

# Influence of the Source of Social Support and Size of Social Network on All-Cause Mortality

Katie M. Becofsky, PhD; Robin P. Shook, PhD; Xuemei Sui, MD, PhD;  
Sara Wilcox, PhD; Carl J. Lavie, MD; and Steven N. Blair, PED

## Abstract

**Objective:** To examine associations between relative, friend, and partner support, as well as size and source of weekly social network, and mortality risk in the Aerobics Center Longitudinal Study.

**Patients and Methods:** In a mail-back survey completed between January 1, 1990, and December 31, 1990, adult participants in the Aerobics Center Longitudinal Study (N=12,709) answered questions on whether they received social support from relatives, friends, and spouse/partner (yes or no for each) and on the number of friends and relatives they had contact with at least once per week. Participants were followed until December 31, 2003, or until the date of death. Cox proportional hazards regression analyses evaluated the strength of the associations, controlling for covariates.

**Results:** Participants (3220 [25%] women) averaged  $53.0 \pm 11.3$  years of age at baseline. During a median follow-up of 13.5 years, 1139 deaths occurred. Receiving social support from relatives reduced mortality risk by 19% (hazard ratio [HR], 0.81; 95% CI, 0.68-0.95). Receiving spousal/partner support also reduced mortality risk by 19% (HR, 0.81; 95% CI, 0.66-0.99). Receiving social support from friends was not associated with mortality risk (HR, 0.90; 95% CI, 0.75-1.09); however, participants reporting social contact with 6 or 7 friends on a weekly basis had a 24% lower mortality risk than did those in contact with 0 or 1 friend (HR, 0.76; 95% CI, 0.58-0.98). Contact with 2 to 5 or 8 or more friends was not associated with mortality risk, nor was the number of weekly contacts with relatives.

**Conclusion:** Receiving social support from one's spouse/partner and relatives and maintaining weekly social interaction with 6 to 7 friends reduced mortality risk. Such data may inform interventions to improve long-term survival.

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Epidemiological and clinical research has established social relations as one of several key domains relevant to behavioral medicine.<sup>1</sup> In 1988, House et al<sup>2</sup> published a seminal review of prospective and experimental studies demonstrating a causal link between social relations and mortality risk. Research on the topic has continued in recent decades, and in 2010 a meta-analysis of 148 studies found that having stronger social relations was associated with a 50% increased likelihood of survival (odds ratio, 1.50; 95% CI, 1.42-1.59) across age, sex, initial health status, and cause of death.<sup>3</sup> The protective effect was found irrespective of whether structural aspects, such as frequency of social participation<sup>4</sup> and diversity of social network,<sup>5</sup> or functional aspects, such as marital quality<sup>6</sup> and perceived social support,<sup>7</sup> of social relations were measured. A 2013 meta-analysis by Tay et al<sup>8</sup> reiterated the

protective effect of both structural and functional aspects of social relations in an extensive study of reviews.

These reviews provide clear evidence of a relationship between social relations and mortality risk, yet important questions remain. From a functional perspective, does the source of social support (eg, partner, relative, or friend) matter? If so, which source(s) is (are) most important? In terms of structural aspects of social relations, is there a minimum social network size required to reap health benefits? And, is more always better, or is there a threshold effect? Answering these questions could facilitate the application of this extensive knowledge base to the development of therapies or interventions to help various medical conditions, including cardiovascular disease (CVD) and cancer<sup>9</sup>; indeed, poor social relations have consistently been associated with an increased risk of major



From the Department of Exercise Science (K.M.B., X.S., S.W., S.N.B.), Prevention Research Center (S.W., S.N.B.), and Department of Epidemiology/Biostatistics (S.N.B.), University of South Carolina, Columbia, SC; Department of Kinesiology, Iowa State University, Ames, IA (R.P.S.); and Department of Cardiovascular Diseases, John Ochsner Heart and Vascular Institute, Ochsner Clinical School, University of Queensland School of Medicine, New Orleans, LA (C.J.L., S.W.). Dr Becofsky is now with the Weight Control and Diabetes Research Center, The Miriam Hospital, Providence, RI, and Warren Alpert Medical School of Brown University, Providence, RI.

CVD, which remains the major threat to health in most of the world.<sup>1,10,11</sup> Therefore, the purpose of this study was to examine the associations between relative, friend, and partner support, as well as size and source of weekly social network, and mortality risk in the Aerobics Center Longitudinal Study (ACLS).

## PATIENTS AND METHODS

The ACLS is a cohort study that investigates the relationship between various health factors and chronic diseases.<sup>12</sup> Data were obtained from patients of the Cooper Clinic in Dallas, Texas. Many patients were sent by their employers for preventive medical examination, some were referred by their personal physicians, and others were self-referred. The present study consisted of 12,709 men and women aged 18 to 90 years who completed a mail-back survey in 1990. The study protocol was approved annually by the institutional review board of the Cooper Institute.

### Measurements

All participants included in the present study completed a mail-back survey in 1990 between January 1 and December 31; the midpoint of survey completion (June 30, 1990) served as the baseline date for calculating follow-up time. The survey was developed by researchers at the Cooper Institute. Participants provided information on smoking habits (never, former, or current smoker), alcohol intake (drinks per week), physical activity habits (physically inactive or not), and marital status (married or not). Consuming more than 14 drinks/wk for men and 7 drinks/wk for women was defined as heavy alcohol drinking. Physically inactive was defined as reporting no leisure-time walking or jogging in the 3 months before the examination. Self-reported height and weight were used to calculate the body mass index as weight in kilograms divided by the height in meters squared. Self-reported history of physician diagnosis of diabetes, hypertension, and high serum cholesterol level was considered for chronic conditions.

### Social Support

As part of the mail-back survey developed by researchers at the Cooper Institute, participants indicated whether they received social support. ("Do you receive support from relatives and

friends? Social support can be instrumental or emotional. Instrumental Support includes financial aid, information, help with family or work, advice, food, or transportation. Emotional Support includes affection, sympathy, trust, encouragement, or guidance. Please indicate whether or not you receive social support from each of the groups listed [Spouse or Partner, Relatives, Friends, and Overall relationships] by circling NO or YES.") The questionnaire also asked participants how many relatives and friends they had contact with at least once per week ("How often do you have social contacts with relatives or friends? Circle one [Daily, Weekly, Monthly, Yearly, Never] per group [Relatives, Friends].") Participants were instructed to answer the latter question "for relatives and friends with whom you do not live."

### Mortality Follow-up

Participants were followed from June 30, 1990 (midpoint of the 1990 survey completion), until date of death or until December 31, 2003. Mortality surveillance was conducted using the National Death Index, and the underlying cause of death was determined from the National Death Index report or by nosologist's review of the official death record from the department of vital records in the participant's state of residence. Follow-up time was computed as the difference between June 30, 1990, and the date of death for decedents or until December 31, 2003, for survivors.

### Statistical Analyses

Continuous variables were summarized using mean  $\pm$  SD, and categorical variables were summarized using frequency (percentage). Continuous variables were compared using the Student *t* test, and categorical variables were compared using the chi-square test. Separate Cox proportional hazards regression analyses were performed to assess the association between receiving social support from relatives, spouse/partner, and friends (compared with not receiving support from these sources) and mortality risk. Covariates included age, sex, body mass index (model 1), plus current smoking (yes/no), heavy alcohol intake (yes/no), and physical inactivity (yes/no) (model 2), plus presence of hypertension, high serum cholesterol level, and diabetes at baseline (model 3). Additional Cox proportional hazards regression analyses were performed to assess the

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