Research report

Predictors of 30-year mortality in depressed and comparison samples

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ABSTRACT

Background: Although higher rates of depression and lower rates of social behaviors (i.e., social support and activities) and physical activities are associated with mortality, the independent contribution of each of these factors needs examination.
Methods: A prospective sample of 848 individuals (55% female) was used; half were clinically depressed at baseline; the other half comprised a comparison sample matched on census tract, gender, and marital status. Depressive symptoms, social behaviors, and physical activities were examined as time-varying predictors of mortality over a 30-year period using multiple imputation for missing data and Cox proportional hazards regression, controlling for demographic factors and health risk factors.
Results: By the end of the study, 137 individuals from the depressed sample and 99 individuals from the comparison sample had died. Although the mortality rate is higher in the depressed sample, after controlling for demographic, health risk factors, social behaviors, and physical activity, there was no significant difference in mortality between the depressed and control samples. Among participants in the depressed sample, reduced participation in social activities was significantly associated with a higher risk of mortality.
Limitations: Frequency and intensity of activities were not assessed and all data except for mortality were self-report.
Conclusions: Promoting social engagement through activities may hold promise for delaying mortality among individuals who are depressed. Potential methods to promote social engagement and factors such as positive emotions that should be considered in future studies are discussed.

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1. Introduction

1.1. Depression and mortality

Depression has been linked to mortality, including deaths due to suicide, hazardous health behaviors (e.g., tobacco use, unhealthy eating), and cardiovascular disease (Cuijpers and Schoevers, 2004; Ensinck et al., 2002; Osby et al., 2001; Pulska et al., 2000; Schulz et al., 2002; Wuslin et al., 1999). In a meta-analysis of community samples, individuals who were depressed had a higher mean relative risk of dying compared to individuals who were not depressed (Cuijpers and Smit, 2002). A 49-year follow-up of patients treated for clinical

depression revealed significantly higher mortality rates compared to those for the general population, with the association stronger for women than for men (Thompson, 2011). The depression–mortality link may be due to health risk factors such as heightened tobacco and alcohol use or reduced physical activity (Cuijpers and Schoevers, 2004), such that these factors should be controlled to identify the independent contribution of depression (Wuslin et al., 1999).

1.2. Social activities

Lack of social connections (i.e., social support and social activities) has been linked to both depression and mortality. Individuals who were depressed had less social support and engaged in fewer social activities compared to their counterparts who were not depressed (Strine et al., 2009). In both clinically depressed and community samples, more depressive symptoms were associated with less social support (Ibarra-Rovillard and

Kuiper, 2011). Among men, mortality was higher among individuals who were unmarried, had a smaller social network, or had less contact with friends and family, but lower among those with organizational group membership (Fuhrer et al., 1999; Welin et al., 1992). Social activities, such as playing cards, talking to relatives or friends, and participating in social groups have been linked to lower mortality among elderly people (Glass et al., 1999; Liu and Newschaffer, 2011). Older individuals who engaged in volunteer service and reported attending church or visiting with friends and neighbors also had lower mortality compared to volunteers who did not engage in these social activities (Harris and Thoresen, 2005). Older individuals who have low levels of social activities and decrease their social activities as they age are at higher risk for mortality than those with a high level of social activities that increases over time (Thomas, 2012).

1.3. Physical activities

Depression has been linked to less physical activity (Boettger et al., 2009; Chwastiak et al., 2011), which can increase risk for cardiovascular disease and obesity, both health factors highly associated with mortality. Risk for mortality is lower among adults who participate in physical activities (Brown et al., 2012; Ford et al., 2012; Gulsvik et al., 2012). Men who increased their physical activity had lower risk for mortality compared to men whose activity level was constant, whereas women and men who decreased their physical activity had a higher risk for mortality than their counterparts whose physical activity remained unchanged (Petersen et al., 2012). Among adults, both a greater number of depressive symptoms and physical inactivity partially explained increased risk for cardiovascular mortality (Kamphuis et al., 2007; Win et al., 2011). Interventions that enhanced physical activity reduced risk of mortality among individuals who were clinically depressed (Kruk, 2007; Lavie et al., 2011; Milani et al., 2011), indicating the potential of interventions to ameliorate the risk of mortality.

1.4. Current study

Despite the strong extant literature, little is known about the independent contributions of depression, social behaviors, and physical activities to mortality, especially in a depressed sample. Previous studies examining the association between social behaviors, physical activities, and mortality have relied primarily on community or population-based samples, and samples of older adults. However, researchers have called for studies that examine activity involvement and mortality among clinically depressed samples (Win et al., 2011). We add to the literature by utilizing a longitudinal prospective sample of women and men who were clinically depressed at baseline and a community comparison sample. In addition, participants were 40 years old on average at baseline (as opposed to previous samples of older adults) and surveyed over the course of 23 years, with mortality data collected up to 30 years post-baseline.

1.4.1. Hypotheses

The primary aim was to determine the relative independent contributions of depressive symptoms, social behaviors, and physical activities to the prediction of mortality, controlling for demographic and health risk factors, in both a depressed and a comparison sample. We hypothesized that for both samples individuals with more depressive symptoms and lower levels of social behaviors and physical activities would have higher mortality rates.

2. Method

2.1. Participants

The sample was comprised of two groups: 424 individuals who were clinically depressed (the depressed sample) and 424 demographically-matched individuals from the community (the comparison sample). Participants in the depressed sample were drawn from five treatment facilities in the San Francisco Bay Area, California, were 18 years or older, and met the Research Diagnostic Criteria (RDC) for unipolar depression, as confirmed by a chart review for each patient (Spitzer et al., 1978). Those with a concurrent mental health disorder (e.g., substance abuse, manic) were excluded. A comparison participant was randomly selected from the same census track and neighborhood as each person with initial depression and matched on gender and marital status to ensure there were the same number of women and men and same number of unmarried and married individuals. Though not matched on age, the two samples did not significantly differ by age.

Participants were surveyed on 5 occasions: the baseline survey, which was conducted at the time the depressed sample entered treatment, and 1 year, 4 years, 10 years, and 23 years post-baseline. For the depressed sample, response rates were 95% at 1 year ($n = 395$ of 415 still alive), 91% at 4 years ($n = 370$ of 407 still alive), 84% at 10 years ($n = 313$ of 373 still alive), and 79% at 23 years ($n = 248$ of 316 still alive) post-baseline. For the comparison sample, response rates were 96% at 1 year ($n = 405$ of 422 still alive), 93% at 4 years ($n = 387$ of 418 still alive), 84% at 10 years ($n = 333$ of 397 still alive), and 79% at 23 years ($n = 272$ of 343 still alive). Mortality data were collected during follow-ups and also 30 years after baseline (see Fig. 1 for mortality rates for each sample at each wave). Participants provided informed consent for the initial and follow-up assessments. All research was approved by the Institutional Review Board affiliated with the institution where the research was conducted and informed consent was collect from all participants. For details on sample recruitment, see Billings et al. (1983) and Billings and Moos (1984a, 1984b).

2.2. Measures

All study participants completed the Health and Daily Living Form (HDL), which asked about demographics, health risk factors, depressive symptoms, social behaviors, and physical activities (Moos et al., 1992). The HDL has convergent and predictive validity, and good reliability and stability in this sample (Holahan et al., 1999; Moos et al., 1998). The time-invariant covariates of gender and race were obtained at baseline. All other measures were
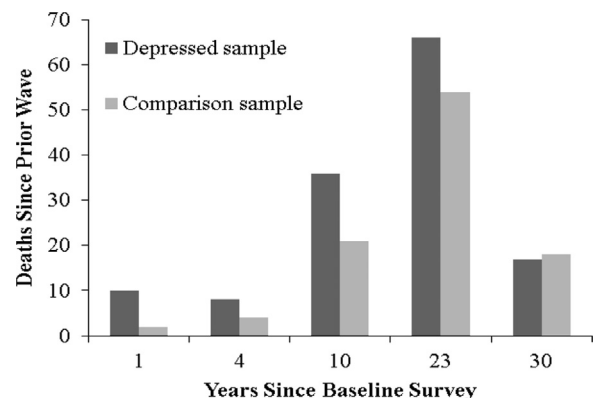

Fig. 1. Number of additional deaths since prior wave of data collection among participants from the depressed and comparison samples.