

Depression and perceived behavioral control are independent predictors of future activity and fitness after coronary syndrome events

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Abstract

Objective: Physical inactivity increases the risk of recurrent coronary events, and both depression and perceived behavioral control (PBC) have been shown to influence levels of physical activity. However, it is not known whether depression and PBC affect activity levels independently of one another. The present study investigates whether depression and PBC exert independent effects on future exercise and fitness in patients hospitalized for coronary syndrome events. **Methods:** Five hundred and two patients (hospitalized for myocardial infarction or newly diagnosed angina) reported their levels of depression, PBC, and current regular exercise prior to discharge from hospital, and leisure activities, fitness, regular exercise, and depression 12 months later. The ability of depression and PBC to predict patient's reported levels of activity ($n=388$) and fitness ($n=361$) was determined with regression analyses. **Results:** Depression prior to discharge from

hospital reliably predicted fitness ($P<.005$), self-reported leisure activities ($P<.005$), and taking regular exercise ($P<.005$) 12 months after hospitalization for coronary syndrome events when controlling for age, gender, socio-economic status, illness severity, and reported activity prior to hospitalization. Depression at 12 months explained the variance in all outcome measures previously explained by depression at discharge, but PBC during hospitalization independently predicted leisure activities ($P<.005$) and taking regular exercise ($P<.005$) 12 months later. **Conclusions:** Perceived behavioral control and depression independently predict activity and fitness in patients 12 months after hospitalization for coronary syndrome events. Consequently, interventions aiming to increase activity and fitness in these patients should take account of both patients' perceptions of control and their level of depression.

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Introduction

Coronary heart disease (CHD) is currently the leading cause of death in both the United Kingdom and the United States [1,2]. While the prognosis of CHD patients depends on many factors, suffering from depression has been repeatedly implicated in both risk of coronary events and risk of subsequent mortality. Depression and depressive symptomatology in the general population correlate sig-

nificantly with future risk of coronary heart disease [3,4], with prospective research indicating that the risk of coronary syndrome events is twice as high in those with a history of depression as those without [5]. Furthermore, recent meta-analytic work has indicated that this relationship is 'dose dependent' because coronary syndrome event risk increases along with severity of depression [6].

Prevalence of depression in patients after an acute coronary syndrome event ranges from 16% to 31% depending of the method of assessment used [7]. Importantly, presence of depression has been found to be a predictor of survival in this patient group [8,9], with risk of mortality increasing along with severity of depression [10].

The mechanisms linking depression with increased mortality are not well established, but two main classes of putative mechanisms have been posited: behavioral and

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biological [11]. Possible biological mechanisms include decreased heart rate variability [12], thrombus formation from increased platelet activation [13], and increased activation of the systemic inflammatory response [14,15].

In terms of behavioral mechanisms, two of the most common suggestions are differences in medication and differences in treatment, as depressed patients are less likely to adhere to medical treatment regimes [16] and may receive a different level of treatment than nondepressed patients [17]. Further behavioral explanations of the link between depression and coronary syndrome events have focused on the higher incidence of coronary risk lifestyle factors in depressed individuals. Patients who are depressed following a coronary syndrome event are less likely to exercise regularly, adhere to a diet, or take prescribed medications after discharge than nondepressed patients [18,19].

Of the lifestyle factors linking cardiac health and depression, physical activity has received the least research attention. Physical inactivity is a critical risk factor in the development and prognosis of coronary heart disease [20]. The risk of mortality from coronary events in those who are inactive is considerably higher than in those who take part in regular physical activity [21]. Individuals who exercise twice a week have been shown to have a 41% smaller risk of experiencing coronary syndrome events than those who are inactive [22]. Given that risk of coronary syndrome events is lower in active individuals and depression has been related to reduced levels of physical activity [23,24], it is possible that becoming depressed after a coronary syndrome event leads to a reduction in physical activity, reducing fitness levels and increasing risk of further events.

Depression, of course, is not the only predictor of inactivity. The social cognitive Theory of Planned Behaviour [25] states that behavior can be directly predicted from two different cognitions—how an individual intends to behave (“intention”) and whether they believe that their intended behavior is within their personal capabilities (“perceived behavioral control”). This model has been successfully used to predict activity levels in the healthy normal population [26], and the present authors have shown that perceived behavioral control (PBC) significantly predicts fitness and activity in patients 1 year after hospitalization for a coronary syndrome event [27]. This finding is in keeping with a body of similar literature showing that PBC predicts exercise intention in patients with coronary heart disease [28] and actual exercise in patients following cancer [29].

The present study investigates whether depression and PBC exert independent effects on exercise and fitness in patients after hospitalization for a coronary syndrome event. It could plausibly be argued that post-event depression would result in reduced PBC, which in turn would result in reduced activity and poorer physical fitness as observed in previous reports [27]. However, it remains a possibility that depression immediately post-event increases the risk of depression during recovery and it is this that produces reductions in physical activity levels.

We examine these possibilities in this paper by determining whether:

- (a) depression immediately after hospitalization for a coronary syndrome event predicts activity, exercise, and fitness 12 months later
- (b) this relationship still holds after depression at 12 months is controlled for
- (c) perceived behavioral control for future exercise recorded immediately after hospitalization predicts activity, exercise, and fitness 12 months later
- (d) the predictive effects of depression and PBC on activity, exercise, and fitness are independent of one another.

Method

Design

This study was conducted with individuals recruited into a trial of follow-up care of patients hospitalized after a coronary syndrome event. The design, methods, and results of the main trial have been reported [30]; no differences were found in risk behaviors, including activity and fitness in the different arms of the trial. All 723 patients with a diagnosis of MI or angina pectoris of recent onset (<3 months) admitted to hospitals or attending a direct access angina clinic in Southampton and South-West Hampshire and receiving primary care services within the geographical area were identified over an 18-month period. Patients were admitted to the trial if they were well enough and consented to take part. Medical and nursing staff judged 686 patients to be well enough to participate, and 597 consented. Depression, PBC, and self-reports of whether patients were “taking regular exercise” were recorded prior to discharge from hospital, and leisure activities, fitness, self-reports of whether they were “taking regular exercise” and depression were recorded at 12-month follow-up. The fact that PBC significantly predicts fitness and exercise 1 year after a coronary syndrome event has already been reported in this patient group [27]; however, the analyses reported in the present paper have not.

Materials

Predictive measures (recorded prior to discharge from hospital)

Depression was assessed using the depression subscale of the Hospital Anxiety and Depression Scale (HADS) [31], a widely used measure designed to assess depression in patients with physical illness. Scores on the anxiety subscale were not relevant to the present hypotheses and, consequently, were not included in subsequent analyses. The HADS is not a diagnostic instrument but a score of 8 or 9 is generally taken to indicate likely clinical depression and 10 or above probable clinical depression. Internal consistency of the HADS is in the region of 0.82–0.90 [32].

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