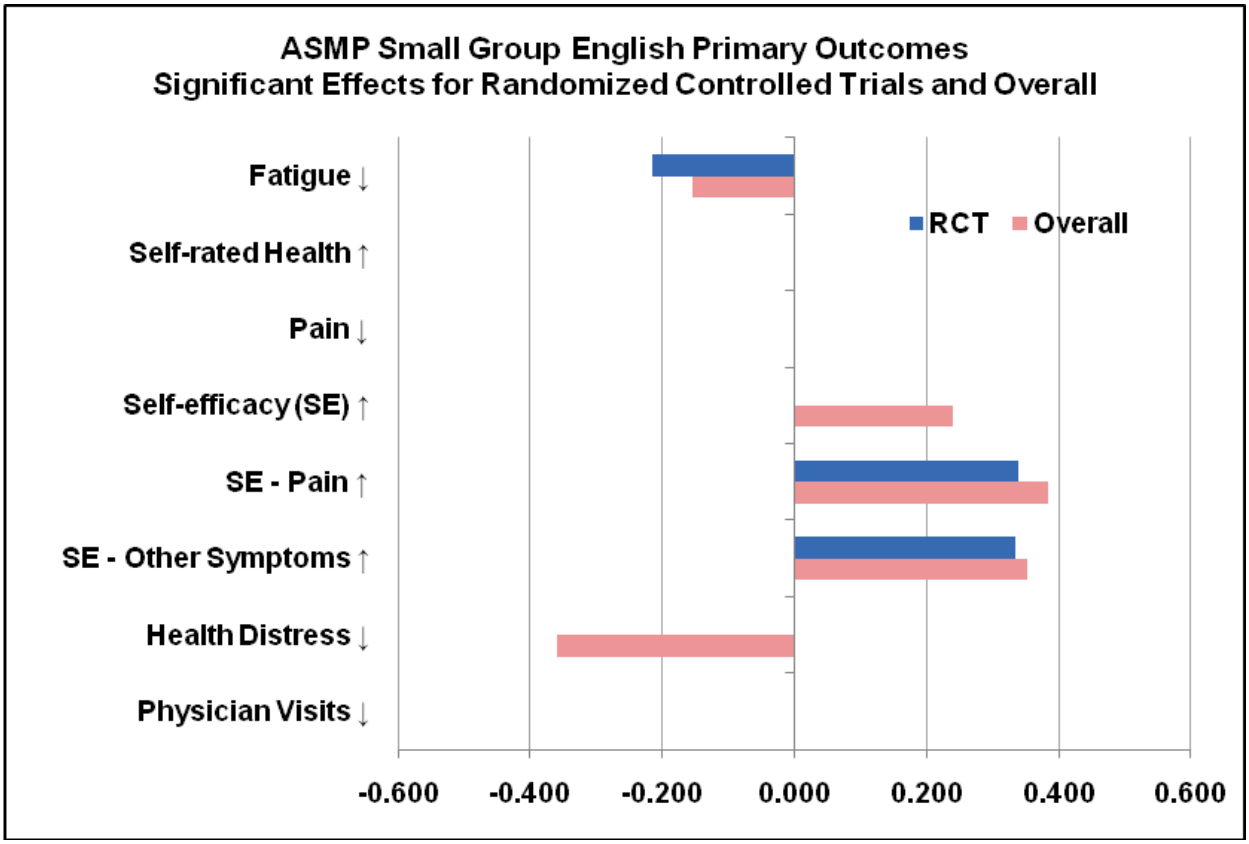
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 7: Overall Effect Sizes at 4–6 and 9–12 Months

	4–6 Months			9–12 Months		
	N	ES	95% CI	N	ES	95% CI
Primary Outcomes						
Fatigue ↓	12	-0.155***	(-0.228, -0.082)	4	-0.200***	(-0.274, -0.125)
Self-Rated Health ↑	7	0.015	(-0.135, 0.164)	3	0.078	(-0.079, 0.234)
Pain ↓	23	-0.139	(-0.321, 0.043)	6	-0.122	(-0.353, 0.109)
Self-Efficacy (SE) ↑	3	0.240***	(0.165, 0.316)	2	0.200**	(0.058, 0.343)
SE — Pain ↑	14	0.383***	(0.287, 0.478)	4	0.325**	(0.110, 0.540)
SE — Other Symptoms ↑	14	0.353***	(0.269, 0.437)	4	0.336**	(0.092, 0.579)
Health Distress ↓	4	-0.359**	(-0.632, -0.086)	2	-0.304*	(-0.604, -0.004)
Physician Visits ↓	16	-0.005	(-0.259, 0.248)	4	-0.085	(-0.256, 0.086)
Secondary Outcomes						
Functional Disability ↓	19	-0.049**	(-0.089, -0.010)	7	-0.021	(-0.102, 0.060)
Social/Role Limitations ↓	3	-0.144	(-0.501, 0.213)	3	-0.186	(-0.549, 0.176)
Anxiety ↓	6	-0.200***	(-0.262, -0.139)	3	-0.224***	(-0.303, -0.145)
Depression ↓	16	-0.171***	(-0.226, -0.116)	5	-0.210**	(-0.361, -0.058)
Aerobic Exercise ↑	4	0.209***	(0.143, 0.274)	2	0.060	(-0.055, 0.175)
Stretching/Strengthening ↑	5	0.179***	(0.074, 0.285)	2	0.187	(-0.017, 0.391)
Cognitive Symptom Management ↑	8	0.533***	(0.352, 0.713)	3	0.402**	(0.139, 0.666)
Communication With Physician ↑	7	0.255***	(0.191, 0.319)	2	0.313***	(0.215, 0.410)

CI = confidence interval; ES = effect sizes; arrow indicates direction of a positive impact
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Figure 3: Significant Effects for RCT and Overall at 4–6 Months



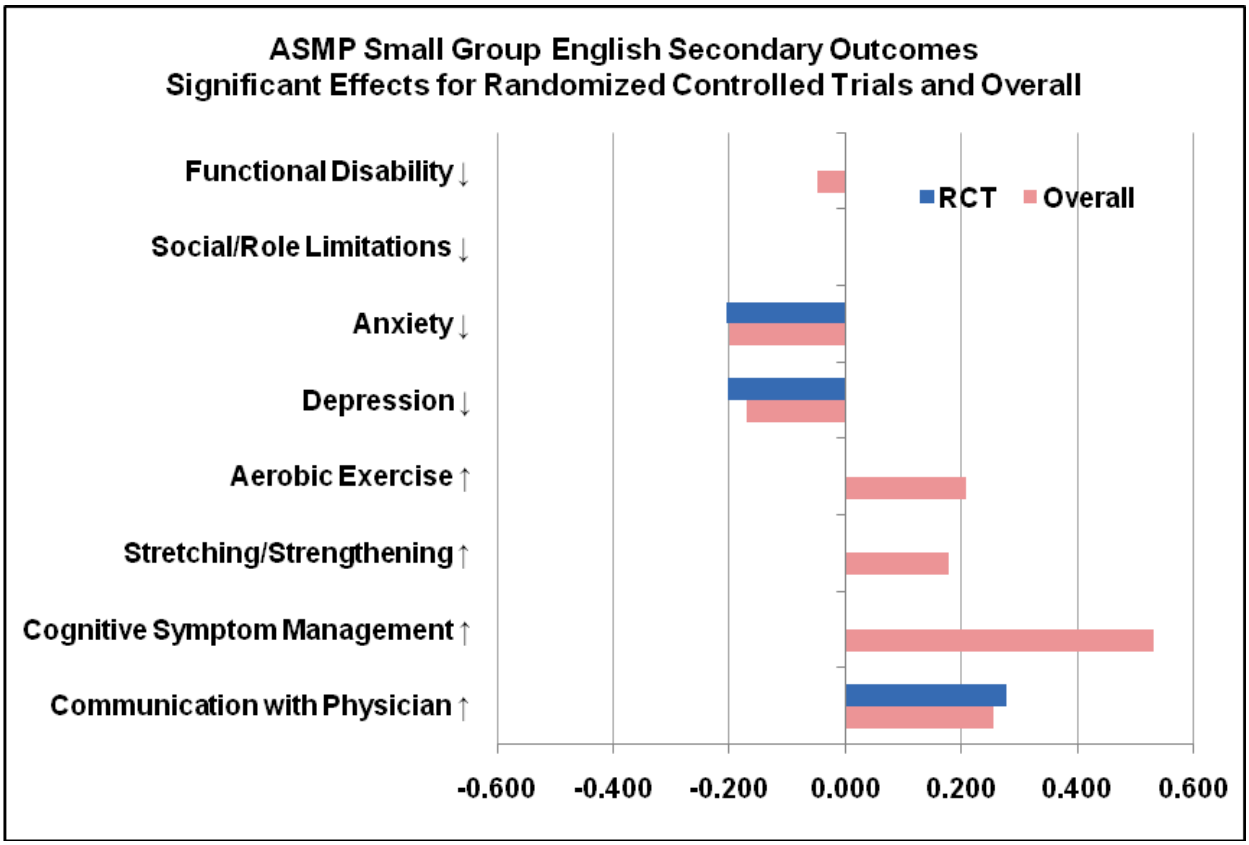
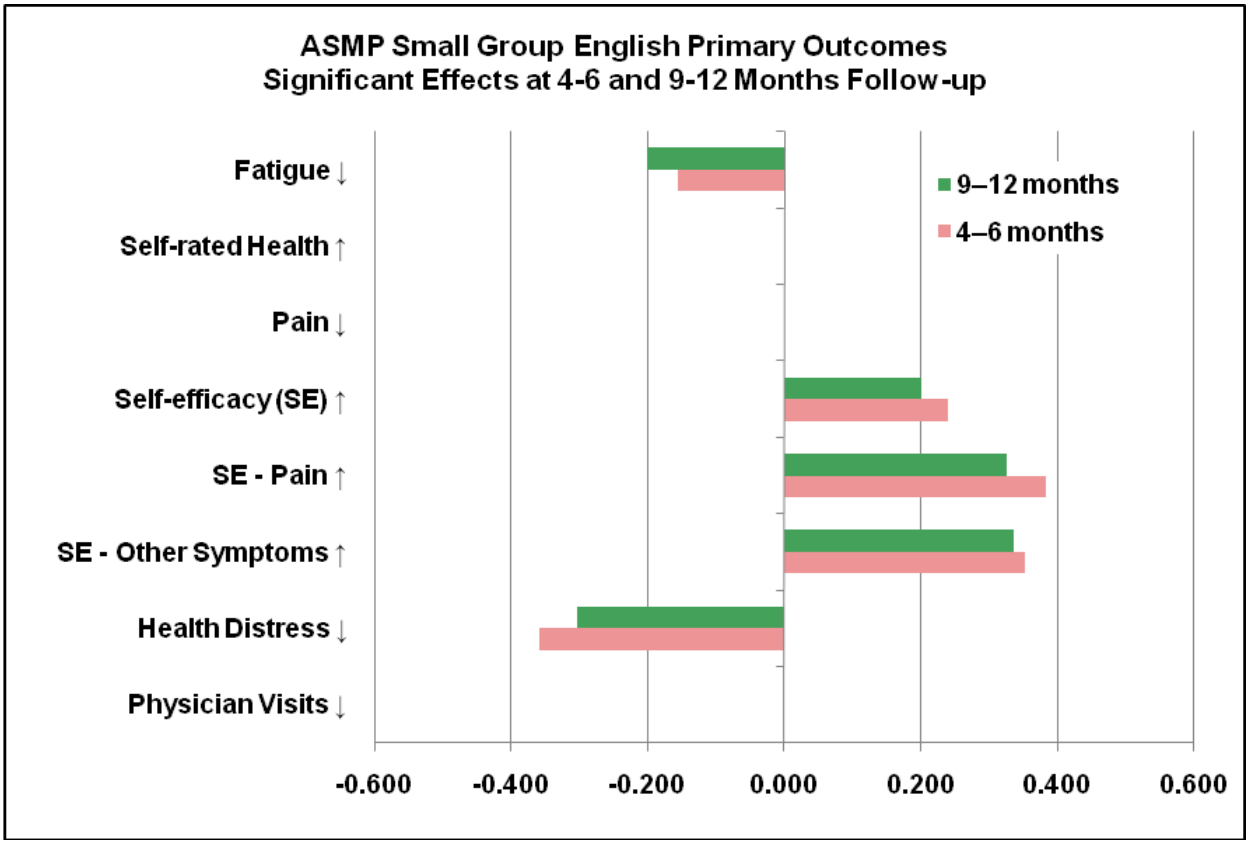
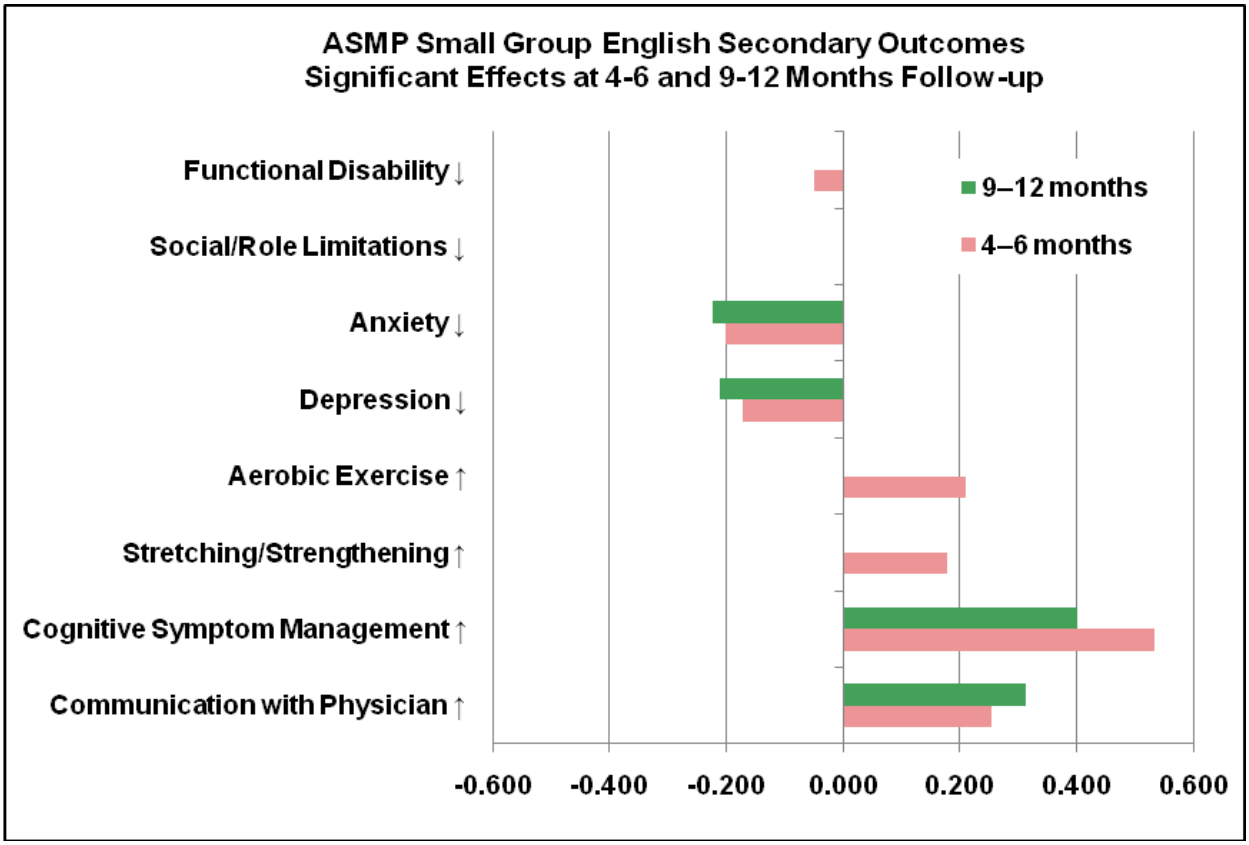


Figure 4: Significant Overall Effects at 4–6 Months and 9–12 Months





CHRONIC DISEASE SELF-MANAGEMENT PROGRAM (CDSMP) ENGLISH-SPEAKING SMALL GROUP

Table 10: Effects by Study Design at 4–6 Months

	RCT			Longitudinal			Between Groups *P*-Value
	N	ES	95% CI	N	ES	95% CI	
Primary Outcomes							
Energy↑	3	0.210	(-0.020, 0.439)	5	0.132	(-0.030, 0.294)	0.588
Fatigue↓	1	0.034	(-0.305, 0.374)	9	-0.158***	(-0.216, -0.100)	0.273
Self-Rated Health↑	2	0.153	(-0.107, 0.413)	9	0.140*	(0.015, 0.265)	0.931
Pain↓	1	0.037	(-0.293, 0.368)	9	-0.164***	(-0.212, -0.116)	0.238
Self-Efficacy (SE)↑	3	0.427***	(0.218, 0.636)	2	0.275**	(0.085, 0.466)	0.293
SE — Disease↑	0	na	na	6	0.260***	(0.116, 0.404)	na
SE — Other Symptoms↑	0	na	na	6	0.283***	(0.187, 0.378)	na
Health Distress↓	2	-0.215*	(-0.420, -0.010)	10	-0.297***	(-0.391, -0.203)	0.475
Physician Visits↓	1	-0.010	(-0.191, 0.170)	8	-0.037	(-0.095, 0.021)	0.782
Emergency Room Visits↓	0	na	na	4	-0.016	(-0.083, 0.051)	na
Secondary Outcomes							
Functional Disability↓	1	-0.148	(-0.330, 0.033)	7	-0.027	(-0.101, 0.048)	0.224
Social/Role Limitations↓	2	-0.209***	(-0.319, -0.098)	7	-0.159***	(-0.206, -0.112)	0.419
Shortness of Breath↓	1	0.048	(-0.184, 0.280)	7	-0.159***	(-0.255, -0.064)	0.106
Depression↓	1	-0.176	(-0.527, 0.175)	5	-0.218***	(-0.304, -0.132)	0.819
Aerobic Exercise↑	1	0.197*	(0.005, 0.389)	8	0.105**	(0.028, 0.182)	0.384
Stretching/Strengthening↑	1	0.143	(-0.207, 0.494)	8	0.111	(-0.017, 0.240)	0.867
Cognitive Symptom Management↑	2	0.312**	(0.094, 0.530)	7	0.249***	(0.146, 0.353)	0.612
Communication With Physician↑	2	0.153	(-0.202, 0.508)	6	0.286**	(0.094, 0.477)	0.518
Hospitalization Times↓	1	-0.023	(-0.161, 0.116)	6	-0.006	(-0.070, 0.059)	0.827
Hospitalization Days or Nights↓	2	-0.138**	(-0.242, -0.035)	6	-0.062*	(-0.123, -0.002)	0.215

RCT = randomized controlled trial; ES = effect sizes; CI = confidence interval; na = not applicable; arrow indicates direction of a positive impact

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

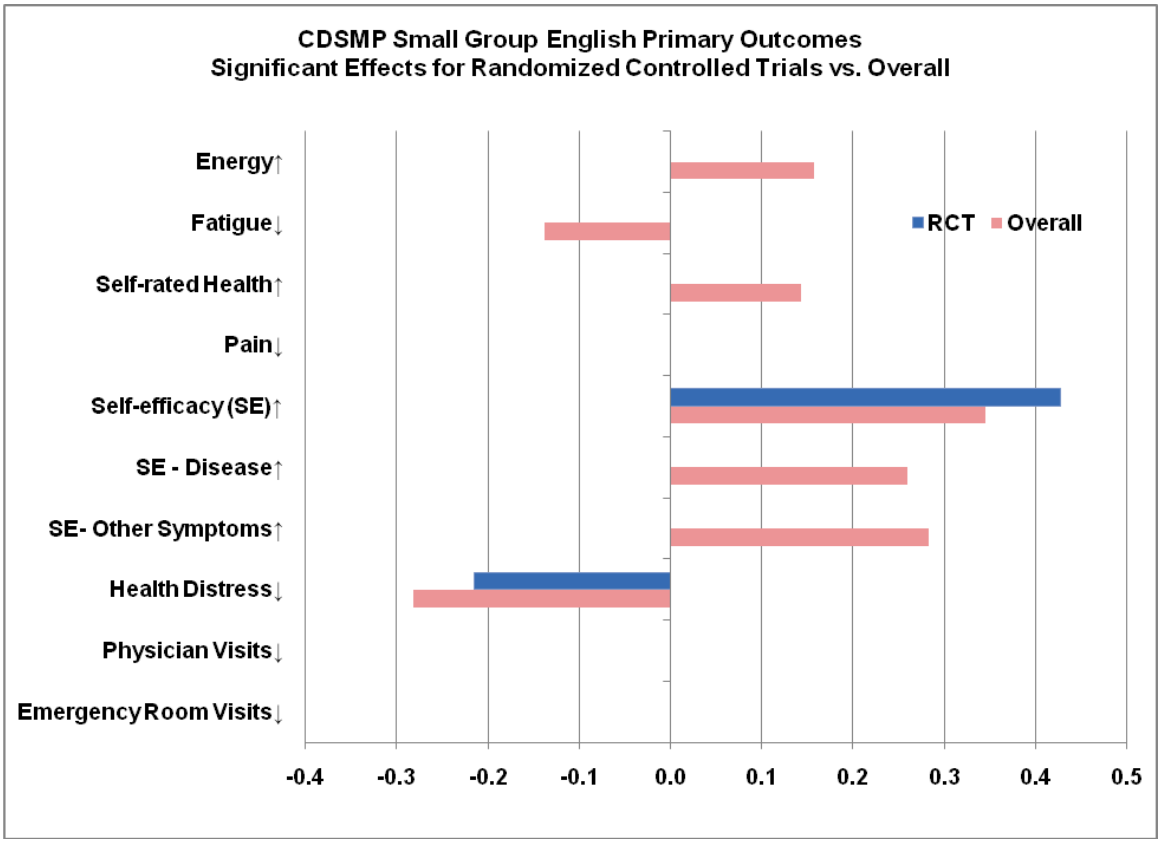
Table 12: Overall Effect Sizes at 4–6 and 9–12 Months

	4–6 Months			9–12 Months		
	N	ES	95% CI	N	ES	95% CI
Primary Outcomes						
Energy↑	8	0.158*	(0.025, 0.290)	1	0.053	(-0.022, 0.128)
Fatigue↓	10	-0.138*	(-0.254, -0.021)	5	-0.140	(-0.315, 0.035)
Self-Rated Health↑	11	0.143**	(0.030, 0.255)	4	-0.023	(-0.135, 0.090)
Pain↓	10	-0.133	(-0.275, 0.010)	5	-0.126**	(-0.205, -0.046)
Self-Efficacy (SE)↑	5	0.345***	(0.197, 0.493)	3	0.204***	(0.082, 0.327)
SE — Disease↑	6	0.260***	(0.116, 0.404)	2	0.377*	(0.040, 0.713)
SE — Other Symptoms↑	6	0.283***	(0.187, 0.378)	1	0.450***	(0.293, 0.607)
Health Distress↓	12	-0.282***	(-0.369, -0.198)	5	-0.227***	(-0.329, -0.126)
Physician Visits↓	9	-0.035	(-0.089, 0.020)	4	-0.081	(-0.174, 0.011)
Emergency Room Visits↓	4	-0.016	(-0.083, 0.051)	2	-0.103	(-0.227, 0.021)
Secondary Outcomes						
Functional Disability↓	8	-0.058	(-0.016, 0.047)	5	0.047	(-0.003, 0.098)
Social/Role Limitations↓	9	-0.167***	(-0.210, -0.123)	4	-0.141*	(-0.280, -0.002)
Shortness of Breath↓	8	-0.084	(-0.841, 0.401)	2	-0.102**	(-0.178, -0.025)
Depression↓	6	-0.216***	(-0.300, -0.132)	3	-0.210***	(-0.286, -0.134)
Aerobic Exercise↑	9	0.118***	(0.046, 0.189)	3	0.098*	(0.001, 0.195)
Stretching/Strengthening↑	9	0.115	(-0.006, 0.236)	2	0.153*	(0.007, 0.300)
Cognitive Symptom Management↑	9	0.261***	(0.167, 0.355)	4	0.374***	(0.268, 0.480)
Communication With Physician↑	8	0.256**	(0.087, 0.424)	3	0.235	(-0.036, 0.507)
Hospitalization Times↓	7	-0.009	(-0.067, 0.050)	4	-0.003	(-0.122, 0.116)
Hospitalization Days or Nights↓	8	-0.088**	(-0.159, -0.018)	3	-0.037	(-0.092, 0.019)

RCT = randomized controlled trial; ES = effect sizes; CI = confidence interval; na = not applicable; arrow indicates direction of a positive impact

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Figure 6: Significant Effects for RCT and Overall at 4–6 Months



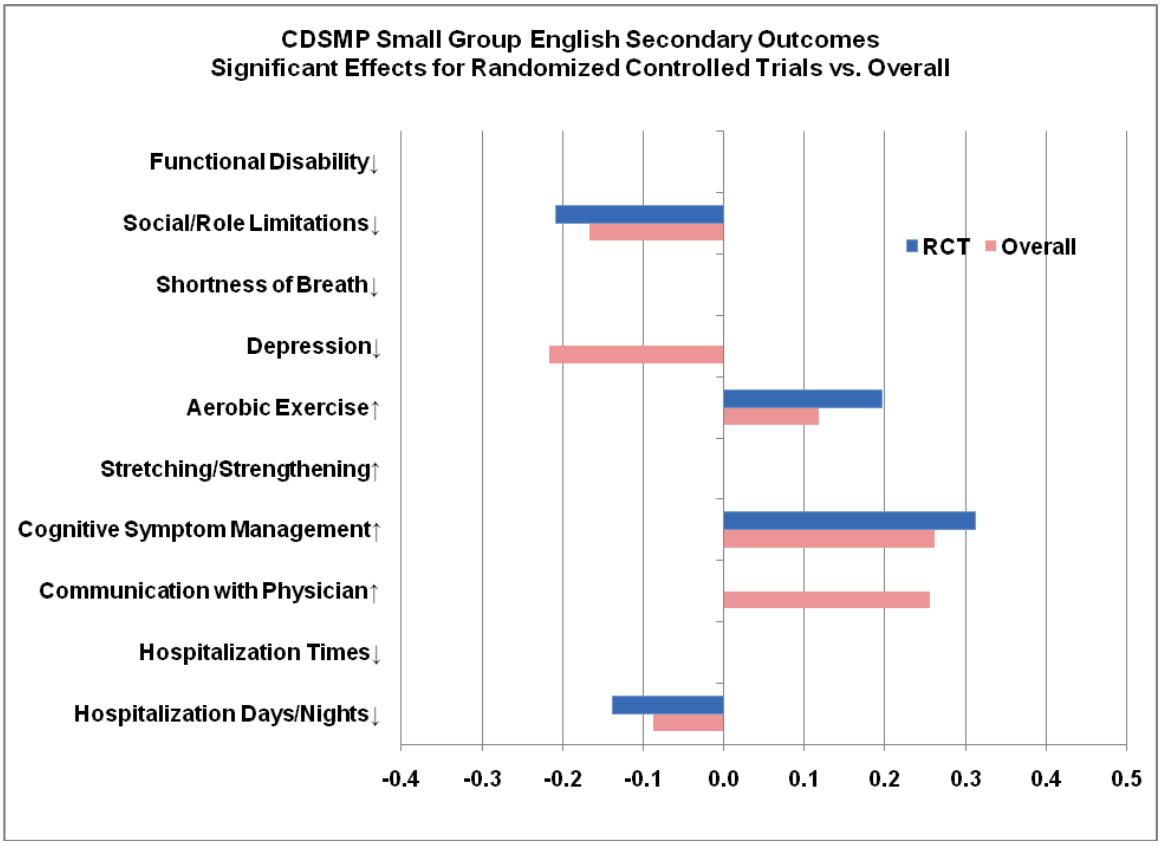
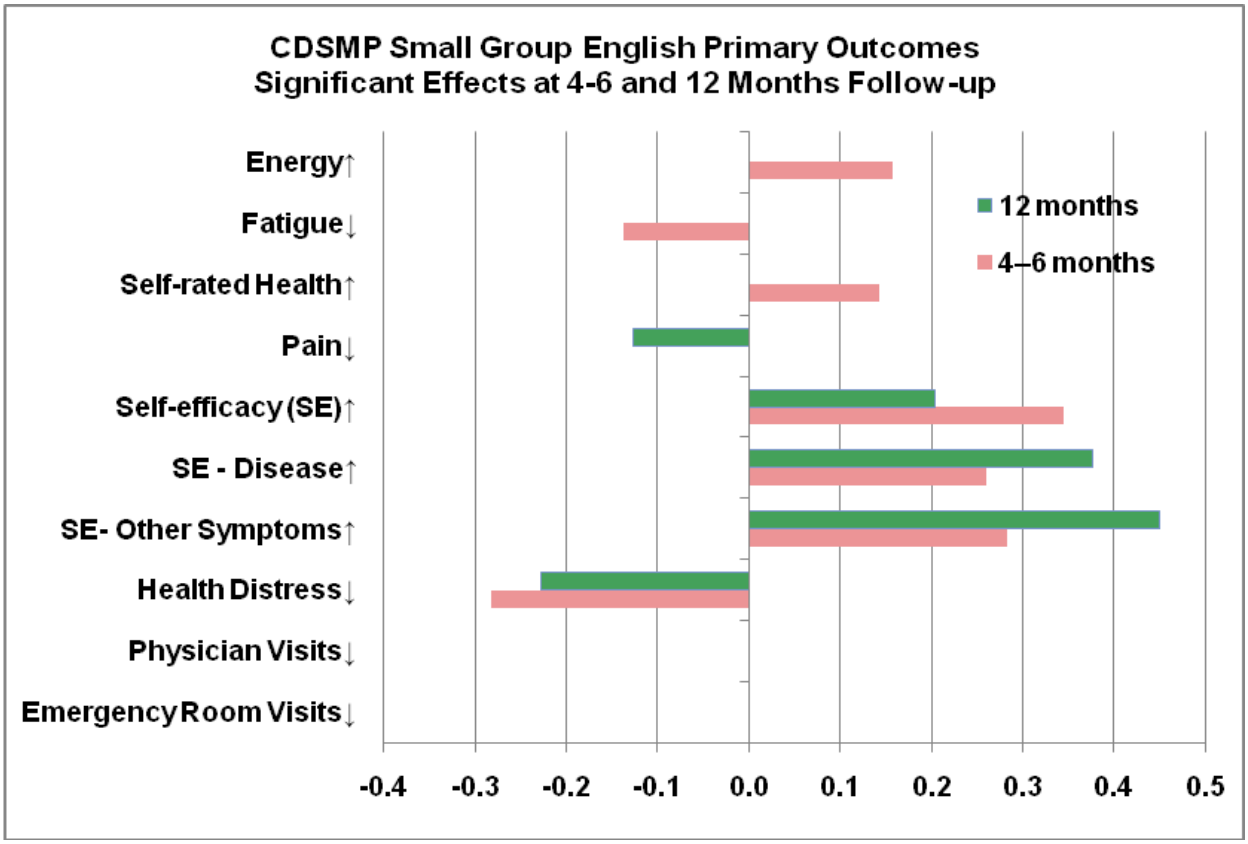
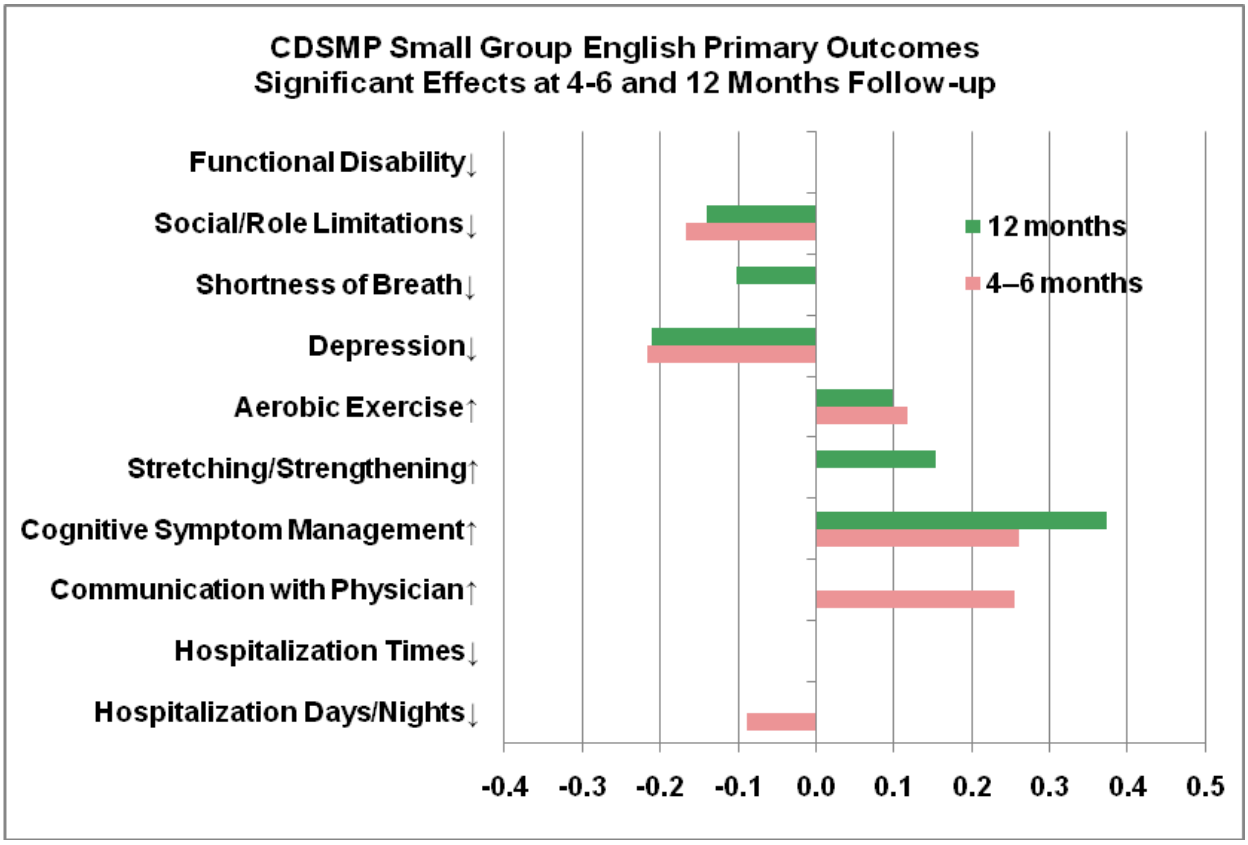


Figure 7: Significant Overall Effects at 4–6 Months and 9–12 Months





Sorting Through the Evidence for the Arthritis Self-Management Program and the Chronic Disease Self-Management Program

Executive Summary of ASMP/CDSMP Meta-Analyses

May 2011

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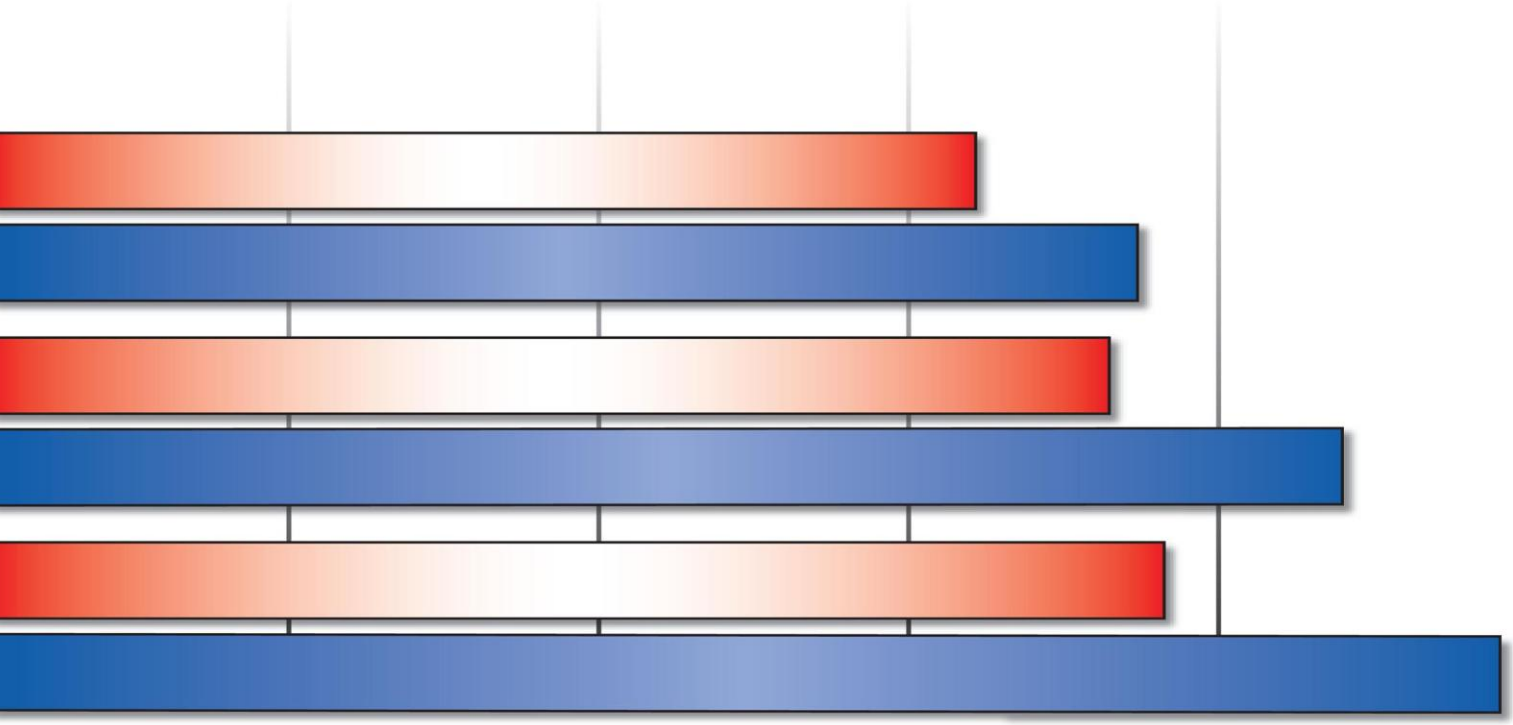
Prepared by ICF Macro under contract # 200-2007-20003 from CDC and contract for services dated 4-12-10 from the Arthritis Foundation



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