

The Impact of Psychological Interventions on Medical Cost Offset: A Meta-analytic Review

Jeremy A. Chiles, Valley Mental Health

Michael J. Lambert and Arlin L. Hatch, Brigham Young University

The impact of psychological interventions on the use of medical services was evaluated by examining the outcome of 91 studies published between 1967 and 1997 using meta-analytic techniques and percentage estimates. Psychological treatments included various forms of psychotherapy, behavioral medicine, and psychiatric consultation. Patients included those undergoing medical procedures such as surgery, patients with a history of overutilization, and patients being treated only for psychological disorders including substance abuse. Results provided evidence for a medical cost-offset effect, specifically in the domain of behavioral medicine. Average savings resulting from implementing psychological interventions was estimated to be about 20%. About one third of the articles demonstrated that dollar savings continued to be substantial even when the cost of providing the psychological intervention was subtracted from the savings. The role of moderating variables such as patient age and type of problem was analyzed and discussed.

Key words: medical cost offset, meta-analysis, psychotherapy outcome, overutilization of medical services, behavioral medicine. [*Clin Psychol Sci Prac* 6: 204-220, 1999]

The rising cost of health care has become a major concern. In 1965 Americans spent \$41.7 billion on health care needs, compared to \$250.1 billion in 1980, \$540 billion in 1988, and \$751.8 billion in 1991. Further, 9.6% of the Gross National Domestic Product was spent on health

care in 1981 but reached over 15.0% in 1994 (Cockerham, 1995). At this rate, it is anticipated that \$5,551 will be spent per person annually on health in the year 2000 (Cockerham, 1995). It is not surprising that a variety of measures have been taken by the insurance industry and government to contain costs. Incidental to these efforts is the discovery that psychological interventions may reduce general medical costs. In recent years, this has been referred to as the "medical cost-offset effect."

Based on a variety of research studies, there is reason to believe that an offset effect may exist. First, there is a growing body of literature that suggests people with mental health problems go to medical doctors and medical clinics for treatment of physical disorders rather than emotional disorders. For example, Shapiro (1971) reported nationally based estimates indicating that 50–80% of medical visits are by persons without any identifiable physical problem. Second, unwarranted physician visits and overutilization of medical care also occurs in patients who experience co-occurring medical and psychological complaints. Fulop and Strain (1991), Gabbard, Lazar, Hornberger, and Spiegel (1997), Goldberg (1995), and Jencks (1985) identified psychiatric disorders including mood disorders, anxiety disorders (e.g., Generalized Anxiety Disorder, Panic Disorder, Phobic Disorder), substance abuse disorders, psychotic disorders, and adjustment disorders that are common in patients who excessively seek medical services. Overutilization has also been observed in rape victims (Kimerling & Calhoun, 1994).

Of these disorders, depressive and anxiety disorders seem to be the most prevalent. Studies have reported that 20–40% of patients who report fatigue in primary care medicine suffer from depression (e.g., Cathebras, Robbins, & Kirmayer, 1992; Goldberg, 1995; Walker,

Address correspondence to Michael J. Lambert, 272 Taylor Building, Brigham Young University, Provo, UT 84602.

Katon, & Jemelka, 1993). Fulop and Strain (1991) reported that 20–25% of medical inpatients experienced excessive anxiety. Cassem (1990) has also documented the existence of Panic Disorder, Social Phobia, Obsessive-Compulsive Disorder, and Generalized Anxiety Disorder in patients seeking medical attention. Anxiety disorders were found in 17% of Parkinsonian patients and ranged from 16% to 83% in patients with a variety of heart conditions (Cassem, 1990).

Because medical patients' mental health can impact the treatment and recovery process, medical hospitals and clinics are likely to see greater length of stay for patients who also have psychological problems (Cohen, Shapiro, Manson, & Kondi, 1985; Fulop, Strain, Fahs, Hammer, & Lyons, 1989; Levenson, Hamer, & Rossiter, 1990; Saravay & Lavin, 1994; Saravay, Steinberg, Weinschel, Pollack, & Alovis, 1991). Specifically, review articles (Candilis & Pollack, 1997; Simon & Katzelnick, 1997) indicate that depression and anxiety are associated with increased use of general medical services. From a medical administrator's viewpoint, increased length of stay translates into higher patient costs, and a higher overall cost of providing medical services. This, in turn, translates into decreased hospital and clinic resources available to other patients, as well as increased costs that must be passed on to the patient, other taxpayers, and the insured public. Persistent, unexplained medical symptoms also have a negative impact on patient social and vocational functioning with their attendant costs (Katon, 1996).

With the American health care system's gravitation toward managed health care, the focus has been on increasing the efficiency and cost-effectiveness of service and delivery (Budman, Simeone, Reilly, & Demby, 1994; Gatchel, Baum, & Krantz, 1989; Klein, Brabender, & Fallon, 1994). Considering this trend, higher utilization of medical services by those with psychological disturbance becomes especially important. The research presented above strongly suggests that mental health problems are related to the use of primary medical care services, and it seems reasonable to suggest that the implementation of psychological interventions in primary care medical facilities could decrease mental health problems resulting in overall decreases in medical care costs and a medical cost offset.

Mumford, Schlesinger, Glass, Patrick, and Cuerdon (1984) reported a meta-analytic review of the offset effect. Their meta-analysis examined data from 58 articles pub-

lished prior to 1984 to determine whether mental health treatment reduced medical utilization and cost. To analyze this issue, Mumford et al. performed two separate meta-analyses. The first consisted of a meta-analytic review of the cost-offset literature. The second involved a meta-analytic review of health insurance claims files. Out of these two reviews came two primary findings. First, "the clearest cost-offset effect appears largely in the reduction of inpatient rather than outpatient costs" (p. 1156). In medical cost offset literature, inpatient generally refers to patients hospitalized for a variety of medical illnesses. Inpatients tend to include those patients who are hospitalized for surgical purposes, or those who seek medical services for chronic medical conditions (e.g., cancer, cardiovascular diseases, diabetes, etc.). The second major finding was that "older patients [over age 55] show larger cost-offset effects than younger ones" (p. 1156).

Although Mumford et al. (1984) answered some questions regarding inpatient versus outpatient utilization and according to age of individuals benefiting from mental health treatment, many questions pertaining to the offset effect remain unanswered. Mumford et al. neglected to separate the literature according to the specific mental health intervention utilized, study characteristics, or severity of psychological and medical symptomatology. It is also unclear as to whether the reduction in costs for inpatients was attributable to behavioral medicine and health psychology interventions or whether the offset effect resulted from traditional psychotherapy. Mumford et al.'s review is now somewhat dated. It is for these reasons that a meta-analysis on the medical offset literature was conducted, which includes current studies as well as studies utilized by Mumford et al. in their 1984 meta-analysis. The goal of the present meta-analysis was to examine the various components involved in medical offset, as well as their effect on medical length of stay, visits, and cost.

The present meta-analytic review attempts to address a number of cost-offset questions. First, is there a measurable medical cost-offset effect in the extant literature? Second, are there particular psychological interventions or specific treatment settings (i.e., behavioral medicine in hospital settings or psychotherapy in mental health outpatient clinics) that have an increased offset effect? Third, is there a demonstrated difference in the offset effect between inpatient hospital offset studies where medical utilization is the focus and outpatient mental health offset

studies where medical utilization is only a piece in a much larger psychological puzzle? Fourth, what characteristics or qualities of specific patient groups make them more likely to benefit from psychological intervention? Fifth, are behavioral medicine and other psychological interventions cost-effective in terms of "offset" savings exceeding the cost of the interventions? Sixth, if an offset effect exists in the literature, to what mechanism of change (e.g., mental health intervention or medical system response) can this reduction in medical costs, inpatient length of stay, or outpatient medical visits be attributed?

METHOD

Literature Search

Articles pertinent to the study of offset effects were identified through several approaches. First, a computer search was conducted for the period January 1967 through July 1997, using the old and new Psychlit and Medline databases. "Cost-offset" search terms including medical offset effect, cost-offset, cost-by-cost-analysis, medical care costs, and cost-effectiveness were crossed with psychotherapy-related terms including mental health treatment, psychotherapy, substance abuse counseling, and psychiatric consultation. These search terms were then crossed with psychiatric/psychological and medical diagnostic categories including anxiety, depression, somatization, cancer, and heart disease to identify additional articles.

To broaden the search, reference sections from post-1984 medical offset research articles were examined for studies pertinent to the analysis (e.g., Goldberg, 1995; Saravay & Lavin, 1994; Strain, Hammer, & Fulop, 1994). Pre-1984 articles on medical offset, as identified in the Mumford et al. (1984) meta-analysis, were added to the study. All the articles identified from the above procedures were used to identify other articles by using them as references to search the Social Sciences Citation Index and Science Citation Index for more recent articles. The reference lists of all articles were used to identify further references.

Design and Reporting Requirements

For inclusion in the present study, articles were required to contain information regarding the effects of mental health treatment on patients in primary medical care settings. Mental health treatment, used synonymously with psychological intervention herein, was defined as any intervention intended to reduce psychological distress and maladaptive behavior or enhance adaptive behavior and

copied skills through counseling, structured training (i.e., behavioral medicine and psychoeducation), or consultation to determine and assess patient concerns and needs. More specifically, obtained articles were included or excluded from the meta-analysis based on criteria established in Mumford et al. (1984) and Saravay and Lavin (1994). Inclusion/exclusion criteria included the following: (1) *N* of the study large enough to calculate either percentage and/or effect-size data; (2) a psychological intervention defined as an independent variable while also being described in enough detail to allow it to be categorized as either psychotherapy, behavioral medicine, psychoeducation, psychiatric consultation, or some derivation of the examples listed; (3) outcome measures reported and pertinent to some aspect of patient medical utilization (e.g., length of hospital stay, cost of treatment, use of medications or X-rays, and/or number of patient medical visits); (4) design either experimental or quasi-experimental; (5) pre and post outcome data to calculate percentage and/or effect-size values reported for an experimental intervention group with a comparison group preferred.

Outcome Studies Generated by the Search

A pool of 91 studies (marked with an asterisk in the Reference section) with 128 different treatment groups were chosen based on the inclusion/exclusion criteria.¹ The studies had been published between 1967 and 1997. Across the 91 studies, the age of the subjects ranged from less than 1 to 100 years. The idea of psychological intervention with a child less than 1 year old may seem implausible. Because of this, we should note that studies involving rather young children employed such techniques as parent-training to manage children's fears, worries, and acting-out.

Coding of the Studies

Studies were coded for patient demographics (e.g., mean age, age range, gender, prior therapy experience), treatment settings (e.g., outpatient mental health clinics or inpatient medical hospitals), provider training (e.g., psychologist, psychiatrist, social worker, substance abuse counselor), types of intervention as previously stated, outcome measures as previously listed, cost of psychological intervention, and experimenter bias. Effect-size and percentage calculations were carried out independently of coding to avoid contamination. An undergraduate research team, trained to code empirical articles, used a

coding sheet and coding format to independently code 25% of the selected studies.² Mean interrater agreement (κ) across pairs of coders reached 90% agreement ($\kappa = .90$) for all coded categories.

Statistics Used to Calculate Effect-Size Values

Effect-size values were calculated from the outcome statistics reported in each study (e.g., significance levels, means and standard deviations, χ^2 tests, t -tests, F -tests) using the DSTAT computer software package (Johnson, 1989) according to the within-study meta-analysis formula $d = (M_1 - M_2)/Sp$, where d is the estimated effect size, M_1 and M_2 (typically the control group) are the posttest means of the groups being compared, and Sp is the pooled within-group standard deviation of the posttest (Cohen, 1977). Thus, an effect size of 1.00 would indicate that the M_1 group achieved an effect one standard deviation above that obtained by the M_2 group. It could then be stated that the average person in the M_1 group achieved an outcome that was better than 84% of the people in the M_2 group. Likewise, an effect size of -1.00 would indicate that the average person in the M_1 group fared worse than 84% of the subjects in the M_2 group. The formula was utilized to calculate effect-size values directly comparing treatment groups with control groups and allowed for an estimate of the treatment group's efficacy relative to control groups. Additionally, effect-size values were calculated for studies consisting only of a treatment group. In these cases, effect-size values were calculated comparing pre- to posttreatment effects.

Effect-size values, using the techniques above, were calculated to obtain an overall effect-size value, along with effect-size values for various relevant medical offset characteristics identified in the literature. These characteristics analyzed in the meta-analysis were grouped, and average effect-size values were calculated for each category. Each averaged effect-size value was examined using a t -test to determine whether it differed significantly from zero. In addition, either a t -test or an ANOVA was conducted to assess whether comparisons within characteristic groupings differed significantly from each other.

Issues Involved in Calculation of Effect-Size Values: Problems, Assumptions, and Solutions

Since it is common for outcome studies to utilize more than one outcome measure within a given study, it is problematic to simply average effect-size values across studies to obtain an overall effect size comparing treat-

ment and control groups. This practice gives studies using the greatest number of outcome measures undue weight in the average effect size produced. Accordingly, effect-size values from any given study were averaged so that one effect size was obtained from each study. The overall effect size was then a function of these average within-study effect-size values.

Furthermore, effect-size values were calculated within each characteristic group that was coded. This means that an average effect size was calculated for each level of each characteristic, and the difference between these effect-size values was tested for statistical significance. For example, effect-size values were calculated for psychotherapy and for psychoeducation. Testing differences between each characteristic of interest allowed for a statistical test of the difference between the effect-size values under these two conditions. Post hoc comparisons were calculated for each of the coded characteristic groups. Statistically significant differences between two group means were estimated using t -tests. A significance level of .05 based on a two-tailed t -test was the standard accepted for detection of a statistically significant difference between effect-size values.

In addition to testing effect-size values for significant differences between groups, effect-size values were evaluated independently to determine the magnitude of the effect. The size and magnitude of effect-size values were based on Cohen's (1969, 1977) explanation of what constitutes small, medium, and large effect-size values. A table demonstrating the transformation of d values to r^2 values is found in Cohen (1969, p. 20). A small effect size ($d = .2$) would be interpreted to mean that the likelihood of the treatment being responsible for the outcome is minimal. A medium effect size ($d = .5$) "is conceived as one large enough to be visible to the naked eye" (Cohen, 1969, p. 24). Although this appears to be a small amount of attributable variance, it is enough to account for moderate differences resulting from treatment effects. A large effect size ($d = .8$) was interpreted to mean that 14% of the variance is attributed to the difference between the treatment and the comparison group (Cohen, 1969).

Statistics Used to Calculate Percentage Change and Difference Among Groups

Although some offset articles did not report data necessary to calculate effect-size values, they did contain percentage data useful in understanding and identifying trends in the offset literature. Utilizing statistics from Mumford et al.

(1984), additional formulas were used to calculate percentage change and difference within and between groups for various outcome measures (e.g., hospital length of stay, medical costs, or clinic visits).

One procedure was utilized to determine percentage change within groups (i.e., pretrial and posttrial differences), and another procedure was used to calculate percentage difference between groups (e.g., differences between experimental and control groups). The formula for calculating percentage change within groups is $PC = (Post - Pre)/Pre$, where PC is the within-group percentage change, and Pre and Post are the pre- and postgroup means for either the experimental group or control group. The percentage change is calculated for experimental and control groups separately. PC is calculated by dividing the difference between the posttrial and pretrial means by the pretrial mean. This yields a percentage change between the pre- and posttrial outcome measure. For example, a percentage change of -10.5% observed between the means in the pretrial and posttrial an experimental group (e.g., psychological treatment group) indicates that the particular psychological treatment led to a -10.5% change in mean value within groups for the outcome measured (e.g., hospital length of stay). In this example, the average length of stay for these subjects decreased by 10.5% following psychological intervention. Therefore, the average length of stay was reduced resulting in an offset effect.

The percentage difference between groups (e.g., experimental and control) was calculated using two formulas. First, percentage differences were calculated for studies that only measured outcome following intervention in experimental and control groups, as opposed to measuring outcome before and after an intervention. The formula used was $PD = (ME - MC)/MC$, where PD is the percentage difference between experimental and control groups, ME is the experimental group postmean, and MC is the control group postmean. Subtracting the control group mean from the experimental group mean and dividing by the control group mean provided a percentage difference between the two groups on the outcome variable measured.

When outcomes were measured before and after an intervention for each group, a different formula was used. Because pretrial and posttrial means within groups allowed for percentage change to be calculated, a between-groups percentage difference was obtained by

the formula $x = C_1 - C_2$, where x is the percentage difference, C_1 is the percentage change in the experimental group, and C_2 is the percentage change in the control group. The percentage difference between experimental and control groups was obtained by subtracting the control group percentage change from the experimental group percentage change. For example, an experimental group (e.g., psychotherapy) demonstrates a 50% decrease in clinic visits, and a control group demonstrates a 10% increase in clinic visits. Subtracting the control group percentage from the psychotherapy group percentage yields a 60% difference between the groups.

The percentage formulas listed above pertain to calculating percentage estimates for a particular study. To combine percentage estimates across studies, two techniques were used. The first technique involved averaging every comparison in all the studies to come up with one percentage for the experimental group, control group, and experimental-control combined. The second technique involved averaging percentages within each study, so that there was only one percentage reported for each individual study in the experimental, control, and experimental-control compared conditions. This is different from the first technique where each individual study could have a number of independent percentage estimates contributing to the total averaged percentage estimate. For the within-study percentages, studies were combined and averaged to come up with the experimental, control, and experimental-control combined percentage estimates.

Percentage change and percentage difference statistics were calculated for all 91 studies. Percentage change was calculated separately for experimental and control groups within each study. Percentage difference for individual studies was then calculated through a comparison of the change percentages in the control (where such groups existed) and experimental groups.

Description of Studies Analyzed

An examination of the 91 studies included in this review indicated that 40% of the studies took place in inpatient medical settings (e.g., public and private hospitals, VA medical centers), while the remaining 60% were conducted in outpatient medical, substance abuse, or psychological facilities. Therapy orientations at each of these settings ranged from behavioral to cognitive-behavioral and from psychodynamic to interpersonal. A problem with an overwhelming majority of the studies, however,

Table 1. Average percentage differences, average LOS in hospital following treatment, average per person savings, for treatment-control, pre-post only, and studies combined

	Percentage Difference			Average Hospital LOS in days	Estimated Savings ^a per Person
	Treatment Group	Control Group	Total		
Treatment-comparison	-7.89 ^b	13.74 ^b	-20.71 ^b		
	-15.70 ^c	12.27 ^c	-25.08 ^c	-2.52	\$2,205.00
Pre-post experimental only	-32.48 ^b		-32.56 ^b		
	-33.79 ^c		-34.72 ^c	-3.32	\$2,905.00
Studies combined	-17.80 ^b	13.74 ^b	-24.14 ^b		
	-23.57 ^c	12.27 ^c	-28.06 ^c	-2.01	\$1,758.75

^aBased on an estimated cost of \$875 per day (Cockerham, 1998).

^bRepresents the sum of every percentage from all 91 studies, averaged across the total number of percentage estimates calculated.

^cRepresents the sum of each study's combined percentage difference, totaled across the 91 studies and averaged.

was a failure to operationally define the type of interventions employed in the study. Many studies not only were unclear as to the treatments utilized but also neglected to state the theoretical orientation within which they were operating. Heterogeneity is a problem regarding type of intervention employed and setting of experiment. Attempts to control for heterogeneity regarding psychological intervention and experimental setting involved separating out and grouping studies where homogeneity of study characteristics was available.

The studies analyzed herein were broad in the range of patients treated. Patients were treated for a variety of medical disorders (e.g., surgery procedures [22%], emergency visits and general medical visits [78%]) and psychological disorders (e.g., substance abuse [18%], depression, anxiety), with many subjects meeting criteria for dual psychological and medical diagnoses of varying severity levels.³ Twenty-nine percent of the studies included a formal design to address psychological or medical disorder severity issues. The subject populations making up the studies were heterogeneous regarding age, gender, psychological and medical disorder, and the setting in which they were treated. The problem of subject heterogeneity was partially controlled for by creating characteristic groupings containing studies with similar subject groups.

Regarding mechanism of change issues, 32% of the articles took steps to control for experimental bias as related to medical system response. The impact of psychological well-being on medical cost offset with the use of psychological outcome measures was addressed in 32% of the articles.

RESULTS

Analysis of Percentage Change and Difference Among Groups

Of the 91 studies analyzed, 90% reported a decrease in medical utilization following some form of psychological intervention. Table 1 summarizes average improvement rates. Percentages are reported for studies that included a contrast between treated patients and control patients. Percentage data reported in the "treatment-comparison" condition in Table 1 indicate that the average treatment group exhibited a reduction in utilization across all dependent variables within a study by 15.7%, while the control group utilization rate increased an average of 12.27%.⁴ Dollar savings for one of the dependent measures—length of hospital stay—were estimated based on an average reduction of 2.52 hospital days per person.⁵ The savings per person was then estimated to be \$2,205.00 (projected savings data are based on an average one day hospital cost of \$875 in 1993; Cockerham, 1998).

The dollar estimate reported above is a projected dollar amount. This same process could be conducted with doctor visits, prescriptions, or other outcome measures. Length of stay in hospitals was chosen because it is a common outcome measure in the medical offset literature. Additional estimations of savings in dollars are presented in Table 1, which are based on pre-post experiment only groups and treatment-comparison groups combined with pre-post experiment-only groups. Savings of 20–30% were reported across cost-offset articles. Furthermore, of the 28 articles that report dollar savings, 31% reported savings after the cost of mental health treatment was subtracted from the original savings figure. Two out of the 28 articles reporting dollar savings indicated that costs of

Table 2. Effectiveness of psychological intervention by comparison group: weighted and unweighted

Treatment Group × Design Type	N of Studies	Effect Size		95% Confidence Interval	p*
		M	SE		
Unweighted					
Treatment-comparison group	40	.34	.17	.25-.43	.001
Pre-post experimental only group	17	.24 ^b	.12	.18-.30	.001
Weighted					
Treatment-comparison group	40	.34	.17	.25-.43	.001
Pre-post experimental only group	17	.16 ^b	.08	.15-.17	.001

*Significance levels are based on a *t*-test examining whether the effect sizes differ significantly from zero.

^bThe *t*-value for testing significance of difference between the effect-size values of the unweighted and weighted group means is *t* = 2.33, *p* < .025, *df* = 32.

mental health treatment exceeded savings resulting from the intervention.

Preliminary Analysis of Effect-Size Values

Heterogeneity of effect sizes across studies can be a confound in meta-analysis that requires attention. Heterogeneity in the analysis of effect size indicates that when observed independently the estimates do not represent the overall mean effect size. In this study, heterogeneity was statistically significant for both groups analyzed (treatment-comparison analysis, $Q[39] = 225.22, p < .001$; experimental pre-post test only analysis, $Q[16] = 66.81, p < .001$). Mean effect-size values for 57 individual studies ranged from $-.74$ to 1.79 .⁶ Homogeneity of effect-size values were such that no one effect-size value, if eliminated, significantly altered the overall mean effect-size value. As a result, no outliers were identified.

Another possible confound in analyzing effect-size values across multiple studies is that studies reporting larger effect-size values tend to have less weight in the meta-analysis because they usually involve smaller sample sizes and larger variances than do smaller effect-size values (Weisz, Weiss, Han, Granger, & Morton, 1995). As a result, overall effect-size values are reported for weighted and unweighted analyses for 40 treatment-comparison group articles (weighted = .34, unweighted = .34; both significantly different from 0, $p < .001$), and 17 experimental pretest/posttest only articles (weighted = .16, unweighted = .24; both significantly different from 0, $p < .001$; weighted vs. unweighted comparison, *t*-test = 2.33, $p < .025$; see Table 2). The weighted versus unweighted effect-size values for the treatment-comparison group are not statistically significant, which indicates that large and small *N* studies did not exhibit

differences large enough to be impacted by weighting procedures. The weighted versus unweighted effect-size values for the experimental pre-post test only group did follow the trend commonly found following weighting procedures; that is, studies with a smaller *N* had slightly larger effect sizes.

Although experimental pre-post test only studies do not have the rigor of treatment-comparison studies, effect-size data were still reported to make comparisons between the two designs. Contrary to our expectations, within-study comparisons had larger rather than smaller average effect-size values.

Characteristic Groupings

Based on the literature review, it was anticipated that various study characteristics within this meta-analysis would be differentially related to the overall mean effect size. Analyzing characteristics contributing to the overall effect-size estimate is essential to identify components of the offset literature where an offset is most pronounced.

Table 3 compares outcomes across treatment settings, types of treatment, combined treatment settings, and types of treatment (i.e., behavioral medicine in medical hospital and psychotherapy in outpatient mental health clinic), types of medical conditions, provider training, gender, and age, including *N* of studies, effect-size values, confidence intervals, significance levels from zero, and significance levels between comparisons in each characteristic category.

Treatment Settings. Analysis of treatment setting effects revealed marginally significant ($p < .10$) results, with a marginally larger mean effect size for inpatient (.53) than outpatient (.23) settings (see Table 3). This suggests that

Table 3. Effect sizes for variable groups, analyzed with meta-analytic procedures

	N of Studies	Effect Size		95% Confidence Interval	p*
		M	SE		
Treatment setting conditions					
Treatment-control group					
Outpatient settings	16 ^b	.23	.11	.06 to .71	.01
Inpatient settings	18 ^b	.53	.26	.25 to .81	.001
Pre-post treatment group					
Outpatient settings	11	.32	.16	.21 to .43	.001
Inpatient settings	4	.19	.09	.16 to .22	.001
Type of treatment conditions					
Treatment-control group					
Psychotherapy or equivalent	21 ^c	.20	.10	.01 to .39	.03
Psychoeducation (includes behavioral medicine)	15 ^c	.52	.25	.27 to .76	.001
Substance abuse counseling	4	.26	.13	.13 to .40	.001
Pre-post treatment group					
Psychotherapy or equivalent	15	.28	.14	.22 to .34	.001
Psychoeducation (includes behavioral medicine)	1	.03	.01	-.01 to .07	.13
Substance abuse counseling	1	1.37	.57	1.12 to 1.62	.001
Behavioral medicine in medical settings versus psychotherapy in outpatient mental health clinics					
Treatment-control group					
Behavioral medicine	16 ^d	.52	.25	.37 to .67	.001
Psychotherapy	11 ^d	.21	.10	.06 to .36	.004
Pre-post treatment group					
Behavioral medicine	4	.47	.23	.07 to .87	.02
Psychotherapy	8	.14	.07	.10 to .18	.001
Subject medical conditions					
Treatment-control group					
Presurgery	11 ^e	.69	.33	.35 to 1.02	.001
Mixed-medical	18 ^e	.26	.13	.07 to .45	.003
Pre-post treatment group					
Presurgery	1	.28	.14	-.17 to .73	.23
Mixed medical	7	.37	.18	.10 to .64	.01
Behavioral medicine with surgical patients	9	.71	.33	.60 to .81	.001
Provider training conditions					
Treatment-control group					
Psychologist	11 ^f	.27	.13	.04 to .49	.002
Psychiatrist	10 ^f	.18	.09	.00 to .36	.04
Pre-post treatment group					
Psychologist	12	.24	.12	.19 to .29	.001
Psychiatrist	3	.26	.13	-.04 to .56	.10
Gender conditions					
Treatment-control group					
100% Male	3 ^g	.26	.13	.11 to .40	.001
100% female	2 ^g	.82	.38	.19 to 1.45	.01
Pre-post treatment group					
100% male	1	.39	.19	.16 to .62	.001
100% female	1	.32	.16	-.17 to .81	.22
Age conditions					
Treatment-control group					
Child (ages 0-18)	2 ^h	.35	.17	.03 to .67	.04
Adult (ages 19-65)	4 ^h	.12	.06	-.09 to .32	.28
Elderly (ages 66 and up)	2 ^h	.34	.17	.19 to .49	.001
Pre-post treatment group					
Child (ages 0-18)	1	.87	.40	.14 to 1.60	.03
Adult (ages 19-65)	4	.33	.16	.08 to .58	.01
Elderly (ages 66 and up)	1	.28	.14	-.17 to .73	.23

*Significance levels are based on a *t*-test examining whether the effect sizes differ significantly from zero.

^bThe *t*-value for testing the significance of the difference between effect-size values of these two group means is $t = 2.00, p < .10, df = 32$.

^cPsychotherapy and psychoeducation mean effect-size values were contrasted via a *t*-test with a resulting *t* value of 2.35, $p < .05, df = 34$.

^dBehavioral medicine in hospital settings and psychotherapy in outpatient mental health clinics mean effect size values were contrasted via a *t*-test: $t = 1.82, p < .05, df = 25$.

^eThe *t*-value for the mean effect-size values in this comparison is 2.49, $p < .02, df = 27$.

^fThe *t*-value for significance of difference between the effect-size values of these group means is .69, $p < .20, df = 19$.

^gThe *t*-value for testing the significance of the difference between effect-size values of these two group means is $t = 2.52, p < .05, df = 3$.

^hThe *F* value for testing the significance of the difference between the effect-size values of these three group means is $F = 4.78, p < .10, df$ (between) = 2, df (within) = 5.

patients undergoing medical procedures that require inpatient care (e.g., surgery patients, cancer patients, heart condition patients) may account for a larger offset effect than patients who seek outpatient medical care (e.g., doctor visits for illness, accidents, skin conditions, gynecological checkups, or infections), although more studies are needed in the analysis before the differences would reach statistical significance.

Types of Treatment. Treatment characteristics were grouped into three categories: psychotherapy or equivalent, instruction or psychoeducation, and substance abuse counseling. The psychotherapy condition consisted of psychiatric consultation, crisis intervention, short-term psychotherapy, relaxation training, and group therapy. Psychoeducation included behavioral medicine, biofeedback, vocational training, and specific instructions on how to improve and what sensations to expect following surgery. Substance abuse treatment in individual and group format targeted individuals with substance abuse and dependence disorders. Only the comparison between psychotherapy and psychoeducation was tested for significance because there were too few substance abuse studies. When comparing psychoeducational techniques that included behavioral medicine studies with psychotherapy, there was a significant effect ($p < .05$), with significantly larger effects for psychoeducation (.52) than for psychotherapy (.20; see Table 3). This result suggests that the more specific psychoeducational interventions were more effective regardless of the settings in which they occurred.

Combined Treatment Setting and Treatment Type. Combining treatment setting and types of treatment into a behavioral medicine in medical settings condition versus psychotherapy in outpatient mental health clinics condition yielded additional results. When comparing behavioral medicine with psychotherapy in their disparate settings, there was a significant effect ($p < .05$), with significantly larger effects for behavioral medicine (.52) than for psychotherapy (.21).

Subject Medical Condition. Subject medical variables consisted of two conditions: patients hospitalized for surgical procedures (mean effect size = .69), and subjects seeking treatment at inpatient and outpatient medical settings for various medical difficulties (mean effect size = .26; see

Table 3). The results suggest that patients hospitalized for surgical procedures and other hospitalized patients are affected by mental health interventions, but interventions have a greater impact on the recovery of surgery patients than on mixed-medical patients ($p < .02$).

Behavioral Medicine With Surgery Patients. Analysis of the various behavioral medicine procedures indicated statistical significance in cost-offset studies that combined the use of behavioral medicine with surgical procedures. This resulted in a Presurgery \times Behavioral Medicine interaction analysis (see Table 3). Of the 12 studies included, 75% (nine studies) reported statistics necessary for calculation of effect-size values. Of those nine studies, each one met criteria for inclusion in the treatment-control group category. Furthermore, of the 12 studies, 83% (10 studies) were conducted prior to 1980. The two other studies (Evans & Richardson, 1988; Farren, 1991; effect-size means: 1.09 and .29, respectively) were the only two studies conducted in the past decade. This is surprising considering a mean effect size of .71 for studies implementing behavioral medicine techniques in the 1970s.

Comparison of Psychologists and Psychiatrists. Differences between medical offset outcomes across provider types were confounded by differences in types of intervention employed (see Table 3 for effect-size data). Typically, psychiatrists' roles included providing psychiatric consultation for medical patients in hospital settings. Consultation consisted of talking with patients about how they were feeling and what physical and emotional problems they were experiencing while in the hospital. In the studies analyzed, psychiatric consultation was considered more of an evaluation than actual therapy. Psychologists and social workers primarily interacted with prospective medical utilizers in outpatient mental health centers. The psychologists and social workers typically were responsible for providing individual, family, and group psychotherapy to patients. In contrast to psychiatrists who worked in medical settings with hospital patients, psychologists and social workers worked in outpatient mental health centers with individuals seeking treatment for psychological problems yet prone to overutilization of medical services.

Whether the mental health intervention is being performed by a psychologist, social worker, or psychiatrist was not a significant factor in medical cost offset. Each of these disciplines appear to utilize treatment techniques

that tend to reduce patients' recovery time, resulting in decreased medical care utilization and cost savings but no differential treatment effect.

Gender and Age Comparisons. A minority of studies (five) using a treatment versus comparison design made it possible to study the offset effects of males and females separately. Analyses controlling for gender were statistically significant ($p < .05$), with a significantly larger mean effect size for offset studies with 100% female subjects (.82) than for studies with 100% male subjects (.26; see Table 3).

Of the 57 studies analyzed via meta-analysis, 25% (14 studies) provided results making it possible to separate subjects into three age categories—child (ages 0–18), adult (ages 19–65), and elderly (ages 66 and older). The remaining analyzed articles could not be categorized by age groups because of the heterogeneity of subject ages. A comparison of child versus adult versus elderly effect-size values was marginally significant, $F = 4.78$, $p < .10$, with marginally larger mean effect-size values for child (.35) and elderly (.34) studies than for adult (.12) studies (see Table 3).

Comparison of Studies Conducted Prior to 1984 and Later.

Table 4 compares outcomes for studies conducted prior to 1984 with those published after this date. The results indicate that a comparison between pre-1984 studies and post-1984 studies for treated patients versus controls was marginally significant ($p < .10$), with marginally larger mean effect size for pre-1984 (.49) than for post-1984 (.23) studies. These results were not replicated in studies that used an experimental pre-post test only design.

DISCUSSION

Given the prevalence of psychological symptomatology in medical patients (Gabbard et al., 1997; Strain et al., 1994) and the fact that this symptomatology affects recovery from physical illness (Saravay & Lavin, 1994), it is not surprising that a medical cost-offset effect is present in the present meta-analysis. Analyses of effect size and percentage change across studies included herein yielded positive findings pertaining to the cost offset of psychological interventions used among a wide variety of patients. The most dramatic treatment effects involved the use of behavioral medicine to treat surgical inpatients. Such interventions lead to a significant decrease in length of stay and

Table 4. Effectiveness of psychological intervention for studies pre-1984 and post-1984 by comparison group

Pre-1984 Versus Post-1984	N of Studies	Effect Size		95% Confidence Interval	p^*
		M	SE		
Treatment-control group					
Pre-1984 studies	17	.49 ^b	.24	.27–.71	.001
Post-1984 studies	23	.23 ^b	.11	.08–.37	.002
Pre-post treatment group					
Pre-1984 studies	6	.31	.15	.15–.47	.001
Post-1984 studies	11	.28	.14	.23–.33	.001

*Significance levels are based on a t -test examining whether the effect sizes differ significantly from zero.

^bThe t value for testing significance of difference between the effect-size values of these two group means is $t = 2.00$, $p < .10$, $df = 38$.

an increase in psychological well-being, as is the goal of behavioral medicine. In essence, health psychology and behavioral medicine techniques in the context of surgery offer consistent support for the cost-offset effect.

The effects of behavioral medicine are not exclusive to a specific surgical procedure or patient with a certain psychiatric complication. Improved recovery rates were observed among hip fracture, hysterectomy, cholecystectomy, and cardiac surgery patients with various comorbid psychiatric difficulties. The cost benefit to health care providers and improved mental status among patients make behavioral medicine practices a worthwhile investment for all parties involved, including patients' families. These results suggest that standard surgical protocols ought to include screening of patients and implementation of planned psychoeducational interventions geared toward anxiety reduction and management of expectations for the surgical procedure and the ensuing recovery process. It appears that interest in studying these interventions has waned since the mid-1980s, but that hospital administrators and third-party payers can anticipate substantial cost savings as well as improved patient care and patient satisfaction with the use of such interventions.

Support for the medical cost-offset effect is further relevant in a discussion of the relationship between mental and physical health. It is apparent that medical patients are influenced by psychological sequelae. It is also apparent that comorbidity of medical and psychiatric disorders is prominent. The presence of psychological symptoms and diagnosable psychiatric disorders has the potential to complicate medical procedures, as well as frustrate the recovery process. For these reasons, the present study lends

support for the utility of behavioral medicine practices in medical clinics and hospitals. The level of support for this is high. For example, Lambert and Bergin (1994), who have summarized meta-analytic reviews of psychotherapy outcome, report large effect sizes often in the range of .50–.80 across treatments. Similarly, interventions labeled as behavioral medicine in the present review appear to be associated with an effect size of .52, considered a large effect according to Cohen's (1969) criteria. In contrast, the level of support for psychotherapy as a cost-offset factor in this study is not high. The overall effect for psychotherapy of .21 is a small effect by Cohen's (1969) criteria.

As is evidenced above, assessing the cost-offset effect outside of the medical context becomes more complicated. Behavioral medicine in medical settings is demonstrated to yield a positive offset effect. What is unclear and unproven is a demonstrated offset effect from psychotherapy as employed in outpatient mental health settings where physical complications are generally not the focus. Unlike studies of the direct effects of behavioral medicine, medical cost offset when it is studied in the context of psychotherapy is an indirect consequence of psychotherapy, rather than the intended effect or goal of treatment. Perhaps psychotherapies aimed at improvement of patients' psychological state cannot be expected to reduce medical costs to the same degree as interventions that have offset as a primary goal. It appears that improved experimental design procedures in future offset studies will be the most optimal method for determining the role of outpatient psychotherapy in cost-offset analyses.

Subjects who experience more severe forms of psychological and medical symptomology tend to use medical services at a greater rate than do subjects with acute or less severe symptomology. The pattern found in this analysis lends support for the notion that subjects with severe psychopathology are less impacted by cost-offset interventions than are those with more mild psychological difficulties. Additionally, those with severe psychopathology are also more resistant to cost-offset effects than are subjects with more severe forms of medical pathology. Paradoxically, individuals with severe medical conditions tend to benefit more from mental health treatment whereas individuals with chronic psychopathology are likely to continue to overutilize both psychological and medical resources.

The present meta-analysis is consistent with that published by Mumford et al. (1984) in terms of overall results.

Mumford et al. found 85% of the reviewed studies showed positive results, while the present review demonstrated 90%. In the context of this high frequency of positive findings, the magnitude of effect was about half as large in the more recent years (at least in comparisons involving a control group). This may be a result of the reduction in psychoeducational/surgical studies in the later years (10 of 12 studies of this type were published prior to 1984) or possibly to changes in hospital discharge policies as a function of the growing presence of managed care. It is possible that there is precious little money left to be saved given the bare-bones policies that are becoming prevalent on the U.S. health care scene.

In addition to the benefits of behavioral medicine, other findings are relevant pertaining to the medical offset literature. Because there was a small number of studies that could be classified and used to examine the difference in outcome across gender, age, and the like, it was difficult to draw firm conclusions about many of the variables that were thought to be related to the medical offset effect. While only supported marginally by tests of significance, it appears that older persons had a larger offset than persons aged 18–64. This finding is also consistent with Mumford et al., who reported larger effects in patients older than 55. In addition to the Mumford et al. results, studies of children, although few in number, suggested effect-size values as large as those found with the older patients. Those children who are prone to overutilize medical services appear to decrease their physician visits when provided psychoeducational training and psychotherapy (Finney, Riley, & Cataldo, 1991; Robinson, Schwartz, Magwene, Kregel, & Tamburello, 1989). This finding is consistent with research suggesting that children demonstrate reduced emotional distress and behavior problems when treated with behavioral techniques (e.g., behavioral modification, social skills training, parent training; Colvin, Kameenui, & Sugai, 1993; Graziano & Diamant, 1992; Smith, 1991; Webster-Stratton, 1993; Weisz et al., 1995). Although an offset trend is indicated with children treated with behavioral interventions, more studies are needed to verify this finding.

Based on the magnitude of effect-size values, female patients also appear to respond well to psychological interventions. This is a trend not demonstrated by Mumford et al. (1984). Particularly, female patients undergoing surgical procedures tend to recover postoperatively more quickly when afforded psychoeducation than when not.

It is unclear, though, whether women are more susceptible to cost-offset interventions or whether interventions related to surgery is the key element in cost savings. Due to a paucity of studies controlling for gender, additional research is necessary to identify this as a "clear-cut" variable influencing the cost-offset effect. Particularly, it would be interesting to identify specific gender effects (e.g., personality factors, physiology, stress response, etc.), if any, that are conducive to the medical cost-offset effect.

An incidental finding in the present review is the observation that, in addition to representing cost savings attributed to reduced medical utilization (cost offset), mental health interventions also appear to pay for themselves (are cost-effective) in studies that reported the cost of psychological services. Of the 28 studies that reported the costs of providing psychological interventions, only two indicated that the cost of treatment either exceeded or was equal to the savings that resulted from reduced patient medical utilization. Because approximately one third of the studies reported estimates of psychological treatment costs, this observation is anecdotal and needs more systematic study.

Several limitations to the present study should be highlighted. One limitation pertains to the percentage data presented in this study. Interpretation of percentage difference estimates can be misleading. For example, one study may yield a 60% decrease in length of stay following psychoeducational training for surgery patients. A comparable study may yield a 25% decrease in length of stay. From the looks of these percentages, it appears that the first study demonstrated a larger medical cost-offset effect. A closer look at the results indicate that the first study's experimental group ($N = 14$) had an initial length of stay of 10 days, but a length of stay of 4 days if a psychological treatment was implemented (yielding a 60% decrease in length of stay). The second study's experimental group ($N = 500$) had an initial length of stay of 10 days, but a length of stay of 7.5 days posttreatment (yielding a 25% decrease). At first glance it appears that the first study contains a greater cost-offset effect. A closer look, though, reveals that this is not the case. Even though the first study had a higher percentage decrease in the outcome measure, the second study had many more patients yielding a decrease in the outcome measure. As a result of the larger N , the second group reported a substantially larger dollar figure in medical savings (e.g., average per day hospital cost of \$875; Study 1: Pre-Tx = 10 days \times 14 \times \$875 =

\$122,500, Post-Tx = 4 days \times 14 \times \$875 = \$49,000, total savings = \$73,500; Study 2: Pre-Tx = 10 days \times 500 \times \$875 = \$4,375,000, Post-Tx = 7.5 days \times 500 \times \$875 = \$3,281,250, total savings = \$1,093,750; difference in savings between Study 1 and Study 2 = \$1,020,250). Percentage estimates yield useful outcome information but they need to be interpreted carefully. A small percentage decrease in some situations (e.g., the cost of a routine lab test) can make an enormous impact on the bottom line (and vice versa).

Another limitation present in the offset literature is that only one fourth to one third of the articles made specified efforts to control for competing causal factors to the independent variable, "mental health treatment." Improvement in the percentage of studies that control for experimental bias and use psychological outcome measures to assess psychological functioning will help us better understand whether or not mental health interventions are causal factors leading to offset effects. Future research in this area needs to demonstrate that psychological interventions have their expected impact on psychological symptoms and that this change is subsequently related to reduced costs.

Many of the confounds in the cost-offset literature are a product of sloppy and unsound methodological and design procedures. The following is a list of common confounds identified in various studies reviewed in the present analysis: (1) a failure to control for seriousness of physical/psychiatric disorders; (2) a failure to specify or define the type, duration, and implementation procedures of mental health interventions employed; (3) lack of randomization; (4) failure to control for experimenter bias (e.g., providers discharging patients early to decrease length of stay); (5) a failure to put in place checks to assure that operationally defined treatments were occurring as expected; and (6) a positive or negative impact on the hypothesized treatment effect as a result of heterogeneous patient samples. These and related problems make a statistical review of this research domain difficult, and many of them have been noted in narrative reviews of small subsets of the studies examined in this review (e.g., Gabbard et al., 1997; Strain et al., 1994).

Despite the difficulties, psychological interventions including brief psychotherapy, psychiatric consultation, psychosocial interventions, psychoeducation, and behavioral medicine appear to result in economic savings to some degree. The effectiveness of the various mental

health interventions from a statistical viewpoint, with the exception of behavioral medicine, remains inconsistent despite the many studies reporting economic dividends. Although it is common across the medical offset literature to talk of cost reduction and economic savings, less attention is paid in this literature to the main objective of medical and psychological providers, which is to improve a patient's quality of life. Although many psychological interventions lead to reduced costs while also improving patient's physical and psychological well-being, some mental health treatments may increase costs. As seen with cancer patients, support groups may extend life while actually increasing overall medical expenditures (Friedman, Sobel, Myers, Caudill, & Benson, 1995). In an age of booming health care costs and the watchful eye of managed care organizations, mental health and medical care providers must do their part to balance the patient's quality of life with economic realities (Yates, 1997).

To date, it is a relatively consistent finding across the medical cost-offset literature that behavioral medicine is an effective intervention for reducing unnecessary medical usage and costs. As for the future of the medical cost-offset literature, scientific and clinical efforts still require improvement in screening, in identifying patients receptive to behavioral medicine and other psychological treatments, and in further understanding the role of mental health interventions in physical health. More research with improved rigor is necessary to answer the remaining medical cost-offset questions. More medical effectiveness studies are particularly needed with patients suffering from severe psychological disorders (e.g., borderline personality disorder) and with patients who have disorders that are especially prone to overutilization of services (e.g., panic disorder, somatization disorders). The present review considers studies that were undertaken across a wide variety of payer systems. There is reason to question the extent to which the results generalize to future health care coverage systems. Nevertheless, questions about the impact of psychological interventions on health care costs and recovery from physical disease, as well as the advantages of recognizing and treating psychological disorders in medical patients should be a high priority for future research.

NOTES

1. Individual study data including percentage estimates and effect sizes for the 91 articles selected for this study can be

obtained by contacting Michael J. Lambert at Brigham Young University (801-378-4050).

2. Copies of coding sheet can be obtained by contacting Michael J. Lambert at Brigham Young University (801-378-4050).

3. Percentages for the prevalence of depression, anxiety, and other psychological disorders are not listed because patient groups for individual studies were not homogeneous for psychological disorders.

4. The "total percentage difference" does not equal the "control group percentage difference" subtracted from the "treatment group percentage difference" because the total percentage difference includes percentage estimates from studies that had experimental and comparison conditions and those that only used an experimental condition.

5. The figure reported (2.52) is the mean reduction in hospital days for a single person. This figure was calculated by adding the mean increase or decrease in hospital days per person for each individual study and dividing it by the total number of studies (91).

6. Of the 91 studies included in this study, 57 reported statistics necessary to compute effect-size values. As mentioned previously, all 91 studies provided data needed to calculate percentage estimates.

REFERENCES

References marked with an asterisk indicate studies included in the meta-analysis and percentage calculations.

- *Ackerman, A. D., Lyons, J. S., Hammer, J. S., & Larson, D. B. (1988). The impact of coexisting depression and timing of psychiatric consultation on medical patients' length of stay. *Hospital and Community Psychiatry, 39*, 173-176.
- *Alander, R., & Campbell, T. (1975). An evaluative study of an alcohol and drug recovery program, a case study of the Oldsmobile experience. *Medical Care, 17*(12), 65-66.
- *Andrew, J. M. (1970). Recovery from surgery, with and without preparatory instruction, for three coping styles. *Journal of Personality and Social Psychology, 15*, 223-226.
- *Anonymous. (1969-1976). Insight. *Medical Care, 17*(12), 67-68.
- *Anonymous. (1975a). Two tales of one city: Fire program. *Medical Care, 17*(12), 63-65.
- *Anonymous. (1975b). Two tales of one city: Police program. *Medical Care, 17*(12), 62-63.
- *Borus, J. F., Olendzki, M. C., Kessler, L., Burns, B. J., Brandt, U. C., Broverman, C. A., & Henderson, P. R. (1985). The "offset effect" of mental health treatment on ambulatory medical care utilization and charges. *Archives of General Psychiatry, 42*, 573-580.
- *Brock, C. P., & Boyajy, T. G. (1978). Alcoholism within prepaid group practice HMOs. *Medical Care, 17*(12), 76-79.

- *Bronheim, H., Strain, J. J., Biller, H. F., & Fulop, G. (1989). Psychiatric consultation on an otolaryngology liaison service. *General Hospital Psychiatry, 11*, 95-102.
- *Budd, S., & Brown, W. (1974). Effects of a reorientation technique on postcardiotomy delirium. *Nursing Research, 23*, 341-348.
- *Budman, S. H., Demby, A., & Randall, M. (1982). Psychotherapeutic outcome and reduction in medical utilization: A cautionary tale. *Professional Psychology, 13*, 200-207.
- Budman, S. H., Simeone, P. G., Reilly, R., & Demby, A. (1994). Progress in short-term and time-limited group psychotherapy: Evidence and implications. In A. Fuhriman & G. M. Burlingame (Eds.), *Handbook of group psychotherapy* (pp. 370-415). New York: Wiley.
- *Burton, W. N., Hoy, D. A., Bonin, R. L., & Gladstone, L. (1989). Quality and cost-effective management of mental health care. *Journal of Occupational Medicine, 31*, 363-367.
- Candilis, P. J., & Pollack, M. H. (1997). The hidden costs of untreated anxiety disorders. *Harvard Review of Psychiatry, 5*(1), 40-42.
- Cassem, E. H. (1990). Depression and anxiety secondary to medical illness. *Psychiatric Clinics of North America, 18*, 597-611.
- Cathebras, P. J., Robbins, J. M., & Kirmayer, L. J. (1992). Fatigue in primary care: Prevalence, psychiatric comorbidity, illness behavior, and outcome. *Journal of General International Medicine, 7*, 276-286.
- *Caudill, M., Schnable, R., Zuttermeister, P., Benson, H., & Friedman, R. (1991). Decreased clinic use by chronic pain patients: Response to behavioral medicine intervention. *The Clinical Journal of Pain, 7*, 305-309.
- *Christopherson, B., & Pfeiffer, C. (1980). Varying the timing of information to alter preoperative anxiety and postoperative recovery in cardiac surgery patients. *Heart & Lung, 9*, 854-861.
- Cockerham, W. C. (1995). *Medical sociology* (6th ed.). Englewood Cliffs, NJ: Prentice Hall.
- Cockerham, W. C. (1998). *Medical sociology* (7th ed.). Englewood Cliffs, NJ: Prentice Hall.
- Cohen, J. (1969). *Statistical power analysis for the behavioral sciences*. New York: Academic Press.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (rev. ed.). New York: Academic Press.
- Cohen, L. M., Shapiro, E., Manson, J. E., & Kondi, E. S. (1985). The high cost of treating a psychiatric disorder as a medical/surgical illness. *Psychosomatics, 26*, 453-455.
- Colvin, G., Kameenui, E. J., & Sugai, G. (1993). Reconceptualizing behavior management and school-wide discipline in general education. *Education and Treatment of Children, 16*, 361-381.
- *Comstock, B. S., Kamilar, S. M., Thornby, J. I., Ramirez, J. P., & Kaplan, H. B. (1985). Crisis treatment in a day hospital. *Psychiatric Clinics of North America, 8*, 483-499.
- *Duehrssen, A. (1962). Katamnestiche ergebnisse bei 1004 patienten nach analytischer psychotherapie [Catamnestic results on 1,004 patients after analytic psychotherapy]. *Medical Care, 17*(12), 29-30.
- *Edwards, D., Bucky, S., Coben, P., Fichman, S., & Berry, N. H. (1977). Primary and secondary benefits from treatment for alcoholism. *American Journal of Psychiatry, 134*, 682-683.
- *Egbert, D. L., Battit, G. E., Welch, C. E., & Bartlett, M. K. (1964). Reduction of postoperative pain by encouragement and instruction of patients. *The New England Journal of Medicine, 270*, 825-827.
- *Evans, C., & Richardson, P. H. (1988). Improved recovery and reduced postoperative stay after therapeutic suggestions during general anesthesia. *The Lancet, 8609*, 491-493.
- *Farren, E. A. (1991). Effects of early discharge planning on length of hospital stay. *Nursing Economics, 9*(1), 25-30.
- *Felton, G., Huss, K., Payne, E. A., & Srsic, K. (1976). Preoperative nursing intervention with the patient for surgery: Outcomes of three alternative approaches. *International Journal of Nursing Studies, 13*, 83-96.
- *Fink, R., & Goldensohn, S. (1977). Use of mental health services by Medicaid enrollees in a prepaid medical group practice. *Medical Care, 17*(12), 46-48.
- *Fink, R., Shapiro, S., & Goldensohn, S. S. (1969). Psychiatric treatment and patterns of medical care. *Medical Care, 17*(12), 34-36.
- *Finney, J. W., Lemanek, K. L., Cataldo, M. F., Katz, H. P., & Fuqua, R. W. (1990). Pediatric psychology in primary health care: Brief targeted therapy for recurrent abdominal pain. *Behavior Therapy, 20*, 283-291.
- *Finney, J. W., Riley, A. W., & Cataldo, M. F. (1991). Psychology in primary health care: Effects of brief targeted therapy on children's medical care utilization. *Journal of Pediatric Psychology, 16*, 447-461.
- *Follette, W., & Cummings, N. A. (1967). Psychiatric services and medical utilization in a prepaid health plan setting. *Medical Care, 5*(1), 25-35.
- *Fortin, F., & Kirouac, S. (1976). A randomized controlled trial of preoperative patient education. *International Journal of Studies, 13*, 11-24.
- *Fraser, J. S. (1996). All that glitters is not always gold: Medical offset effects and managed behavioral health care. *Professional Psychology, 27*, 335-344.
- Friedman, R., Sobel, D., Myers, P., Caudill, M., & Benson, H. (1995). Behavioral medicine, clinical health psychology, and cost offset. *Health Psychology, 14*, 509-518.
- *Fries, J. F., Bloch, D. A., Harrington, H., Richardson, N., & Beck, R. (1993). Two-year results of a randomized con-

- trolled trial of a health promotion program in a retiree population: The Bank of America study. *The American Journal of Medicine*, 94, 455–462.
- Fulop, G., & Strain, J. J. (1991). Diagnosis and treatment of psychiatric disorders in medically ill patients. *Hospital and Community Psychiatry*, 42, 389–394.
- Fulop, G., Strain, J. J., Fahs, M. C., Hammer, J. S., & Lyons, J. S. (1989). Medical disorders associated with psychiatric comorbidity and prolonged hospital stay. *Hospital and Community Psychiatry*, 40, 80–82.
- Gabbard, G. O., Lazar, S. G., Hornberger, J., & Spiegel, D. (1997). The economic impact of psychotherapy: A review. *American Journal of Psychiatry*, 154, 147–155.
- Gatchel, R. J., Baum, A., & Krantz, D. S. (1989). *An introduction to health psychology* (2nd ed.). New York: Random House.
- *Goldberg, I. D., Allen, G., Kessler, L., Carey, J. F., Locke, B. Z., & Cook, W. A. (1981). Utilization of medical services after short-term psychiatric therapy in a prepaid health plan setting. *Medical Care*, 12, 672–686.
- *Goldberg, I. D., Krantz, G., & Locke, B. Z. (1970). Effect of a short-term outpatient psychiatric therapy benefit on the utilization of medical services in a prepaid group practice medical program. *Medical Care*, 8, 419–428.
- Goldberg, R. J. (1995). Psychiatry and the practice of medicine: The need to integrate psychiatry into comprehensive medical care. *Southern Medical Journal*, 88, 260–267.
- *Goldensohn, S. S., & Fink, R. (1979). Mental health services for Medicaid enrollees in a prepaid group practice plan. *American Journal of Psychiatry*, 136, 160–164.
- *Graves, R. L., & Hastrup, J. (1978). Effects of psychological treatment on medical utilization in a multi disciplinary health clinic for low income minority children. *Medical Care*, 17(12), 55–56.
- Graziano, A. M., & Diament, D. M. (1992). Parent behavioral training: An examination of the paradigm. *Behavior Modification*, 16(1), 3–38.
- *Hankin, J. R., Kessler, L. G., Goldberg, I. D., Steinwachs, D. M., & Starfield, B. H. (1983). A longitudinal study: Offset in the use of nonpsychiatric services following specialized mental health care. *Medical Care*, 21, 1099–1111.
- *Hankin, J., Steinwachs, D., & Elkes, C. (1980). The impact on utilization of a copayment increase for ambulatory psychiatric care. *Medical Care*, 18, 807–815.
- *Hellman, C. J., Budd, M., Borysenko, J., McClelland, D. C., & Benson, H. (1990). A study of the effectiveness of two group behavioral medicine interventions for patients with psychosomatic complaints. *Behavioral Medicine*, 16, 165–173.
- *Hengeveld, M. W., Ancion, F. A., & Rooijmans, H. G. (1988). Psychiatric consultations with depressed medical inpatients: A randomized controlled cost-effectiveness study. *International Journal of Psychiatry in Medicine*, 18(1), 33–43.
- *Hilker, R. J. (1974). Untitled and unpublished paper presented to the North American Congress on alcohol and drug problems, San Francisco, California. *Medical Care*, 17(12), 61–62.
- *Holder, H. D., & Blose, J. O. (1986). Alcoholism treatment and total health care utilization and costs. *Journal of the American Medical Association*, 256, 1456–1460.
- *Holder, H. D., & Blose, J. O. (1987). Mental health treatment and the reduction of health care costs: A four-year study of U.S. federal employees enrollment with the Aetna Life Insurance Company. *Advances in Health Economics and Health Services Research*, 8, 157–174.
- *Holder, H. D., & Blose, J. O. (1992). The reduction of health care costs associated with alcoholism treatment: A 14-year longitudinal study. *Journal of Studies on Alcohol*, 53, 293–302.
- *Holder, H. D., & Hallan, J. B. (1976). A study of health insurance coverage for alcoholism for California state employees. *Medical Care*, 17(12), 70–72.
- *Holder, H. D., & Hallan, J. B. (1986). Impact of alcoholism treatment on total health care costs: A six-year study. *Advances in Alcohol & Substance Abuse*, 6(1), 1–15.
- *Houts, C. B., Turbett, J. A., Arnold, L. E., & Kruse, E. (1985). Cost of medical/surgical pediatric hospital days preventable by psychiatric treatment. *Journal of the American Academy of Child Psychiatry*, 24, 227–230.
- *Hunter, H. (1978). Arizona health plan cost-benefit study. *Medical Care*, 17(12), 74–76.
- *Jacobs, D. F. (1987). Cost-effectiveness of specialized psychological programs for reducing hospital stays and outpatient visits. *Journal of Clinical Psychology*, 43, 729–735.
- *Jameson, J., Shuman, L. J., & Young, W. W. (1978). The effects of outpatient psychiatric utilization on the costs of providing third-party coverage. *Medical Care*, 17(12), 44–46.
- Jencks, S. F. (1985). Recognition of mental distress and diagnosis of mental disorder in primary care. *Journal of the American Medical Association*, 253, 1903–1907.
- Johnson, B. T. (1989). *DSTAT: Software for the meta-analytic review of research literatures*. Hillsdale, NJ: Erlbaum.
- *Johnson, J. E., Fuller, S. S., Endress, M. P., & Rice, V. H. (1978). Altering patients' responses to surgery: An extension and replication. *Research in Nursing and Health*, 1, 111–121.
- *Johnson, J. E., Rice, V. H., Fuller, S. S., & Endress, M. P. (1978). Sensory information, instruction in a coping strategy, and recovery from surgery. *Research in Nursing & Health*, 1(1), 4–17.
- Katon, W. (1996). Panic disorder: Relationship to high medical utilization, unexplained physical symptoms, and medical costs. *Journal of Clinical Psychiatry*, 57, 11–22.
- *Kessler, L. (1978). Episodes of psychiatric care and medical utilization in a prepaid group practice. *Medical Care*, 17(12), 56–61.
- *Kessler, L. G., Steinwachs, D. M., & Hankin, J. R. (1982).

- Episodes of psychiatric care and medical utilization. *Medical Care*, 20, 1209–1221.
- Kimerling, R., & Calhoun, K. S. (1994). Somatic symptoms, social support, and treatment seeking among sexual assault victims. *Journal of Consulting and Clinical Psychology*, 62, 333–340.
- Klein, R. H., Brabender, V., & Fallon, A. (1994). Inpatient group therapy. In A. Fuhrman & G. M. Burlingame (Eds.), *Handbook of group psychotherapy* (pp. 370–415). New York: Wiley.
- *Klerman, G. L., Budman, S., Berwick, D., Weissman, M. M., Damico-White, J., Demby, A., & Feldstein, M. (1987). Efficacy of a brief psychosocial intervention for symptoms of stress and distress among patients in primary care. *Medical Care*, 25, 1078–1088.
- *Klimes, I., Mayou, R. A., Pearce, M. J., Coles, L., & Fagg, J. R. (1990). Psychological treatment for atypical non-cardiac chest pain: a controlled evaluation. *Psychological Medicine*, 20, 605–611.
- *Kogan, W. S., Thompson, D. J., Brown, J. R., & Newman H. F. (1975). Impact of integration of mental health service and comprehensive medical care. *Medical Care*, 13, 934–942.
- Lambert, M. J., & Bergin, A. E. (1994). The effectiveness of psychotherapy. In A. E. Bergin & S. L. Garfield (Eds.), *The handbook of psychotherapy and behavior change* (4th ed., pp. 143–189). New York: Wiley.
- *Langer, E. J., Janis, I. L., & Wolfer, J. A. (1975). Reduction of psychological stress in surgical patients. *Journal of Experimental Social Psychology*, 11, 155–165.
- *Leigh, J. P., Richardson, N., Beck, R., Kerr, C., Harrington, H., Parcell, C. L., & Fries, J. F. (1992). Randomized controlled study of a retiree health promotion program. *Archives of International Medicine*, 152, 1201–1206.
- *Levenson, J. L. (1991). Experimental study of psychiatric consultation for unrecognized psychopathology in general medical inpatients. *Psychiatric Medicine*, 9, 593–606.
- Levenson, J. L., Hamer, R. M., & Rossiter, L. F. (1990). Relation of psychopathology in general medical inpatients to use and cost of services. *American Journal of Psychiatry*, 147, 1498–1503.
- *Levenson, J. L., Hamer, R. M., & Rossiter, L. F. (1992). A randomized controlled study of psychiatric consultation guided by screening in general medical inpatients. *American Journal of Psychiatry*, 149, 631–637.
- *Levitan, S. J., & Kornfeld, D. S. (1981). Clinical and cost benefits of liaison psychiatry. *American Journal of Psychiatry*, 138, 790–793.
- *Lindeman, C. A., & Aernam, B. V. (1971). Nursing intervention with the presurgical patient—the effects of structured and unstructured preoperative teaching. *Nursing Research*, 20, 319–332.
- *Lindeman, C. A., & Stetzer, S. L. (1973). Effect of preoperative visits by operating room nurses. *Nursing Research*, 22(1), 4–16.
- *Longobardi, P. G. (1981). The impact of a brief psychological intervention on medical care utilization in an army health care setting. *Medical Care*, 19, 665–671.
- *Lorig, K., Kraines, R. G., Brown, B. W., & Richardson, N. (1985). A workplace health education program that reduces outpatient visits. *Medical Care*, 23, 1044–1054.
- *Lorig, K. R., Mazonson, P. D., & Holman, H. R. (1993). Evidence suggesting that health education for self-management in patients with chronic arthritis has sustained health benefits while reducing health care costs. *Arthritis and Rheumatism*, 36, 439–446.
- *Lunn, C. R. (1976). Remarks. *Medical Care*, 17(12), 69.
- *Lyons, J. S., Hammer, J. S., Strain, J. J., & Fulop, G. (1986). The timing of psychiatric consultation in the general hospital and length of hospital stay. *General Hospital Psychiatry*, 8, 159–162.
- *Marcus, S. E., Pincus, H. A., Goldman, H. H., & Wallen, J. (1987). Factors associated with the use of psychiatric consultations in short-term general hospitals. *Psychosomatic Medicine*, 49, 508–522.
- *Massad, P. M., West, A. N., & Friedman, M. J. (1990). Relationship between utilization of mental health and medical services in a VA hospital. *American Journal of Psychiatry*, 147, 465–469.
- *McHugh, J. P., Kahn, M. W., & Heiman, E. (1977). Relationships between mental health treatment and medical utilization among low-income Mexican American patients: Some preliminary findings. *Medical Care*, 15, 439–444.
- *Mechanic, D., Cleary, P. D., & Greenley, J. R. (1982). Distress syndromes, illness behavior, access to care and medical utilization in a defined population. *Medical Care*, 20, 361–372.
- Mumford, E., Schlesinger, H. J., Glass, G. V., Patrick, C., & Cuerdon, T. (1984). A new look at evidence about reduced cost of medical utilization following mental health treatment. *American Journal of Psychiatry*, 141, 1145–1158.
- *Olbrisch, M. E. (1981). Evaluation of a stress management program for high utilizers of a prepaid university health service. *Medical Care*, 19, 153–159.
- *Olson, M. (1991). Primary care patients who refuse specialized mental health services. *Archives of International Medicine*, 151, 129–132.
- *Pallak, M. S., Cummings, N. A., Dorken, H., & Henke, C. J. (1993). Managed mental health, Medicaid, and medical cost offset. *New Directions for Mental Health Services*, 59, 27–40.
- *Pallak, M. S., Cummings, N. A., Dorken, H., & Henke, C. J. (1994). Medical costs, Medicaid, and managed mental health treatment: The Hawaii study. *Managed Care Quarterly*, 2(2), 64–70.

- *Patterson, D. Y., & Bise, B. (1978). Report pursuant to contract #282-77-0219-MS. *Medical Care*, 17(12), 51-54.
- *Rapkin, D. A., Straubing, M., & Holroyd, J. C. (1991). Guided imagery, hypnosis and recovery from head and neck cancer surgery: An exploratory study. *International Journal of Clinical and Experimental Hypnosis*, 39, 215-226.
- *Regier, D. A., Goldberg, I. D., Burns, B. J., Hankin, J., & Hoepfer, E. W. (1977). Epidemiological and health services research findings in four organized health/mental health service settings. *Medical Care*, 17(12), 49-51.
- *Richman, A. (1990). Does psychiatric care by family practitioners reduce the cost of general medical care? *General Hospital Psychiatry*, 12, 19-22.
- *Risser, N. L., Strong, A., & Bither, S. (1980). The effect of an experimental teaching program on post-operative ventilatory function: A self-critique. *Western Journal of Nursing Research*, 2, 485-500.
- *Robinson, J. S., Schwartz, M. M., Magwene, K. S., Kregel, S. A., & Tamburello, D. (1989). The impact of fever health education on clinic utilization. *American Journal of Diseases of Children*, 143, 698-704.
- *Rosen, J. C., & Wiens, A. N. (1979). Changes in medical problems and use of medical services following psychological intervention. *American Psychologist*, 34, 420-431.
- Saravay, S. M., & Lavin, M. (1994). Psychiatric co-morbidity and length of stay in the general hospital: A critical review of studies. *Psychosomatics*, 35, 233-252.
- Saravay, S. M., Steinberg, M. D., Weinschel, B., Pollack, S., & Alovis, B. A. (1991). Psychological co-morbidity and length of stay in the general hospital. *American Journal of Psychiatry*, 148, 324-329.
- *Schlesinger, H. J., Mumford, E., Glass, G. V., Patrick, C., & Sharfstein, S. (1983). Mental health treatment and medical care utilization in a fee-for-service system: Outpatient mental health treatment following the onset of a chronic disease. *American Journal of Public Health*, 73, 422-429.
- *Schmitt, F., & Wooldridge, P. J. (1973). Psychological preparation of surgical patients. *Nursing Research*, 22, 108-116.
- Shapiro, A. K. (1971). Placebo effects in medicine, psychotherapy and psycho-analysis. In Garfield, S. L., & Bergin, A. E. (Eds.), *Handbook of psychotherapy and behavior change: An empirical analysis* (pp. 439-473). New York: John Wiley.
- *Sherman, R. M., Reiff, S., & Forsythe, A. B. (1979). Utilization of medical services by alcoholics participating in an outpatient treatment program. *Alcoholism: Clinical and Experimental Research*, 3, 115-120.
- *Simmons, J. W., Avant, W. S., Demski, J., & Parisher, D. (1988). Determining successful pain clinic treatment through validation of cost effectiveness. *Spine*, 13, 342-344.
- Simon, G. E., & Katzelnick, D. J. (1997). Depression, use of medical services and cost-offset effects. *Journal of Psychosomatic Research*, 42, 333-344.
- Smith, C. (1991). Child psychiatry training. *Australian and New Zealand Journal of Psychiatry*, 25, 304-307.
- *Smith, G. R., Monson, R. A., & Ray, D.C. (1986). Psychiatric consultation in somatization disorder. *The New England Journal of Medicine*, 314, 1407-1413.
- Strain, J. J., Hammer, J. S., & Fulop, G. (1994). APM task force on psychosocial interventions in the general hospital inpatient setting: A review of cost-offset studies. *Psychosomatics*, 35, 253-262.
- *Strain, J. J., Lyons, J. S., Hammer, J. S., Fahs, M., Lebovits, A., Paddison, P. L., Snyder, S., Strauss, E., Burton, R., Nuber, G., Abernathy, T., Sacks, H., Nordlie, J., & Sacks, C. (1991). Cost offset from a psychiatric consultation-liaison intervention with elderly hip fracture patients. *American Journal of Psychiatry*, 148, 1044-1049.
- *Surman, O. S., Hackett, T. P., Silverberg, E. L., & Behrendt, D. M. (1974). Usefulness of psychiatric intervention in patients undergoing cardiac surgery. *Archives of General Psychiatry*, 30, 830-835.
- *Uris, J. (1974). Effects of mental health utilization and diagnosis on general medical care utilization in a prepaid clinic setting. *Medical Care*, 17(12), 39-40.
- *Vickery, D. M., Golaszewski, T. J., Wright, E. C., & Kalmer, H. (1988). The effect of self-care interventions on the use of medical service within a Medicare population. *Medical Care*, 26, 580-588.
- Walker, E. A., Katon, W. J., & Jemelka, P. R. (1993). Psychiatric disorders and medical care utilization among people in the general population who report fatigue. *Journal of General Internal Medicine*, 8, 436-440.
- Webster-Stratton, C. (1993). Strategies for helping early school-aged children with oppositional defiant and conduct disorders: The importance of home-school partnerships. *School Psychology Review*, 22, 437-457.
- *Weiner, M. F. (1992). Group therapy reduces medical and psychiatric hospitalization. *International Journal of Group Psychotherapy*, 42, 267-275.
- Weisz J. R., Weiss, B., Han, S. S., Granger, D. A., & Morton, T. (1995). Effects of psychotherapy with children and adolescents revisited: A meta-analysis of treatment outcome studies. *Psychological Bulletin*, 117, 450-468.
- Yates, B. T. (1997). From psychotherapy research to cost-outcome research: What resources are necessary to implement which therapy procedures that change what processes to yield which outcomes. *Psychotherapy Research*, 7, 345-364.

Received May 20, 1998; revised November 11, 1998; accepted November 24, 1998.