Self-management of Age-related Macular Degeneration at the 6-Month Follow-up

A Randomized Controlled Trial

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Objective: To assess the effectiveness at the 6-month follow-up of an age-related macular degeneration (AMD) self-management program consisting of health education and enhancement of problem-solving skills in improving quality of life as shown by measures of mood and function.

Methods: Six-month follow-up data were analyzed from 214 of 252 older adult volunteers (mean age, 80.8 years) with advanced AMD who had been randomly assigned to a 12-hour self-management program (n=82), a series of 12 hours of tape-recorded health lectures (n=66), or a waiting list (n=66). The primary outcome measure was emotional distress (Profile of Mood States). Secondary outcome measures included function (National Eye Institute Visual Function Questionnaire), self-confidence to handle AMD-specific challenges in daily life (AMD Self-efficacy Questionnaire), and depression status on the Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.

Results: At the 6-month follow-up, participants in the self-management program reported significantly less emotional distress (P=.008), better function (P=.05), and increased self-efficacy (P=.006) compared with control subjects. The latter effects were more pronounced in the depressed than in the nondepressed subjects. Finally, the incidence of clinical depression at the 6-month follow-up was significantly lower in the self-management group (P=.05) than in the control group.

Conclusion: The sustained positive effects at the 6-month follow-up provide support for the effectiveness of the AMD self-management program in reducing distress and disability, improving self-efficacy, and preventing depression in poorly sighted elderly patients with AMD.


Age-related macular degeneration (AMD) is the leading cause of irreversible vision loss in older adults, and remains incurable. Despite the prevalence of this disease and its devastating impact, patients are often left to cope with their disability on their own.

In 2002, the results at postintervention of a randomized controlled trial of an AMD self-management program conducted among elderly patients with advanced AMD were reported. The intent of the trial was to assess the effectiveness of the AMD self-management program on quality of life, mood, and function. At enrollment, participants were randomly assigned to a 12-hour AMD self-management program, a series of 12 hours of tape-recorded education, or a waiting list. Because there was no difference between the 2 control conditions in demographic characteristics, clinical characteristics, or outcome, the control groups were combined in the analyses. Consistent with the findings of an earlier pilot study, postintervention, compared with the controls, the self-management group showed significant improvement on measures of mood and function. The changes were significantly greater for those who were depressed at baseline compared with those who were not depressed. At postintervention, decreased emotional distress was associated with high expectations (self-efficacy) to handle AMD-specific challenges. Improvements in function also were associated with increases in self-efficacy and perceived social support, although these associations were weak. The postintervention results were generally consistent with the findings of behavioral medicine interventions for other chronic diseases. The long-term effects of the AMD self-management program were not known.

The present study is an examination of the effects at the 6-month follow-up of the effectiveness of the AMD self-management program in terms of the primary intent to improve participants’ mood and secondarily...
to improve function. As at postintervention, we predicted that the effects would be greater in the subgroup of participants who had been clinically depressed. The present study was also intended to determine if participants who reported more social support and increased levels of AMD-related self-efficacy would show more improvement in mood and function and to assess depression status at the 6-month follow-up.

METHODS

PARTICIPANTS

Participants in this study were recruited through letters to all the ophthalmologists in the county, the media, an AMD registry, health fairs, and senior centers. The 214 subjects who completed the trial were enrolled between February 1, 1998, and September 30, 2000. The 6-month follow-up interviews were concluded in February 2001. Inclusion and exclusion criteria, reported earlier and summarized herein, were as follows: (1) diagnosis of AMD by an ophthalmologist and confirmed by fundus photographs; (2) visual acuity of 20/60 or worse in the better eye and 20/100 or worse in the other eye, with habitual correction (ie, current glasses); (3) no other unstable eye disease or vision loss due to other eye disease; (4) 60 years or older; and (5) no cognitive impairment, as assessed by the Orientation-Memory-Concentration Test.16

Overall, 252 (72.2%) of the 349 patients screened met the criteria (Figure). Seventy-one (20.3%) of the potential subjects were excluded for one of the following reasons: another eye disease was responsible for vision loss (n=20 [5.7%]); on retesting, visual acuity was confirmed to be better than 20/60 (n=16 [4.6%]); cognitive impairment (n=21 [6.0%]); deceased (n=1 [0.3%]); hearing impairment (n=2 [0.6%]); other health problems limiting mobility (n=5 [1.4%]); or moved out of the area (n=6 [1.7%]). The 26 otherwise eligible volunteers (7.4%) (the overall percentage does not total 100 because of rounding) declined participation after learning the study requirements. The study participants and the people who declined participation were similar in demographic and clinical characteristics. In addition, 21 subjects were present at baseline but subsequently declined participation because of personal reasons; another 17 subjects were present at baseline and were interviewed at 6 weeks postintervention, but then declined participation for personal reasons. This left 214 subjects who completed the 6-month follow-up interview. Those who completed the follow-up interview and those who declined were not significantly different in demographic and clinical characteristics.

DESIGN AND PROCEDURES

The protocol for the randomized clinical trial was approved by the institutional review board, and informed consent was obtained. Data used in this study came from baseline and 6-month follow-up interviews conducted by a clinical psychologist and trained research assistants using the measures described later. The design, procedures, randomization, and methods for the trial have been reported previously, and are summarized herein. Participants were assigned, using computer-generated random numbers, to 1 of 3 conditions: self-management program, tape-recorded health education program, or waiting list. The self-management program was a 6-week 12-hour AMD education program based on social cognitive theory and knowledge of the psychosocial impact of AMD on the daily lives of subjects. The tape-recorded education condition consisted of a series of 12 hours of health lectures. Procedures were in place to keep the treatment assignment of subjects unknown to the interviewer (eg, staff and subjects were briefed not to reveal the treatment arm to the interviewers, and the interviewers were naive as to the study hypotheses).

Trained personnel measured the subjects’ visual acuity with habitual correction (ie, current glasses) using Snellen chart ratings in an examination room with standardized lighting conditions. Subjects were encouraged to use their peripheral sight for this examination when appropriate. All data were double entered.

The self-management program was held in the community conference room of the Department of Ophthalmology, University of California, San Diego, with 8 to 10 participants. Didactic presentations and group problem solving with guided practice were used in the sessions led by an experienced professional in public health and behavioral medicine (B.L.B.). The components of the self-management intervention consisted of the following: (1) cognitive elements, including information about AMD, services, reevaluation of barriers, and positive challenges; and (2) behavioral elements, such as communication about AMD, problem solving using vignettes, modeling of adaptive behaviors, and a simple exercise program.

MEASURES

Primary Outcome Measure

The Profile of Mood States (POMS), a 65-item self-report, was used to assess emotional distress during the previous week.

Secondary Outcome Measure

The National Eye Institute Visual Functioning Questionnaire–25 with appendixes was administered to assess impairment in vision-related functioning. An overall summary scale (National Eye Institute Visual Function Questionnaire [NEI-VFQ]) was created using the average of the 12 subscales.

Mediator Variables

The 11-item Duke Social Support Index (DSSI) was used to measure satisfaction with the frequency, content, and quality of support and social interaction with family and friends.

The AMD Self-efficacy Scale (AMD-SEQ), a 13-item self-report, was used to evaluate the degree of self-confidence in the individual’s ability to handle situations related to AMD.
Table 1. Demographic and Clinical Characteristics of Participants With Age-related Macular Degeneration*

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Self-management Group (n = 82)</th>
<th>Tape-recording Group (n = 66)</th>
<th>Waiting List Group (n = 66)</th>
<th>All Participants (N = 214)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>80.51 (7.09)</td>
<td>81.28 (5.26)</td>
<td>80.29 (5.26)</td>
<td>80.82 (6.15)</td>
<td>.73</td>
</tr>
<tr>
<td>Range</td>
<td>60-99</td>
<td>67-91</td>
<td>66-91</td>
<td>60-99</td>
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<tr>
<td>Education, y</td>
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<td></td>
<td></td>
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<tr>
<td>Mean (SD)</td>
<td>13.72 (2.94)</td>
<td>13.70 (3.34)</td>
<td>13.88 (2.50)</td>
<td>13.76 (2.93)</td>
<td>.93</td>
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<tr>
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<td>3-21</td>
<td>8-21</td>
<td>9-21</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23 (28.0)</td>
<td>23 (34.8)</td>
<td>23 (34.8)</td>
<td>69 (32.2)</td>
<td>.60</td>
</tr>
<tr>
<td>Female</td>
<td>59 (72.0)</td>
<td>43 (65.2)</td>
<td>43 (65.2)</td>
<td>145 (67.8)</td>
<td></td>
</tr>
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<td>Hollingshead level†</td>
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<td></td>
<td></td>
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<tr>
<td>I</td>
<td>14 (17.1)</td>
<td>15 (22.7)</td>
<td>8 (12.1)</td>
<td>37 (17.3)</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>34 (41.5)</td>
<td>28 (42.4)</td>
<td>32 (48.5)</td>
<td>94 (43.9)</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>24 (29.3)</td>
<td>12 (18.2)</td>
<td>15 (22.7)</td>
<td>51 (23.8)</td>
<td>.28</td>
</tr>
<tr>
<td>IV</td>
<td>10 (12.2)</td>
<td>9 (13.6)</td>
<td>11 (16.7)</td>
<td>30 (14.0)</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>0</td>
<td>2 (3.0)</td>
<td>0</td>
<td>2 (0.9)</td>
<td></td>
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<tr>
<td>Marital status</td>
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<td></td>
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<tr>
<td>Single</td>
<td>41 (50.0)</td>
<td>40 (60.6)</td>
<td>42 (63.6)</td>
<td>123 (57.5)</td>
<td>.21</td>
</tr>
<tr>
<td>Married</td>
<td>41 (50.0)</td>
<td>26 (39.4)</td>
<td>24 (36.4)</td>
<td>91 (42.5)</td>
<td></td>
</tr>
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<td>Living arrangement</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lives alone</td>
<td>24 (29.3)</td>
<td>29 (45.9)</td>
<td>27 (40.9)</td>
<td>80 (37.4)</td>
<td>.14</td>
</tr>
<tr>
<td>Lives with others</td>
<td>58 (70.7)</td>
<td>26 (54.1)</td>
<td>39 (59.1)</td>
<td>134 (62.6)</td>
<td></td>
</tr>
<tr>
<td>Log of best eye, mean (SD)‡</td>
<td>1.09 (0.41)</td>
<td>1.14 (0.44)</td>
<td>1.11 (0.42)</td>
<td>1.11 (0.42)</td>
<td>.75</td>
</tr>
<tr>
<td>Log of best eye frequencies †</td>
<td>0.477-0.499</td>
<td>0.500-0.999</td>
<td>1.000-1.499</td>
<td>1.500-2.000</td>
<td></td>
</tr>
<tr>
<td>Time since diagnosis, mo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>62 (75.6)</td>
<td>50 (75.8)</td>
<td>53 (80.3)</td>
<td>165 (77.1)</td>
<td>.48</td>
</tr>
<tr>
<td>No</td>
<td>20 (24.4)</td>
<td>16 (24.2)</td>
<td>13 (19.7)</td>
<td>49 (22.9)</td>
<td></td>
</tr>
<tr>
<td>Depressed subjects</td>
<td>19 (23.2)</td>
<td>14 (21.2)</td>
<td>18 (27.3)</td>
<td>51 (23.8)</td>
<td>.40</td>
</tr>
</tbody>
</table>

*Data are given as number (percentage) of each group unless otherwise indicated. Percentages may not total 100 because of rounding.
†Level I indicates major business or professional; II, medium business or professional; III, skilled worker; IV, semiskilled worker; and V, unskilled.
‡Log value (LV) 0.477=Snellen rating (SR) 20/60, LV 0.499=SR 20/80, LV 0.699=SR 20/100, LV 1.000=SR 20/200, LV 1.30=SR 20/400, and LV 2.60=SR 20/8000.

Classification of Depression

The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (SCID research version), is the standard method for identifying current major and minor symptomatic depression, was administered.

Measures of Clinical and Demographic Characteristics and Vision

The visual acuities of the better and worst eyes and the weighted acuity (0.75, better eye; and 0.25, worst eye) were obtained using the Snellen ratings, and then converted to the logMAR scale.

The Health and Impact Questionnaire, a medical history including current medical conditions, medications, living arrangements, educational level, and occupation, was administered. The principal occupation and educational level of the main wage earner was used in the Hollingshead Two Factor Index of Social Position.

STATISTICAL ANALYSIS

Statistical analyses were conducted using statistical software (Statistica for Windows, version 6). Descriptive statistics were used to characterize the sample data at baseline and to examine potential covariates to be included in the analysis. Unpaired t tests and χ² tests were used to detect any differences at baseline. The Pearson r was used to determine the relationship between baseline outcome measures (POMS and NEI-VFQ) and the mediator measures (DSSI and AMD-SEQ), and potential covariates to the outcome measures among the demographic and clinical characteristics. Repeated-measures analyses of variance were performed with 2 between-subject factors, treatment (2 levels: self-management program vs control) and status (2 levels: depressed vs nondepressed at baseline), and 1 within-subject factor, time point (2 levels: baseline and 6-month follow-up). Covariates found significant were included in an analysis of covariance model. Forward stepwise multiple regression analyses (with an F to enter set at 0.05 as the selection criterion) were used to determine any relationship between the changes in scores on emotional distress (POMS), functioning (NEI-VFQ), the mediators (ie, the changes in scores in perceived social support [DSSI]), and self-efficacy (AMD-SEQ). When necessary to satisfy the assumptions of normality and homogeneity of variances, data transformations were performed. Thus, square root transformations on the POMS and logarithmic transformations on the DSSI were performed, where appropriate.
using the 2-tailed Fisher exact test. Missing data were casewise deleted.

The primary hypothesis regarding the primary outcome measure (POMS) led to the following a priori predictions, which were analyzed using planned comparisons: (1) the participants in the self-management group would experience a significant improvement in emotional distress from baseline to the 6-month follow-up compared with the control groups; and (2) the participants in the self-management group identified as depressed according to the SCID would experience a significant improvement in emotional distress from baseline to the 6-month follow-up not only compared with the nondepressed participants but also compared with the depressed participants in the control groups. The secondary hypothesis for the secondary outcome measure (NEI-VFQ) and the mediator measures (DSSI and AMD-SEQ) led to the same a priori predictions as for the POMS. No differences in the changes on the SCID were anticipated because the SCID was used as a categorical independent variable. The purpose of this SCID was to place patients into diagnostic categories as independent variables. The dependent variables included the POMS and the NEI-VFQ. We focused on continuous rather than categorical variables because they are more sensitive to clinical change. The statistical significance level was set at .05.

With the sample size of this study, there was a power of 0.80 to detect a difference of 0.5 of a standard deviation (a moderate effect size)\(^2\) between groups on the primary outcome measure, which was the total score on the POMS. Randomization resulted at baseline in no differences between the 3 groups on demographic and clinical factors (Table 1). The attrition rate between baseline and follow-up was not significantly different across the 3 groups (\(P > .05\)). Also, the subjects who dropped out were not significantly different on demographic and clinical factors from the subjects who remained in the study (\(P > .05\)). The number of depressed subjects in the 3 groups (\(P > .05\)) was not significantly different at baseline. Depressed subjects were no more likely to drop out of the study (\(P = .87\)). As shown in Table 2, the depressed and nondepressed subjects were similar, including being legally blind in the better eye, except that the depressed subjects had somewhat poorer vision (\(P = .04\)). There were no adverse events. Change scores between the tape-recording and the waiting list groups were not statistically significant (\(P > .05\)). These groups were, therefore, collapsed into one control group. There was no difference between the self-management and control groups in the proportion of patients who reported receiving antidepressants outside the context of the study at baseline (8.5% vs 12.0%; \(P = .43\)) or at follow-up (11.0% vs 14.4%; \(P = .47\)).

### RESULTS

Randomization resulted at baseline in no differences between the 3 groups on demographic and clinical factors (Table 1). The attrition rate between baseline and follow-up was not significantly different across the 3 groups (\(P > .05\)). Also, the subjects who dropped out were not significantly different on demographic and clinical factors from the subjects who remained in the study (\(P > .05\)). The number of depressed subjects in the 3 groups (\(P > .05\)) was not significantly different at baseline. Depressed subjects were no more likely to drop out of the study (\(P = .87\)). As shown in Table 2, the depressed and nondepressed subjects were similar, including being legally blind in the better eye, except that the depressed subjects had somewhat poorer vision (\(P = .04\)). There were no adverse events. Change scores between the tape-recording and the waiting list groups were not statistically significant (\(P > .05\)). These groups were, therefore, collapsed into one control group. There was no difference between the self-management and control groups in the proportion of patients who reported receiving antidepressants outside the context of the study at baseline (8.5% vs 12.0%; \(P = .43\)) or at follow-up (11.0% vs 14.4%; \(P = .47\)).
Stepwise multiple regression analyses were performed to examine whether the changes in social support and self-efficacy from baseline to follow-up at 6 months were related to changes in emotional distress (POMS) and/or changes in functioning (NEI-VFQ). The analyses on the POMS revealed that change in self-efficacy was the only significant mediator for change in emotional distress and only in the self-management group (β = −.40 [95% CI, −0.62 to −0.19]; P = .002). On the NEI-VFQ, these analyses revealed that only the changes in self-efficacy were significantly related to the improvement in functioning and only in the self-management group (β = .31 [95% CI, 0.08 to 0.53]; P = .02).

In addition, the analysis of variance on AMD self-efficacy revealed an interaction (F1,207 = 7.64, P = .006) indicating that the participants in the self-management program reported increased self-efficacy between baseline and the 6-month follow-up compared with the control group (Table 3). As was found for emotional distress and visual functioning, there was a 3-way interaction (F1,207 = 4.29, P = .04) indicating that the depressed participants in the self-management group were more likely to benefit from the program than any other subgroup (Table 4). While the nondepressed participants in the self-management program reported increased self-efficacy, it was not significantly different from the increase reported by the nondepressed subjects of the control group. Furthermore, the latter increase was not significantly different from the increase reported by the depressed subjects of the control group, thereby leaving the increase reported by the depressed participants in the self-management program as the only significant improvement (Table 4). This analysis further identifies self-efficacy as pivotal in decreasing emotional distress and increasing function for the participants in the self-management program.

Finally, analyses were performed to examine the depression status of participants in the self-management group compared with controls at the 6-month follow-

### PRIMARY ANALYSIS

There was a significant 2-way interaction (F1,209 = 7.10, P = .008) indicating that participants in the self-management program showed reduced emotional distress on the POMS from baseline to the 6-month follow-up (Table 3 shows the planned contrasts). There was also a 3-way interaction (F1,209 = 14.51, P < .001) indicating that the depressed participants in the self-management group reported a reduction in emotional distress compared with the nondepressed and depressed participants in the control group, as predicted (Table 4 shows the planned contrasts).

### SECONDARY ANALYSES

The self-management program was effective in increasing functioning, as revealed by the analysis of variance. Visual acuity was a covariate to visual function and was, therefore, included in the analysis of covariance. There was a significant 2-way interaction (F1,205 = 3.83, P = .05) indicating that participants in the self-management program showed increased visual functioning from baseline to the 6-month follow-up (Table 3 shows the planned contrasts). A 3-way interaction (F1,205 = 6.32, P = .01) indicated that the depressed participants in the self-management program reported an increase in functioning compared with the nondepressed and depressed participants in the control group, as predicted (Table 4 shows the planned contrasts).

At baseline, there was a moderate correlation between the level of self-efficacy (AMD-SEQ) and the extent of emotional distress (POMS) (r121 = −0.50; 95% confidence interval [CI], −0.62 to −0.39) and the level of functioning (NEI-VFQ) (r133 = 0.44; 95% CI, 0.32 to 0.56), showing that subjects reporting less distress and better functioning also were more likely to report that they had greater self-efficacy. For the other mediator (DSSI), the correlations were weak (−0.28 ≤ r ≤ 0.15).

### Table 3. The POMS, NEI-VFQ, and AMD Self-efficacy Data for the Self-management and Control Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of Participants</th>
<th>Total Score, Unweighted (Mean, SD)</th>
<th>Difference</th>
<th>95% Confidence Interval</th>
<th>Planned Contrasts for Change*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-management</td>
<td>82</td>
<td>60.61 (29.96)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>132</td>
<td>55.46 (31.04)</td>
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</tr>
<tr>
<td>Self-management</td>
<td>80</td>
<td>56.08 (14.49)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>131</td>
<td>54.72 (14.08)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-management</td>
<td>80</td>
<td>67.25 (16.33)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>132</td>
<td>69.00 (15.09)</td>
<td>NA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Abbreviations: AMD, age-related macular degeneration; NA, data not applicable; NEI-VFQ, National Eye Institute Visual Function Questionnaire; POMS, Profile of Mood States.

*From baseline to postintervention, within groups.
There was no difference in the proportion of change from depression to nondepression between the intervention and control groups (10 [12.2%] of 82 subjects vs 14 [10.6%] of 132 subjects; \( P = .44 \)). However, the difference in incidence of depression was significant, with fewer participants in the intervention group becoming depressed compared with controls, indicating that participation in the self-management program contributed to a reduction in depression. Thus, the results at 6 months provide more compelling evidence for the effectiveness of the AMD self-management program that were reported previously. As a consequence, the 6-month follow-up was a significant reduction in the overall proportion of depressed participants among the self-management program participants compared with the controls (15 [18.3%] of 82 subjects vs 41 [31.1%] of 132 subjects; \( P = .04 \)) (risk ratio, 0.49; 95% CI, 0.25 to 0.97).

Among 252 subjects in the trial at baseline, 214 (84.9%) completed the 6-month follow-up assessment. The study population was composed of cognitively intact elderly women and men who had poor eyesight because of advanced AMD and were living in the community. Approximately 24% met the criteria for major or minor depression on the SCID, which is the standard method for identifying depression. There was no difference in attrition at the 6-month follow-up between the self-management program participants and the controls or between the depressed and nondepressed subgroups. This high rate of follow-up was notable because the mean age was older than 80 years in this study sample.

The effectiveness of the AMD self-management program was assessed with widely used measures of mood and disability. The improvements after participation in the AMD self-management program that were reported previously were sustained at the 6-month follow-up. The effects did not diminish with time, but rather became more pronounced. At the 6-month follow-up, we also found that participants in the self-management group were significantly less likely to become depressed than the controls. This indicates that the self-management program provided a way to ward off depressive episodes that otherwise would occur in many patients with this incurable disease. Thus, the results at 6 months provide more compelling evidence for the effectiveness of the AMD self-management program.

Most behavioral interventions either do not report follow-up or, if there is follow-up, the beneficial effects at postintervention diminish with time. Notable excep-
tions are cognitive-behavioral skills–based programs similar to this AMD self-management program, such as the studies of patients with melanoma and arthritis. In the present study, emotional distress continued to decline during the 6-month period and self-efficacy continued to increase among the self-management group participants, particularly those who were depressed. These findings suggest that the increased self-confidence engendered from participating in the self-management program may have had a positive impact in dealing with the challenges of AMD, which in turn improved mood and function. This stronger correlation at the 6-month follow-up adds support to the pivotal role of increased self-efficacy in the dynamic of how the self-management program reduced distress. This is consistent with a central concept of self-management.

At the 6-month follow-up, we continued to find that the benefits of reduced distress and improved function in the self-management program were seen, particularly in the depressed subjects. As noted previously, it is possible that the POMS had a floor effect or that the non-depressed subjects had already maximized their potential for adaptation to advanced AMD, at least in terms of mood and function, because they reported significantly lower levels of distress and higher levels of function at baseline. Whatever the reason why some elderly patients with advanced AMD adapt and cope better, there was an obvious distinction between the 2 groups.

The depression status was similar in the self-management and control groups at baseline. At the 6-month follow-up, approximately half of those clinically depressed in both groups were no longer depressed. This finding is not surprising because clinical depression is known to resolve or remit in some patients.

In contrast, at the 6-month follow-up, the incidence of depression in the control group was more than twice that in the self-management group. Although this intervention was not expected to treat depression, it seemed to have a remarkable influence on preventing new cases of depression. As a consequence, this points to the AMD self-management program as an effective approach that may provide resources to protect against the development of depression that otherwise would occur in many patients with advanced AMD.

In addition, the examination of the changes in depression status of the controls provided a window on the natural history of depression in a population of patients with advanced AMD, and indicated the following. First, without intervention, depression seemed to ebb and flow rather than resolve in most patients over time as an adaptation to vision loss, as might have been thought. Second, the burden of major and minor depression in this population was likely to be greater than identified at baseline. The rate of 31.0% found in the controls at 6 months is probably closer to the actual rate.

This study was limited to subjects who had advanced AMD, were cognitively intact, and had no visual loss due to other diseases. It is not known if these findings would apply to all AMD patients, how the benefits of the AMD self-management intervention fared over more than 6 months, or why some adjust to AMD better than others. We are examining the latter in studies under way.

Because many subjects with advanced AMD are not candidates for further surgical or medical treatment, the AMD self-management program may serve to provide an avenue of therapeutic optimism for coping with the effects of advanced AMD and improving quality of life.

This study was not designed to identify the specific mechanism underlying the treatment effect. However, we believe that the intervention promotes self-efficacy and that these changes in self-efficacy mediate changes in outcome. This finding is consistent with several other reports in the literature.

This AMD self-management program was more than standard cognitive-behavioral training. As described previously, the program's cognitive and behavioral components were specifically designed and performed based on insights derived from a previous study of the psychosocial impact of advanced AMD in the daily life of patients. Professionals who were experts in working with this population carefully orchestrated all aspects to increase patients' expectations of successfully dealing with the effects of advanced AMD. Questions and concerns about AMD were generated by the group and then addressed by an ophthalmologist. Low-vision aids and services were discussed. Problem-solving skills training, including goal setting, action plans, new ways to think about their situations, role playing, and modeling of the behaviors to be changed, was provided in an enjoyable and stimulating manner. We believe that the combined effects interrupted the overwhelming sense of loss and empowered participants to feel less helpless and more hopeful. This was based on new information and new skills to achieve small and then bigger successes that fostered engagement in personally meaningful activities. Future research is under way to attempt to identify the specific behavioral mechanism associated with these outcomes.

In summary, this self-management intervention offers an encouraging addition to current treatments for an ever-growing aging population with AMD, and seems suitable for an eye clinic setting. At the 6-month follow-up, the described intervention resulted in improvement in mood and function; increased confidence in coping abilities, specifically among depressed and nondepressed AMD patients; and aided in the prevention of depression.

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