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Can Psychological Interventions Reduce Mortality Rates in Patients with Coronary Heart Disease and Cancer? A Review of Randomized Trials

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This paper reviews evidence on the impact of psychological interventions on survival in patients suffering from one of two leading causes of death in developed countries: coronary heart disease and cancer. "Psychological interventions" in this context refers to those procedures commonly thought of as psychotherapy. Studies employing randomized controlled trials (RCTs) are considered. While there are inconsistencies in the literature, there is promising evidence on the potential for psychotherapy to affect survival from these two diseases. Beneficial effects on survival have been documented in about half of the controlled trials that have been reported in the literature. Limitations of these findings are considered and promising directions for future research identified.

Keywords: Psychological interventions; Mortality; Coronary heart disease; Cancer; Review.

Introduction

With the reductions in mortality from infectious disease over the last century, chronic disease has become the leading cause of death in most Western countries. In most of these, the highest rates of mortality are due to coronary heart disease (CHD) and cancer (see Anderson, 2001). In recent years there have been significant improvements in the knowledge regarding the nature of these illnesses, particularly with respect to their etiology and prevention (e.g., Adami, Day, Trichopoulos, & Willett, 2001; McGovern et al., 2001).

While most modern treatments for both CHD and cancer emphasize surgical and pharmacological interventions, there is growing evidence that psychosocial factors may be implicated in both the origin and progression of these illnesses (e.g., Courtney, Longnecker, Theorell, & de Verdier, 1993; Krantz et al., 1989;

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Temoshok, 1985). At the same time, there has been an increase in research on the usefulness of psychological therapies for treating individuals suffering from heart disease or cancer (e.g., Fawzy et al., 1993; Kuchler et al., 1999). The rationale for use of psychological interventions among such patient populations typically relates to their ability to improve quality of life by way of arming patients with better coping skills, or through the provision of emotional support. Systematic evaluations of the effectiveness of such interventions have therefore, centred primarily on such outcome measures as general quality of life indicators, the treatment's ability to moderate affective states such as anxiety and depression, and behavioural measures related to adoption of specific adaptive coping skills. However, since it provides the most powerful indicator of a treatment's overall effectiveness, mortality rate (or viewed alternatively, survival time) might logically be considered the strongest measure of "success" when interventions in the surgical and pharmacological domains are evaluated (Ahrens, 1994).

The introduction of psychological interventions as part of a broad treatment regimen is often justified through suggestions that such treatments influence physical health (Hemingway & Marmot, 1999; Rozanski, Blumenthal, & Kaplan, 1999). For example, smoking reduction programs are promoted as a means to reduce lung cancer and other tobacco-related health problems (e.g., Rodu & Cole, 1996; Russell et al., 1998). As such, there are significant grounds for asking if psychological interventions do, in fact, have an appreciable impact on health status (e.g., whether these interventions could prove useful in reducing death rates associated with cases of life-threatening illnesses, such as cancer and CHD).

The present review summarizes randomized trials (RTs) evaluating the impact of psychological interventions on survival outcomes for patients diagnosed with either CHD or cancer. Although there are limitations associated with the RT, it is widely considered the strongest research design for establishing causal effect. The rigorous nature of the randomized trial (e.g., procedures of random assignment, an assurance that subjects are administered a fixed amount of the treatment in question, and use of target outcomes operationalized according to specific diagnostic criteria) helps ensure confounding factors are kept to a minimum.

To be included in this review, trials must have had a minimum sample size per group of at least 25. We have therefore, excluded several earlier studies which had important heuristic value and stimulated work in this area (e.g., Ashton et al., 1997; Blumenthal et al., 1997; Fielding, 1980; Ibrahim et al., 1974; Rahe, Ward, & Hayes, 1979). We have also excluded studies which, although of interest, created controversy and suggest that the methods employed may have been problematic (cf. Fox, 1991; Grossarth Maticek, Schmidt, Vetter, & Arndt, 1984 [Study 2]; Grossarth Maticek & Eysenck, 1989; Spiegel, 1991).

Relevant studies were identified through comprehensive literature search procedures, including searches of computerized databases (PsycLit, PubMed) and surveys of journals and library holdings.

What Types of Interventions Are Considered Here?

We have included interventions, which would fall within the general category of psychotherapy. The review focuses on interventions delivered, in individual or group format, to persons diagnosed with CHD or cancer. These interventions typically have the goal of altering maladaptive affective states or behaviours believed to contribute to diminished quality of life and disease progression in afflicted persons (e.g., Fawzy et al., 1993; Frasure-Smith & Prince, 1985). Thus, the interventions considered here are secondary or tertiary preventive measures, since they are applied to persons after CHD or cancer has been diagnosed. Programs of health education as well as those designed to increase compliance with health care advice are not considered, nor are exercise training programs, a widely used measure among CHD patients (e.g., DeBusk et al., 1994; Horlick, Cameron, Firor, Bhalerao, & Baltzman, 1984). We make no restrictions as to intervention setting or duration. Studies are organized chronologically, and according to whether or not a linkage between a particular psychological intervention and survival or mortality was found. The studies reviewed are summarized in Table 1. In Table 1, studies are grouped according to whether they do or do not provide evidence that psychological interventions can reduce mortality.

Coronary Heart Disease

In spite of considerable advances in clinical research and practice in recent decades, cardiovascular disease, in particular CHD, remains the leading cause of death in North America (e.g., Anderson, 2001). The exact causes of coronary heart disease are not yet fully understood. Epidemiological studies have demonstrated associations between the development of ischemic heart disease and a variety of risk factors (e.g., smoking, hypercholesterolaemia, hypertension, diabetes, and obesity). Specific behavioural and affective patterns have also been suggested as risk factors for CHD. Friedman and Rosenman (1959) proposed the Type A pattern of behaviour (TABP) as a risk factor, and initial prospective studies supported a relationship between Type A behavioural pattern (TABP) and experience of cardiac events (e.g., Friedman & Rosenman, 1959; Jenkins, 1976). More recent studies suggest that the proposed

Table 1
Summary of Randomized Studies Evaluating the Impact of Psychological Interventions on Mortality.

Authors	Study Group	Intervention Type	Outcome Measure and Follow-Up Interval	Findings
A. Studies involving CHD patients				
Studies finding an effect				
Frasure-Smith & Prince (1985)	453 post-MI patients.	Treated patients (n = 229) participated in a monthly stress monitoring and intervention program.	Rate of cardiac recurrence and death over one year.	Significant (over 50%) reduction in mortality in the treated group.
Friedman et al. (1986)	862 patients who had suffered one or more MIs at least 6 months prior.	A control condition offering standard group cardiologic counselling (n = 270), and a treatment group who additionally received group TABP counselling for 24 90-minute sessions (n = 592). Remaining 151 patients served as a non-random comparison group and did not receive treatment of any kind.	Rate of cardiac death and other cardiac events over 4.5 years.	Significant difference in rate of cardiac death between experimental, control, and comparison groups after the first year.
Van Dixhoorn et al. (1987)	90 post-MI patients.	Comparison of exercise training plus individual relaxation (n = 43) and breathing therapy with exercise training only (n = 47). Exercise training lasted one half hour daily for 5 weeks; relaxation consisted of weekly 1 hr sessions over six weeks.	Rate of cardiac death and other cardiac events assessed at years two and three.	Significantly fewer deaths among patients who received relaxation and breathing therapy coupled with exercise counselling.
Studies finding no effect				
Stern et al. (1983)	106 post-MI patients who achieved a mean workload of less than seven mets during treadmill testing, or were diagnosed anxious or depressed.	Comparison of a control condition (n = 29) with both an exercise therapy program (n = 42) and group counselling (n = 35).	Mortality and recurrence data tracked for 12 months.	Neither counselling nor exercise demonstrated a significant effect on mortality.
Jones & West (1996)	2328 post-MI patients.	A control condition including no formal rehabilitation (n = 1160) compared with a rehabilitation program comprised of psychological therapy, counselling, relaxation training, and stress management training over seven weekly outpatient group sessions for patients and spouses (n = 1168).	Mortality tracked over twelve months.	No differences in clinical sequelae or mortality; however, brevity of treatment program (i.e., seven weeks) coupled with lack of control for several patient background variables may have confounded results.
Frasure-Smith et al. (1997)	1376 post-MI patients.	A control condition of standard cardiac care (n = 684) and an intervention program (n = 692) comprised of supportive and educational home nursing.	Rate of cardiac death and recurrence traced for one year.	The program had no overall survival impact. Later analyses showed higher cardiac and all cause mortality among women in the intervention group.
B. Studies involving cancer patients				
Studies finding an effect				
Grossarth-Maticek et al. (1984)	100 breast cancer patients with visceral metastases.	A 2 × 2 design including two groups of chemotherapy refusers and accepters who did or did not receive psychotherapy (n = 25 per group). Patients undergoing psychotherapy were randomly assigned to receive behaviour therapy, depth therapy, or creative novation therapy.	Patients followed until all were deceased (maximum interval not noted).	Both chemotherapy and psychotherapy significantly increased survival time. Creative novation therapy increased survival time significantly more that the other two forms of psychotherapy.
Spiegel et al. (1989)	86 patients with metastatic carcinoma of the breast.	A control condition (n = 36) and a weekly group therapy program (n = 50) lasting one year.	Death records tracked for ten years post-intervention.	Survival time for the treated group was significantly longer than controls (36.6 and 18.9 months, respectively). However, later evaluation of records from the original trial by Kogon et al. (1997) revealed differences in disease course between control and treatment groups to be independent of any differences in medical treatment.

Table 1 (Continued)
Summary of Randomized Studies Evaluating the Impact of Psychological Interventions on Mortality.

Authors	Study Group	Intervention Type	Outcome Measure and Follow-Up Interval	Findings
B. Studies involving cancer patients				
Studies finding an effect				
Richardson et al. (1990)	94 patients newly diagnosed with hematologic malignancies.	Control condition ($n = 25$) and three variations of a one-hour educational intervention ($n = 69$) designed to improve compliance with drug regimens.	Death records tracked over five years.	Assignment to any one form of educational intervention was found to be a significant predictor of increased survival.
Fawzy et al. (1993)	68 Patients diagnosed with stage 1 or stage 2 malignant melanoma.	A control condition ($n = 34$) who received surgical intervention only, and a treatment group ($n = 34$) who received surgery plus a "psychiatric intervention" consisting of six 1.5-hour group meetings.	Death records tracked between five and six years following group participation. Recurrence data were also obtained.	Total mortality in the treatment group (8.8%) was significantly lower than in the surgery only group (29.4%). There was also a trend toward lower recurrence in the treated group ($p = .09$).
Kuchler et al. (1999)	271 patients with cancer of the esophagus, stomach, liver, gallbladder, pancreas, or colon/rectum.	Standard care control group ($n = 135$) compared with an experimental group that additionally received formal psychotherapeutic support ($n = 136$).	Patient records followed for two years.	Kaplan-Meier survival analyses demonstrated significantly better survival for the experimental group. Secondary analyses showed that most treatment benefits accrued to women and among patients diagnosed with one of the following cancer-types: stomach, pancreatic, primary liver, or colorectal.
Studies finding no effect				
Linn, Linn, & Harris (1982)	120 patients with end-stage malignancy.	Standard treatment group ($n = 58$) compared with experimental group who received regular sessions with a counsellor over a one-year period ($n = 62$).	Medical records tracked for 12 months.	Neither functional status nor survival differed between groups. The authors note that these results may indicate that little can be done to alter survival when intervention occurs late in the progression of terminal illness.
Ilnyckyi et al. (1994)	127 patients with various forms of malignancy.	Standard care controls ($n = 31$) versus both a professionally led and an unsupervised group ($n = 96$) who engaged in weekly supportive group therapy over six months.	Retrospective analyses over 11 years.	Results showed no significant differences in survival time between controls and either treatment group (84.0 months versus 70.7 and 62.0 months, respectively).
Cunningham et al. (1998)	66 patients with metastatic breast cancer.	Control condition ($n = 36$) including a home-study cognitive behavioural kit, and a treatment condition ($n = 30$) comprised of 2-hour sessions of supportive plus cognitive behavioural therapy over 35 weeks.	Death records tracked for five years.	No significant difference in survival time found between the two groups, though a small subgroup of intervention subjects who had attended outside support groups survived significantly longer than those who did not ($p = .024$).
Edelman et al. (1999)	121 patients with metastatic breast cancer.	Survival effects of eight weekly sessions of Cognitive Behaviour Therapy (CBT) focused on coping skills training ($n = 60$), compared to standard care controls ($n = 61$).	Disease progression and patient survival over five years.	Cox Proportional Hazards analyses showed no survival benefit among intervention patients; the brevity of the intervention may have undermined therapeutic effects.
Goodwin et al. (2001)	235 patients with metastatic breast cancer	Subjects receiving supportive-expressive group therapy ($n = 158$) compared to no-therapy controls ($n = 77$).	Patients followed over 18 months.	No significant difference in survival time for patients receiving S-E group therapy compared to controls (17.9 months and 17.6 months, respectively).

link between TABP and heart disease might be associated with specific individual TABP components, such as hostility (Barefoot, Dahlstrom, & Williams, 1983; Barefoot, Dodge, Peterson, Dahlstrom, & Williams, 1989; Delunas, 1996; Matthews, 1988; Miller, Smith, Turner, Guijarro, & Hallet 1996; Shelke, Gale, Ostfield, & Paul, 1983). There is also evidence that affective states, in particular depression and stress-induced psycho-physiological response, (as these relate to levels of neuroendocrine activity), might be implicated in the development of CHD and sudden cardiac death (Williams, 1978; Irvine et al., 1999; Rozanski et al., 1999).

Studies Finding a Link Between Psychological Intervention and Mortality

Evidence that psychosocial stress can precipitate ventricular arrhythmias and sudden cardiac deaths lead Frasure-Smith and Prince (1985) to investigate the effects of a stress monitoring and intervention program in post-myocardial infarct (MI) patients (see also Allison et al., 1995). Monthly monitoring via telephone established whether levels of self-rated stress levels had reached a critical threshold, at which point an intervention comprising individually tailored combinations of teaching and support was implemented. Although the intervention was not standardized and was administered by nurses who lacked specific training in psychological therapy, the results indicated a significant reduction in deaths (just over 50%) in the treated group. The authors suggested that stress monitoring and related psychotherapeutic approaches work to lower ambient levels of fear or anger, causing attendant reductions in sympathetic nervous activity and the concomitant potential for heart failure (Frasure-Smith & Prince, 1985).

Mortality outcomes from the Recurrent Coronary Prevention Project (RCPP) were reported by Friedman et al. (1986). The RCPP was designed to evaluate whether reductions in the Type A behaviour pattern (TABP) among MI survivors would result in lowered coronary morbidity and mortality. Persons who had suffered at least one MI were followed over a period of 4.5 years. Subjects in the control group (n = 270) received group cardiac counselling regarding salubrious regimens for medication, diet, and exercise. Experimental subjects (n = 592) also underwent cardiac counselling, though were additionally administered Type A behavioural counselling comprising relaxation regimens and behavioural alteration techniques. A third comparison group (n = 151) did not receive counselling of any kind. Results showed that the program of behavioural counselling successfully reduced TABP, and had a significant impact on the total number of cardiac deaths. Although there was no difference in cardiac death rate after the first year, during the remainder of the follow-up the experimental group experienced a significantly lower death rate compared to both control and comparison groups (3.4%, versus 6.4% and 9.2%, respectively; Friedman et al., 1986).

Van Dixhoorn, Duivenvoorden, Staal, Pool, and Verhage (1987) compared a group of MI survivors assigned to a program of exercise rehabilitation to another undergoing exercise combined with relaxation training. Results show that compared to exercise-only controls, the group practicing relaxation experienced fully 20% fewer cardiac events, including death (i.e., 37% and 17%, respectively; Van Dixhoorn et al., 1987).

Studies Finding No Link Between Psychological Intervention and CHD Survival

Several studies have failed to establish a link between psychological interventions and mortality among CHD patients. Stern, Gorman, and Kaslow (1983) examined the effects of both behavioural counselling and exercise therapy on 106 post-MI patients. While subjects who participated in counselling sessions demonstrated substantial improvements in mood, including an increased sense of independence and sociability, neither therapy significantly altered mortality.

Jones and West (1996) evaluated disease progression among 2328 MI-patients. One group was randomly assigned to receive a rehabilitation program comprising psychological therapy, counselling, relaxation training, and stress management training over a seven-week period. At twelve-month follow-up the authors found no differences in clinical complications, sequelae, or mortality.

Frasure-Smith et al. (1997) examined outcomes in 1,376 post-MI patients (903 men, 473 women) assigned to either an intervention comprising of monthly stress screening coupled with educational and home nursing (n = 692), or to a "usual" care regimen (n = 684). Findings show that after 12 months the program had no overall impact on survival. As well, additional analyses revealed a significantly higher rate of all-cause mortality among women in the intervention group (10.3% vs. 5.4%, p = .051). Also noteworthy is the fact that the intervention demonstrated little impact on depression and anxiety among survivors (Frasure-Smith et al., 1997).

Meta Analysis: Amassing a Case for Psychological Intervention Effects

Statistical meta-analytic techniques enable researchers to combine data across studies, thereby enlarging the sample size available. In the area of coronary heart

disease, three meta-analyses of the effects of psychological interventions have been reported. All of these have included some of the studies reviewed here, as well as those that were specifically excluded as noted previously, and all point to a beneficial impact of psychological interventions on mortality.

Nunes, Frank, and Kornfeld (1987) collectively assessed 18 RCTs completed between 1974 and 1985 to examine the how Type A behavior modification might impact health. Though only five studies were deemed methodological sound enough to be included in the analysis (i.e., Fielding, 1980; Friedman et al., 1986; Ibrahim et al., 1974; Rahe et al., 1979; Stern et al., 1983), results showed the effects of psychological intervention were significant for MI recurrence including mortality at three year follow-up.

Linden, Stossel, and Maurice (1996) evaluated the benefits of psychosocial treatments targeting stress reduction among patients with coronary artery disease. The authors found that compared to controls patients undergoing intervention experienced significantly lower rates of mortality and cardiac recurrence over two years—log-adjusted odds ratios of 1.84 and 1.70, respectively (Linden et al., 1996). Though the interventions were diverse regarding length and target behaviour, the authors point to the important underlying factor as psychological stress as a major determinant of cardiac disease.

A third meta-analysis reported by Dusseldorp, van Elderen, Maes, Meulman, and Kraaj (1999) examined ten studies of mortality outcomes associated with psychoeducational programs, grouping these according to those reporting short-term (one year post-program), medium-term (one to two years post-program) and long-term (two years post-program) outcomes. The authors found these interventions significantly improved mortality significantly over long-term follow-up intervals (Dusseldorp et al., 1999).

Commentary

Earlier studies appeared to be more likely to find that psychological intervention was associated with a reduction in CHD mortality, while more recent evidence has been less favourable. Nevertheless, meta-analyses of the evidence point to a beneficial net impact of psychological interventions on mortality measures. It appears the evidence on the benefit of these treatments is most consistent in the context of outcomes that evaluate cardiac events generally—that is, in which morbidity and mortality outcomes are combined. Nunes et al. (1987) have noted that longer and more complex treatments (i.e., a package as opposed to a single technique) tend to produce larger effects. It may be important to note here that some of the studies finding no effect have used treatments that would be considered very brief or were only supplied when some indication of need was observed (e.g., Frasure-Smith et al., 1997). It is possible that in the context of a life-threatening illness the need for psychological assistance should be assumed.

Cancer

Cancer is the second leading cause of death in North America, with over one third of North Americans expected to develop some form of the disease (e.g., National Cancer Institute of Canada [NCIC], 2001). The most common forms of cancer in North America are lung, prostate, breast, and colorectal. Lung cancer remains one of the most preventable cancers, with almost 90% of deaths attributable to smoking (NCIC, 2001). Dietary factors, smoking, and the overuse of alcohol are among the disease's major determinants (Swedish Cancer Committee, 1992).

Studies Finding a Link Between Psychological Intervention and Mortality

Spiegel, Bloom, and Yalom (1981) devised and evaluated a program to reduce the effects of psychological strain associated with cancer diagnosis and treatment. Eighty-six women with breast cancer were randomly assigned to weekly support group meetings for one-year or a no program control group. Sessions focused on the difficulties coming to terms with terminal illness, and women were taught skills to improve relationships with family, friends, and physicians. At outcome, treated patients had significantly lower disturbance of mood scores, fewer maladaptive coping responses, and were less phobic than the control group (Spiegel et al., 1981). Spiegel, Bloom, Kraemer, and Gottheil (1989) subsequently assessed the long-term impact of this program on survival. Three women from the initial sample of 86 women were still living, and death records were examined for the remainder. Survival time in the treated group was significantly longer compared to that of the controls (36.6 months versus 18.9 months, respectively). The specific contribution to outcome of several moderator variables was examined, but the only factor significantly associated with delayed mortality was the intervention itself (Spiegel et al., 1989).

In a commentary, Fox (1991) noted that unlike similar experiments reporting the benefits psychotherapy on survival among cancer patients, Spiegel et al. (1989) experiments have been "very careful", ensuring that all patients not only receive standard medical treatment (including surgery, radiation, or chemotherapy), but that assignment to therapy and control groups is wholly random. However, at the same time Fox (1991) cautions that "one shouldn't draw infer-

ences for the population on the basis of [this single study]" (Page number should be included for quotes), particularly in light of its small sample size. Also notable in this context is the fact that Spiegel et al. (1989) do not claim that the apparent psychological benefit brought about by group psychotherapy has a direct physiological impact on disease progression. Instead they suggest that psychotherapy might influence attitudinal changes, encouraging subjects to better comply with physician recommendations regarding diet and medication. Similarly, Barinaga (1989) has suggested in the context of these studies that intervention-based pain reduction might enable therapy patients to maintain more active lifestyles, thereby improving survival outcome.

Poor treatment compliance is associated with poor outcome for a variety of health-related problems (e.g., hypertension, epilepsy, childhood asthma, CHD, and affective disorders; Jamison & Akiskal, 1983; Sackett, Haynes, & Gibson, 1976; Stanaway, Lambie, & Johnson, 1985; Witek, Schacter, & Dean, 1983). Richardson, Shelton, Krailo, and Levine (1990) evaluated the health benefits to cancer patients of an educational program designed to improve treatment compliance. Ninety four patients newly diagnosed with hematological malignancies were randomly assigned to a control condition, or one of three intervention groups aimed at improving compliance with medication regimens for the drugs allopurinol and prednisone. Interventions comprised a 1 hour educational session focused on one of the following pill taking cues: a four level shaping program, a home visit to organize a personalized "cueing" system, or, a combination of the two. Blood levels of the two drugs were taken as measures of compliance. Results showed that compared to controls, improvements in compliance among each of the treatment groups were significant ($p < .05$). Further regression analyses revealed three factors to be predictive of increased survival: (a) low disease severity; (b) assignment to any one form of educational intervention; and (c) high compliance with allopurinol therapy (Richardson et al., 1990).

More recently, Fawzy et al. (1993) developed and tested a group therapy program consolidating different psychosocial treatments believed to be effective in promoting survival from cancer. Isolating specific components of these interventions, the authors created a 6 week structured group therapy program comprised of health education, stress management, coping skills, and supportive group psychotherapy. Individuals diagnosed with malignant melanoma who had recently undergone surgical treatment were randomly assigned to either standard medical care or, a group that additionally received the multi-modal intervention. At six-months the intervention had enhanced adaptive coping (i.e., both cognitive and behavioural), reduced psychological distress, and enhanced immune system function. At the six-year follow-up, experimental patients exhibited significantly lower rates of both cancer recurrence and cancer-related deaths (i.e., recurrence among the treated group totaled 7 of 34 patients compared to fully 13 of 34 among controls, while mortality rates were 3 of 34 and 10 of 34, respectively). An evaluation of multiple covariates (i.e., age, sex, Breslow depth measuring tumour severity, and site of malignancy) revealed the only variables significantly associated with both recurrence and survival were Breslow depth and the intervention (Fawzy et al., 1993).

Kuchler et al. (1999) examined the effectiveness of psychotherapeutic support on survival among patients with gastrointestinal cancer in various forms (e.g., esophageal, liver/gallbladder, pancreatic). Two-hundred and seventy one patients were followed over two years during which randomly assigned treatment patients received one-on-one counselling from a professional psychotherapist. Kaplan-Meier survival curves showed significantly better survival among the treated group ($p = .002$). Notably, secondary analyses found that most of the benefits of treatment accrued in women and among patients diagnosed with specific forms of gastrointestinal cancer (i.e., stomach, pancreatic, primary liver, or colorectal cancer; Kuchler et al., 1999).

Studies Finding No Link Between Psychological Intervention and Survival

An early investigation into the impact of psychotherapy on cancer progression conducted by Linn, Linn, and Harris (1982) found no direct evidence for the benefits of group counselling among 120 terminally-ill cancer patients. At twelve months follow-up, the authors found that treated patients did not differ significantly from controls on either quality of life measures or survival rates. The authors report these results in conjunction with an important caveat, however. They note that in light of the advanced stage of cancer progression among the patients they studied, these results "do not rule out" the potential benefit of psychotherapeutic treatment. In fact, Linn et al. (1982) make the point that the potential benefit of treatments aimed at altering physical function and survival may be overshadowed among patients who have reached the latter phase of terminal illness, suggesting that early intervention is key.

Ilnyckyj, Farber, Cheang, and Weinerman (1994) evaluated the 11-year survival of cancer patients randomly assigned to either a standard-care control group or one of two treatment conditions: (a) a professionally-led counselling group; and (b) a self-help program whereby patients engaged in mutual support. Patients had been diagnosed with different cancer types, though all were either stage I or II with good prognosis. Sur-

vival analyses did not indicate any significant benefit to patients who had participated in either treatment group. The authors point to several potential reasons for their null-findings, specifically in the context of the positive results of the Spiegel et al. (1989) trial. In particular, they note differences in the studies' sample populations in relation to the overall quality of support provided during the intervention (i.e., treatment in the Spiegel study consisted of a homogeneous breast cancer support group whereby patients could communicate mutually shared illness-related dilemmas—a key component of the group intervention process; Ilnyckyj et al., 1994).

Like Spiegel et al. (1989), Cunningham et al. (1998) tested effects of group psychological intervention on survival among 66 metastatic breast cancer patients. Randomly assigned treatment patients received 35 weekly sessions comprised of both supportive-expressive therapy, and training in cognitive and behavioural coping strategies. Controls were provided literature used in the intervention but did not attend group sessions. After five years the authors found no significant difference in survival between the groups. However, in addition to prognostic factors including metastatic site and chemotherapy prior to randomization, self-reported exercise proved a significant predictor of survival. Comparing these findings to those of Spiegel et al. (1989), wherein a link between a similar intervention strategy (i.e., supportive-expressive therapy) and breast cancer survival was found, the authors point to important differences in the control groups. Specifically, Cunningham et al. (1998) point out that their controls may have undergone some degree of contamination due to a tendency to access outside interventions (e.g., relaxation tapes, support groups and the like). In a similar vein, Edelman, Craig, and Kidman (2000) note problems associated with the fact that Cunningham and his colleagues provided control patients with materials available to the intervention group.

In another study of women with metastatic breast cancer, Edelman, Lemon, Bell, and Kidman (1999) examined the survival impact of a group Cognitive-Behaviour Therapy (CBT) program. Therapy concentrated on directed acquisition of cognitive and behavioural coping skills. Five years hence, Cox's Proportional Hazards analyses showed no survival advantage associated with the randomly prescribed intervention. Again, survival rates appeared correlated with more standard prognostic indicators including visceral metastases and chemotherapy treatment. Referring to Spiegel et al. (1989), Edelman et al. (1999) identify important differences in both the nature of the interventions used in the two studies (i.e., non-directive and expressive versus directed acquisition of coping skills) as well their relative duration (one year versus only eight weeks) as probable reasons for divergent outcomes.

Goodwin et al. (2001) randomly assigned 158 breast cancer patients to treatment comprised of weekly sessions of supportive-expressive group therapy. Though women assigned to therapy did exhibit more improvement in psychological symptoms and reported less pain, the intervention was not found to prolong survival with treated patients living a median of 17.9 months, compared to 17.6 months among controls. The authors did find a significant interaction between baseline psychological score and intervention effects whereby women who were most distressed derived greatest therapeutic benefit.

In a comment, Spiegel (2001) offers a potential explanation for the different results of the Goodwin et al. (2001) investigation. First, he points to the critical role played by lowered rates of breast cancer mortality due to such factors as advances in early detection, use of selective estrogen-receptor modulators, and development of more effective chemotherapy. Perhaps just as critical, however, is the growing awareness among patients and service providers regarding the importance of meeting the psychosocial needs of cancer patients. It has therefore become much less likely that these patients will remain emotionally isolated. Thus, improvements in medical and surgical treatments coupled with widening availability of psychosocial support programs has made findings from earlier studies supporting a link between psychological intervention and survival difficult to replicate (Spiegel, 2001).

Commentary

Collectively, results from these studies offer support for the value of psychotherapeutic treatments among persons with cancer. Though evidence regarding survival benefit is somewhat mixed, there is enough supportive evidence to flag this linkage as a promising area for additional research if only in an attempt to standardize widely fluctuating conditions with respect to disease stage, type of cancer, and the duration and type of therapy used. At the very least, a more rigorous approach to research in this domain might help assuage the current level of disagreement surrounding the etiological role of psychosocial factors in cancer onset and progression (Lewis, O'Sullivan, & Barraclough, 1994). However, we can at this point conclude with some assurance that these treatments can effectively improve quality of life among cancer patients by, for example, reducing the typically heightened levels of anxiety and mood disturbance associated with diagnosis.

Discussion

What can reasonably be concluded regarding the effect of psychological interventions on mortality among

persons diagnosed with CHD or cancer? In this review, half of the trials identified provide evidence of a beneficial impact. However, in light of a lack of standardization across trials (e.g., with respect to treatment type, disease stage and other patient variables), much work must be done to establish the replicability of these effects. For example, in a critique of the RCT method, Lipsey and Cordray (2000) note the importance of potential confounding effects of varying subject characteristics like problem severity, level of motivation, and level of ability (e.g., to effectively engage the intervention). Compounding these problems are the often inadequate sample sizes generating too little power to detect clinically significant effects. For example, assessments of pharmacological, surgical, and other more standard medical interventions have been explicitly designed to detect small effect sizes by using thousands of subjects (e.g., Gubitz, Counsell, Sandercock, & Signorini, 2001). In sharp contrast, the studies reviewed here have a median sample of less than 110. However, in spite of these shortcomings we would argue that the evidence-base regarding the efficacy of psychological interventions as a means of prolonging survival can be considered equivalent to (and in some cases even exceeds) that of some commonly relied upon surgical and pharmacological procedures (e.g., Evans, Barer, & Marmor, 1994; Non-Small Cell Lung Cancer Collaborative Group, 2000).

Another important issue is the fact that only a few of the studies examined here used interventions that at some level were rooted in theory as to their potential to affect survival. For example, Richardson et al. (1990) explicitly targeted compliance with medical regimens as a means to delay mortality, and the Cunningham et al. (1998) study was based on some evidence (e.g., Spiegel et al., 1989) that supportive-expressive therapy coupled with healthy coping might have similar effects. Demonstrating a link in this context requires that researchers attend diligently to specific patterns of behaviour, cognition, emotion, and social interaction associated with lowered mortality or prolonged survival and construct interventions to influence those patterns (Cunningham et al., 1998). For example, there is much evidence that reductions in stress and feelings of isolation can minimize the risk of re-infarction among CHD patients (Levine, 1963; Olsson & Rehnqvist, 1982; Rahe et al., 1979), and may improve immune system function among cancer patients (Fawzy et al., 1993; Grossarth Maticek & Eysenck, 1989; Spiegel et al., 1989). Moreover, there is a demonstrated link between depression coupled with low social support and sudden cardiac death (de Leon, 1999; Irvine et al., 1999). Behavioural modification programs like those aimed at improving treatment compliance have also been associated with lowered mortality in a range of patient populations (Bunn, Booth, Loveland Cook, Blow, & Fortney, 1994; Friedman et al., 1986; Mann et al., 1993; Richardson et al., 1990; Smart & Mann, 1990).

As well, in studying the effect of psychological interventions on mortality from CHD and cancer, alternative quasi-experimental and epidemiological designs may prove useful in detecting intervention-based changes in mortality rates. One such alternative is the correlative design whereby specific behaviours or other treatment outcomes are associated with mortality or survival rate (Cunningham et al., 1998). This type of study has been useful in evaluating the effects of treatment for alcoholism. For example, achieving the goals ascribed to successful treatment (e.g., abstinence; reduced drinking) has been linked to reduced mortality rates (Barr, Antes, Ottenberg, & Rosen, 1984; Bullock, Reed, & Grant, 1992; Smith, Cloninger, & Bradford, 1983). Another effective approach is the systematic assessment of the natural variation in amount of treatment administered in relation to mortality outcomes in large samples of alcoholics (Bunn et al., 1994; Moos, Brennan, & Mertens, 1994). These studies provide evidence of a dose-response relationship between amount of treatment received and survival rates in these populations.

At the population level, epidemiological studies of alcohol-related mortality provide further corroborative evidence regarding the effectiveness of psychological interventions. Recent investigations of liver cirrhosis mortality rates in North America and Sweden suggest a relationship between increases in aggregate levels of treatment for alcoholism and corresponding declines in these population mortality rates (Holder & Parker, 1992; Mann, Smart, Anglin, Rush, 1988; Mann, Smart, Anglin, & Adlaf, 1991; Smart, Mann, & Li, 1996; Leifman & Romelsjo, 1997; Mann, Smart, & Govoni, in press).

In the area of coronary heart disease, cohort studies have proven a good source of convergent information on the value of psychological intervention. For example, Blumenthal et al. (1997) used a cohort design to investigate the effectiveness of programs of exercise and stress management among post-MI patients. Patients in the exercise group exhibited a lower (though non-significant) relative risk of cardiac recurrence compared to controls at five-years. Patients treated with stress management had a relative risk of re-infarction significantly lower than that of controls.

Research Needs and Opportunities

The design of future studies needs to acknowledge that neither CHD nor cancer constitutes a singular condition with an easily traced etiology and trajectory for treatment. Instead, these illnesses are rooted in a complex set of factors with differing etiologies and sub-

sequent prognoses. Although randomized trials will continue to provide the strongest evidence for an impact of psychological interventions on mortality, there is much room for supplementary investigations using quasi-experimental or epidemiological designs. Existing databases containing information on clinical trials offer important opportunities in this regard. Natural variations in treatment level across populations provide a basis for evaluating dose-response effects on mortality (e.g., Bunn et al., 1994). Additionally, studies of survival in individuals who achieve the behavioural or emotional goals associated with a particular intervention can shed light on both the value of these goals as well as the means prescribed to attain them.

Finally, the limitations inherent in this type of review must be acknowledged. By restricting our focus to mortality outcomes we have not considered the important and substantial research on the effects of psychological interventions on quality of life of those with CHD and cancer. In this literature, the utility of psychological interventions is strongly supported by its associations with other health-related measures, including lowered morbidity and improved psychological well-being (e.g., Lipsey & Wilson, 1993; Nunes et al., 1987; Fawzy, Fawzy, Arndt, & Pasnau, 1995). The evidence in this context is compelling and, by itself, supports the expanded use of these interventions in health-care contexts.

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