

Social Support, Cardiovascular Disease, and Mortality

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Abstract. This chapter presents a conceptual and selective review of the relationship between social support and cardiovascular illness and death. It is argued that cardiovascular health is not only determined by biological factors but also by social and psychological factors. For decades, epidemiological studies have linked mortality rates to marital status and social networks, thus indicating a beneficial effect of such social factors on longevity. Moreover, studies on cardiac patients have attributed increased survival rates to the existence of close social bonds. In the case of conjugal loss, for example, widowers are at risk of illness and death in the absence of a compensating network of support providers. Health psychology is looking for the mediating mechanisms that help explain such epidemiological associations. For this purpose, social support is distinguished from social integration, and further differentiations are made to better understand the quality and function of interaction processes that result in favorable health outcomes. Physiological, behavioral, and psychological pathways are distinguished in the etiology of disease, signifying differences in how people may respond to stressful encounters and critical life changes.

1. Social integration and social support

People can be predisposed to illness by long-term experiences of social isolation, neglect, loneliness, and social stress. Before discussing some current issues in the relationship between social factors (as predictors) and illness and death (as outcomes), the conceptual background of the former needs to be made clear. The term “social support” is often used in a broader sense, including social integration and social networks. In this chapter, too, we will use it as a summary term in the title and headings. However, these three notions should be clearly distinguished. *Social networks* represent the objective basis for social integration and social support. The latter two are seen as theoretical constructs. They refer to the degree to which individuals are socially embedded, have a sense of belonging and intimacy, and tangible needs are met, such as assistance, guidance, and access to information. Social integration and social support need to be distinguished. *Social integration* refers to the structure and quantity of social relationships, such as the size and density of networks, frequencies of interaction. but sometimes also to subjective perceptions of embeddedness. *Social support*, in contrast, refers to the function and quality of social relationships, such as perceived availability of help or actually received support. It occurs through an interactive process and can be related to altruism, a sense of obligation, and the perception of reciprocity [1, 2, 3]. Both constructs have been related to ill health and mortality which represents the topic of the present chapter.

1.1 Social integration

Community-based prospective epidemiological studies have documented a link between lack of social integration on the one hand and morbidity and all-cause mortality on the other. Socially isolated persons are at the highest risk for a variety of diseases and fatal health outcomes. Social integration, or the lack of it, can influence the onset, progression, and recovery from illness. This relationship has been shown for diverse physical health problems, such as the common cold, cancer, HIV infection, cardiovascular diseases (CVD), and cardiovascular reactivity [4, 5, 6].

In this chapter, we will focus on CVD for two reasons: (a) Cardiovascular diseases are the leading causes of death in Western societies, with growing incidence rates in Eastern Europe; (b) there is a substantial body of literature examining the linkage of CVD to an array of behavioral and psychological factors. For example, studies have found a link between social embeddedness and survival rates of patients who had experienced a myocardial infarct (MI). Male survivors of an acute MI who were socially isolated were more than twice as likely to die over a three-year period than those who were socially integrated. Diagnosis of coronary artery disease and subsequent death was also linked to marital status. Those who were single or without a confidant were more than three times as likely to die within five years compared with those who had a close confidant or who were married [4,5]. The present chapter will refer to some of these findings in more detail.

1.2 Social support

Social support in the narrow sense has been defined in various ways. It may be regarded, for example, as resources provided by others, as coping assistance, or as an exchange of resources. Several types of social support have been investigated, such as instrumental support (e.g., assist with a problem), tangible support (e.g., donate goods), informational support (e.g., give advice), and emotional support (e.g., give reassurance), among others. Social support can assist coping and exert beneficial effects on various health outcomes. It has also been found to be advantageous for patients during recovery from heart surgery. Coronary artery bypass surgery patients who received many visits by their spouses were, on average, released earlier from hospital than those who received only few visits. Cardiac patients and their spouses were studied over a half-year period before and after heart surgery. It was found that resourceful spouses transferred their resiliency to the patients as part of a dyadic coping process [7, 8, 9]. Gender differences are essential here and need to be examined with advanced multilevel analyses within dyads.

There is growing evidence about the causal pathways that involve social factors in the etiology of disease and in the recovery from illness, although further research is needed to understand the mechanisms that render social ties beneficial for the organism [10]. Among the multiple physiological pathways, an immunological and a neuroendocrine link have been investigated. A behavioral pathway, on the other hand, has been suggested by studies where social networks were stimulating health behaviors that prevented the onset of illness, slowed its progression, or influenced the recovery process [10].

Social support theories are typically intertwined with the concepts of *stress and coping*. The cognitive appraisal of stress, for example, depends partly on the perceived availability of social resources. Moreover, the mobilization of support can be understood as a coping strategy. Thus, linking health outcomes to social relationships requires a conceptual framework that includes stress parameters and individual preferences in dealing with stress, as well as the causal pathways that lead to morbidity and mortality [11].

2. Social Support and Mortality

Numerous investigations have documented that social relationships constitute a buffer against premature death. A distinction can be made between large-scale epidemiological studies and life event studies. *Life event research* on social support and mortality comes mainly from two sources, namely research on survival of patients after severe medical incidents or procedures, and research on conjugal loss (see below). In *epidemiological studies*, indicators of social integration (e.g., marital status) have been correlated with longevity, and it has been repeatedly found that the relative risk to die within a given time period is higher for socially isolated than for socially integrated individuals [12]. In the classic Alameda County Study, for example, the mortality risk of those with weak social integration is about twice as high than that of those who are socially well integrated [13]. Although the relative risk ratios sometimes sound quite impressive, the effect sizes of these findings are usually very small. In a meta-analysis on this topic, Schwarzer and Leppin [1] have estimated an effect size of $r = -.07$ between mortality and social integration. This estimate is a weighted average from 18 data sets based on a total of 10,735 individuals. Decomposing this parameter by gender yields $r = -.06$ for women and $r = -.08$ for men. Only the latter value is sufficiently homogeneous to be interpreted as a reliable meta-analytic result [3].

Hemingway and Marmot [5] distinguish between two kinds of epidemiological studies, prospective etiological investigations in healthy samples as compared to prognostic studies in patient samples. In a review, they found that 5 out of 8 prospective studies documented an effect of social integration on coronary heart disease. Moreover, they found that 9 out of 10 prognostic studies confirmed evidence for a link between social integration and coronary heart disease. Table 1 provides an overview of these studies. More information can be found in Hemingway and Marmot [5].

Studies including age differences and cohort differences also account for the fact that the evolution of most cardiovascular diseases involves long-term pathological processes and that the provision or lack of social support can have both short-term and long-term consequences. Social support varies across different age groups. Changes in the availability and the subjective importance of presence or absence of different social ties (e.g., partnership, kinship, organizational embeddedness) over the life-span may go along with changes in their potential protective or detrimental effects. People have a history of social integration and embeddedness and support experience. Loss of intimate partners may be followed by new relationships, social network changes in size and composition, in meaning and support potential, depending on the specific life context of a person [see for example 14].

Tucker et al. [14] examined the relationship between social ties and mortality in 697 men and 544 women of the Terman Life-Cycle Study over a period of 51 years (1940 – 1991) at four assessment points. They found that men who were consistently married had a significantly lower mortality risk compared to those who were separated, divorced, widowed or remarried. For women, no such effect of marital status emerged. Instead, their mortality risk was lower when they had a greater number of children and more organizational memberships. However, when conducting separate analyses for two different age periods, namely those younger than 70 years versus those 70 years and older, the authors found a protective effect of organizational memberships for the younger group of men, but not for the older. Also, as they passed the age of 70, remarried men no longer had a higher risk of dying than those who were consistently married. For women, the beneficial effects of having more children was found only for those aged 70 years and older, but not for the younger ones. With respect to organizational memberships, women showed an opposite age-related change

compared to men: For them, these particular social ties exerted their beneficial influence only in the later life period. In sum, these results suggest that social ties other than marriage become stronger predictors of mortality as people become older, and that effects are different for men and women. One possible explanation is that age differences and gender differences are due to changing social roles and norms.

Table 1. *Studies of social networks and social supports and coronary heart disease. Cited from Hemingway and Marmot [5].*

| Study year | Age at entry | Exposure | Follow up (years) | Type of events | Result* |
|------------|--------------|--|-------------------|--|---------|
| 1976 | >40 | Perceived love and support from spouse | 5 | Angina | + |
| 1982 | 35-69 | Social relationships and activities | 11 | Fatal CHD | + |
| 1983 | 30-69 | Social network index | 9 | Fatal CHD | ++ |
| 1983 | 52-71 | Social network score | 6 | Fatal CHD + non-fatal | 0 |
| 1988 | 39-59 | Social network index | 5 | Fatal CHD | 0 |
| 1992 | 18-75+ | Network scope, network frequency, and network size | 15 | Fatal CHD + non-fatal CHD | + |
| 1993 | 50 | Emotional support from close people and support from extended network (social integration) | 6 | Fatal CHD + non-fatal CHD | ++ |
| 1996 | 42-77 | Social network index | 4 | Fatal CHD + non-fatal MI | 0 |
| 1983 | Not stated | Marital status | 10 | All cause mortality | + |
| 1984 | 30-69 | Social support, life stress | 3 | All cause mortality, sudden cardiac death | ++ |
| 1988 | 32-60 | Social support, depression and other psychosocial factors | 8.3 | All cause mortality + recurrent non-fatal MI | + |
| 1992 | 25-75 | Living alone, disrupted marriage | 2 | Fatal CHD + recurrent non-fatal MI | + |
| 1992 | 68 | Social support and social network | 5 | Fatal CHD + non-fatal MI | ++ |
| 1992 | 52 | Structural social support (marital status) and function social support | 9 | All cause mortality | ++ |
| 1992 | 65-85+ | Emotional support | 0.5 | All cause mortality | + |
| 1993 | 60.8 | Social support | 0.8 | All cause mortality | + |
| 1993 | 25-84 | Social isolation, life stress, depression, type A | 3 | All cause mortality | 0 |
| 1995 | 63 | Social support, life events, depression, anxiety, type A, anger | 1 | All cause mortality | + |

Notes:

CHD = coronary heart disease; MI = myocardial infarction.

0 = no association - that is, relative risk not significantly different from unity; + = moderate association (relative risk > 1, ≤ 2.0); ++ = strong association (relative risk > 2.0).

In another longitudinal study examining the impact of social integration on mortality in a 15-year follow-up design, Shye, Mullooly, Freeborn, and Pope [15] found that amongst

the elderly (aged 70-90), network size was more predictive of mortality than marriage. Interestingly, men in this sample seemed to gain direct protection from smaller networks than women. Here also, it remains unclear which internal processes mediate this protective effect. Men might derive a stronger sense of social integration and belonging even from few social ties, whereas, in this age group, women's costs and investments in close ties are higher, thus, leading to a greater need for more external support. Whatever the mediating links may be, these results provide strong evidence for the notion that embeddedness in social networks and social participation means something different for older men compared to older women.

2.1 Survival from chronic illness and medical procedures

Having a close confidant has an effect on life or death of patients. Williams et al. [16] examined 1,965 CVD patients after angioplasty. The presence or absence of a confidant or spouse appeared to be the best predictor of time to death, after controlling for other factors such as family history of heart disease and cigarette smoking. Berkman et al. [12] found that myocardial infarction (MI) patients with low levels of social support were more likely to die than those with high support, even after accounting for other factors such as severity of disease. A ten-year follow-up study of MI patients found lower survival rates in unmarried patients. This positive effect of social integration seems to be stronger for men than for women [17]. Poor social integration is associated with an increased risk for myocardial infarction. Also, women with few confidants have been found to be at greater risk for myocardial infarcts than men [18].

Several major studies have found a link between social integration and survival rates of patients who had experienced MI. Ruberman, Weinblatt, Goldberg, and Chaudhary [19] studied male survivors of an acute MI and found that cardiac patients who were socially isolated were more than twice as likely to die over a three-year period than those who were socially integrated. A Swedish study of cardiac patients revealed that those who were socially isolated had a three times higher ten-year mortality rate than those who were socially integrated [20]. Diagnosis of coronary artery disease and subsequent death was linked to marital status [16]. Those who were single or without a confidant were more than three times as likely to die within five years compared with those who had a close confidant or who were married. Another study of 40,820 patients investigated the effect of marital status on patient outcome [21]. Here, unmarried surgical patients had a higher risk of dying in hospital than those who were married, even after controlling for other factors such as severity of illness. The risk was even higher for patients who had never been married compared to patients who were widowed, separated or divorced.

In another prospective study on MI patients, it was found that mortality rates within a six-month period were related to the social support reported by these patients [12]. The authors identified the number of persons providing major sources of emotional support, distinguishing between patients with one, two, and more than two such sources. There was a consistent pattern of death rates, the highest of which was associated with social isolation, and the lowest of which pertained to two or more sources of emotional support, independent of age, gender, comorbidity, and severity of MI.

2.2 Conjugal loss

Conjugal loss has also been studied as a source of premature death. In general, marriage is regarded as beneficial for social functioning. Therefore, the loss of a spouse may signal the loss of one's social network, initiating an array of events with severe health consequences. Can the death of a spouse be so detrimental that it results in the premature death of the survivor? For decades, studies have addressed this question and found, on average, that the mortality risk for widows/widowers is increased compared to those who do not experience this loss [for reviews see 22, 23, 24, 45]. The risk seems to be greatest for men during the first six months of bereavement. There may be several reasons for this gender difference: Men typically have a smaller social network than women, so their loss has a more profound effect on their social ties [47]. Also, widowhood occurs at an older age for men than for women since men, on average, die earlier than their spouses due to age differences in couples and biological gender differences in longevity. As a result, the death of a wife leaves a widower who is older and more in need for support. Moreover, men usually confide in their spouse as their only intimate partner whereas women cultivate a larger network of family members and friends and find it easier to turn to someone else in times of need. This higher social integration and support may buffer the stressful experience of losing their husbands [45].

Traumatic grief has been shown to be a risk factor for mental and physical morbidity [25]. When widowers feel socially isolated during the grieving process, they may develop depression and loneliness, which in turn may lead to more severe consequences. For example, the surviving spouse may be at substantial risk of committing suicide in the weeks and months following conjugal loss. Suicide following death of a spouse may be five times as likely in widowers compared to widows [47]. In other cases, their immune system or cardiovascular reactivity may be affected in the long run, resulting in illness and eventually in death. The mechanism of pathogenesis needs to be further explored. Not only death from all causes is higher in widowers, but also specific causes of death, such as suicide. Widowed individuals show impaired psychological and social functioning, including depression, and some studies report a significant decline in physical health, mainly for men. Frequencies of sick days, use of ambulant physician services, and onset of illness according to medical diagnosis seem to be about the same for the widowed and for controls [23]. There is a lack of evidence that the onset of specific diseases such as cancer or coronary heart disease is triggered by conjugal loss or other forms of bereavement, which may be explained by the long time span of pathogenesis. It takes many years to develop chronic degenerative diseases, for example, and numerous additional factors contribute synergistically to illnesses that may emerge during this time period.

3. Social support and morbidity

3.1 Social support and recovery from cardiac disease

Studies among cardiac patients have found social support to be beneficial for recovery from surgery. Some researchers have focused on the mere existence of social networks, others have examined perceived or actually received social support. Kulik and Mahler [8], for example, studied men who underwent coronary artery bypass graft surgery (CABG). Those who received many hospital visits by their spouses were, on average, released earlier than those who received few visits. In a longitudinal study, the same authors also found that emotional

support from their spouses had positive effects on patients after surgery [26]. Similar results were obtained by other researchers [27]. King, Reis, Porter, and Norsen [28] found that perceived availability of support was associated with emotional and functional outcomes up to a year following coronary artery surgery. In particular, esteem support (that one is respected and valued by others) appeared to be related to improved health outcomes over the follow-up period. Thus, some types of social support are better than others when matched to the situation at hand. Emotional and esteem support, more so if extended from women to men, may be beneficial because it instills optimistic self-beliefs and equips the patient with more hardiness to cope with barriers and setbacks.

Marital status and recurrent cardiac events were linked in a study by Case et al. [29], who identified a higher risk of cardiac deaths and nonfatal infarctions among those who lived alone.

Close network members of cardiac patients make a difference in how patients adjust to their disease depending on their interaction with each other [30, 7]. Marital satisfaction was related to patients' well-being in a study by Waltz [31]. Helgeson [32] found that patients' perceived availability of information support was a good predictor of recovery. Negative marital interaction predicted poor adjustment, and spousal disclosure predicted patients' life satisfaction.

Within a longitudinal design, 174 patients undergoing coronary artery bypass graft (CABG) surgery were surveyed before the event and interviewed afterwards [33]. Presurgical personal and social resources were examined along with social and ruminative ways of coping in terms of a variety of recovery outcomes. Worry, emotional states, mental activity, and physical activity were chosen as indicators of recovery. It was found that social resources predicted recovery and that coping mediated presurgery resources and postsurgery readjustment. Covariance structure analysis revealed that seeking social support was an adaptive way of coping. It was positively associated with recovery indicators, whereas rumination was negatively associated with both resources and outcomes. In addition, 114 social network members, most of them spouses, reported about their own perceived resources at Time 1 [9]. The patient-spouse dyad was chosen as the unit of analysis. It turned out that characteristics of spouses were related to those of patients. Recovery from surgery at Time 2 and readjustment to normal life after half a year (Time 3) could be partly predicted by spouses' social support as measured at Time 1. Resourceful spouses seemed to transfer their resilient personality to the patients as part of a dyadic coping process.

3.2 Social support in the etiology of disease

Although much evidence has demonstrated that psychosocial factors play an important role in the etiology and prognosis of cardiovascular diseases, comparatively little is known about the actual pathways by which these factors influence the onset or progression of specific pathological mechanisms. It is obviously not the mere presence of social network members that results in better physical functioning; also, the effect of functional support or lack of it is mediated by internal processes (e.g., emotions, affective states, control beliefs) that follow the individual's perception of the supportive acts. In general, associations between social support and health can be due to *direct* or *indirect* effects of social support, and these in turn can be beneficial or detrimental. Also, it has been postulated that social support might reveal its beneficial effect on health only in times of distress, in so far as it serves as a buffer to the negative impact of stressful events that people encounter. This moderating impact is known as the so called *stress-buffering effect* [1, 2, 3]. This effect is illustrated in Figure 1. Moreover,

physiological, behavioral and psychological mechanisms have been discussed as potential pathways linking both functional and structural support to illness and subsequent mortality.

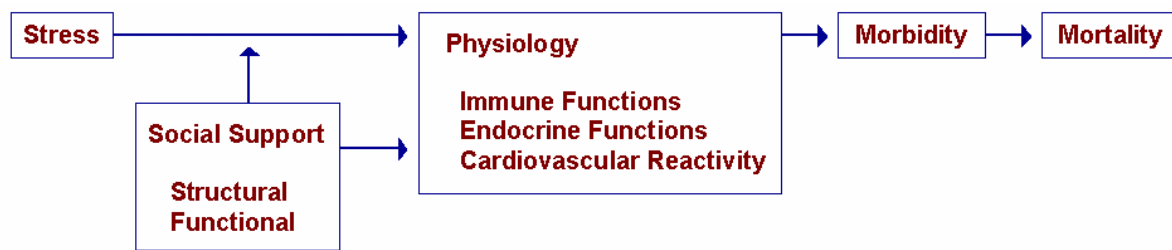


Figure 1. The Stress-Buffering Model

3.2.1 The physiological pathway

Among the multiple physiological pathways linking social support to health outcomes and the progression of illness, the focus has been on the cardiovascular, immune, and the neuroendocrine system. Loss and bereavement, for instance, are followed by immune depression which may compromise natural killer cell activity and cellular immunity [10, 34]. This, in turn, reduces overall host resistance, so that the individual becomes more susceptible to a variety of diseases, including infections and cancer. The quality of social relationships, for example marital quality, has been found to be a predictor of immune functioning. Social stress, in general, tends to suppress immune functioning [10, 34, 35].

Acute changes in neuroendocrine secretion may also be linked to increased cardiovascular reactivity and physiological arousal, which are regarded as antecedents of severe cardiac events. In a study by Seeman et al. [35], for instance, emotional support was associated with increased urinary levels of epinephrine, norepinephrine, and cortisol in a sample of elderly people. The link with emotional support was stronger than the link with instrumental support or with mere social integration.

In a review of 81 studies relating social support to physiological processes, Uchino, Cacioppo, and Kiecolt-Glaser [10] concluded that there is reliable evidence for the beneficial effects of social support on aspects of the cardiovascular as well as the neuroendocrine and the immune system. Various facets of functional and structural support were compared, revealing that familial ties as well as emotional support appeared to be important dimensions in protecting people from damaging short-term pathophysiological processes. The majority of the studies reviewed dealt with the impact of social support functions on the cardiovascular system. Table 2 summarizes this review.

With respect to gender, 12 out of 20 studies that included both sexes reported no gender differences in the beneficial effects of social support on cardiovascular regulation. Yet, when specific types of social support were examined separately, such differences were indeed found. Janes [36], for example, found that in a Samoan sample blood pressure was most strongly predicted by social resources in men, whereas in women instrumental support appeared as the stronger predictor.

The *stress-buffering effect* of social support on cardiovascular regulation has often been investigated in laboratory settings. Most typically, study participants are exposed to a stressful situation (e.g., giving a spontaneous speech, watching a frightening film) with varying social contexts. In a study by Glynn, Christenfeld, and Gerin [4], 57 female and 52

male normotensive, healthy undergraduates, were asked to give an impromptu speech to an observer. The latter was instructed to behave either in a supportive (nodding, smiling) or nonsupportive (inattentive behavior) manner during the speech. During baseline and speech, subjects' blood pressure and heart rate were monitored continuously. Results indicated that cardiovascular changes for both men and women were significantly lower in the support as compared to the nonsupport condition, but only when the observer was a woman.

Table 2. Association between social support and cardiovascular functioning. Cited from Uchino et al. [10].

| Type of study | Sample | Number of studies | Results |
|-----------------------|--------------------------|-------------------|--|
| Correlational Studies | normotensive individuals | 28 | – Social Support was associated with better blood pressure regulation in 23 studies ($r = .08$) – no difference between structural and functional measures => both predict better cardiovascular regulation |
| Intervention Studies | normotensive individuals | 6 | – Social Support was associated with better blood pressure regulation both in normal (4 of 6 studies) and at-risk populations ($r = .15$) |
| | hypertensive individuals | 8 | – strongest association when interventions were performed on familial sources of support |
| Laboratory Studies | normotensive individuals | 4 | – Social Support reduced cardiovascular reactivity to acute stress in all 4 studies ($r = .28$) – strongest association when support is manipulated (instead of taking naturalistic measures of support) |

Studies on the link between neuroendocrine function and social support are still rare, and findings are mixed, depending on the specific neuroendocrine measures under investigation. Uchino et al. [10] reported that five out of six studies found an association between social support and catecholamine levels, whereas cortisol levels had no association with social support indicators in four out of six studies. However, due to the small number of studies and the restricted social support measures included, results should be viewed as preliminary.

In contrast, evidence is richer for the impact of social support on quantitative immune measures (e.g., number and relative balance of immune cells) and functional immune measures (lymphocyte proliferation). Twelve out of 19 studies in the review found associations between social support and immune functioning. A meta-analysis of nine studies including functional immune measures revealed an effect size of $r = .21$. Notably, the association appears to be consistent in the middle-aged and elderly as well as younger age groups.

Finally, it is important to keep in mind that the cardiovascular, neuroendocrine, and immune systems interact in a complex dynamic manner. For example, endocrine substance release (e.g., catecholamines) results in changes in both the cardiovascular and immune system (increased heart rate and myocardial contractility, and changes in vascular resistance as well as transient increases in natural killer cell lysis).

3.2.2. The behavioral pathway

The behavioral pathway has been suggested by studies showing that social networks stimulated health behaviors that prevented the onset of illness, slowed its progression, or influenced the recovery process. For example, abstinence after smoking cessation was facilitated by social support [37]. Alcohol consumption was lower in socially embedded persons [38], although other studies have found that social reference groups can trigger more risky behaviors, including alcohol consumption [39].

Physical exercise is among the health behaviors that have a close link to social integration and social support. Perceived support by family and friends can help in developing the intention to exercise, as well as initiating the behavior [40, 41]. Long-term participation in exercise programs or the maintenance of self-directed exercise is probably more strongly determined by actual instrumental support than by perceived and informational support [42]. Duncan and McAuley [43] have found that social support influences exercise behaviors indirectly by improving one's self-efficacy. The latter might be an important mediator in this process. The reason could be that not only a sense of belonging and intimacy is perceived as supportive, but also the verbal persuasion to be competent or the social modeling of competent behaviors.

3.2.3. The psychological pathway

It has been shown that social support is closely linked to a variety of other psychological processes including feelings of distress, depression, loneliness, and other emotional states. These factors can operate as protective or risk factors for pathophysiological processes as well as the recovery processes in their own right [e.g., 34]. Moreover, they might mediate the support - health association (see Figure 2). So far, not many studies have directly tested the

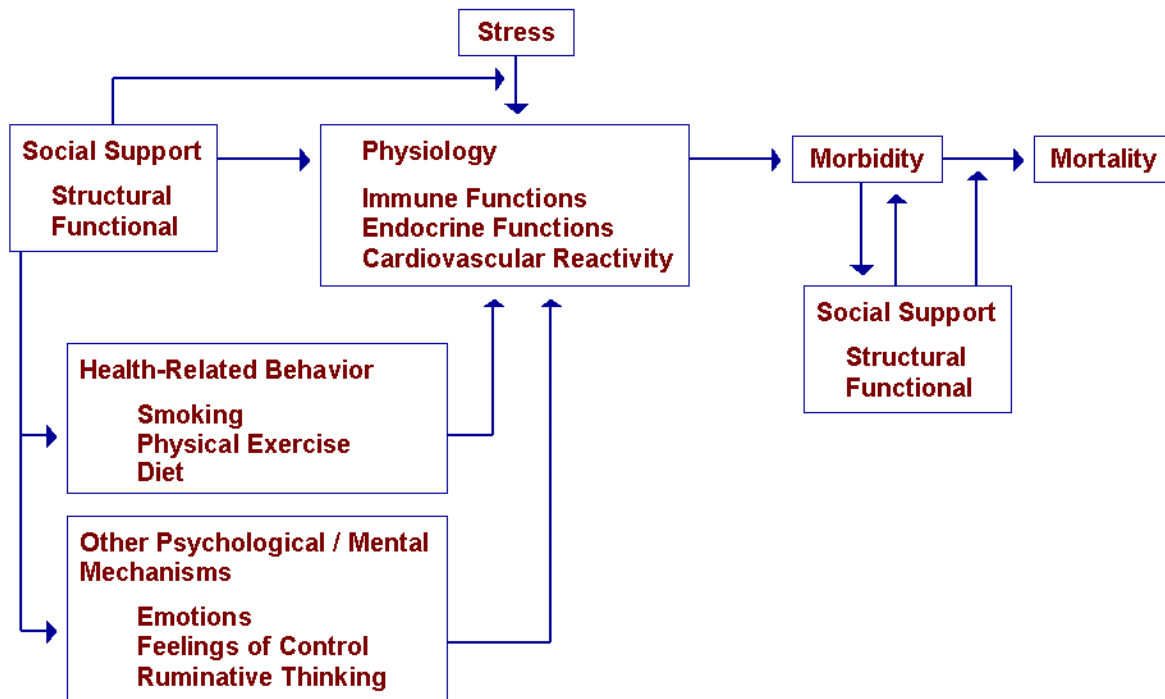


Figure 2. Multiple pathways linking social support to cardiovascular morbidity and mortality

mediating role of these variables. Some find that the effects of social support are independent from other psychological processes. For example, in three of the studies included in the meta-analytic review by Uchino et al. [10], depression, anxiety, and reported life stress did not mediate the association between social support and immune function.

In sum, our understanding of the processes that mediate the influence of social support on people's physical condition is still very limited. There is evidence for direct, indirect and stress-buffering effects with various facets of the social network and functional support operating through a variety of psychological, physiological and behavioral mechanisms that jointly contribute to the long-term evolution of diseases involving the cardiovascular system and to the recovery of patients. Preliminary conclusions suggest that for health behavior changes and their maintenance over time, instrumental support and social embeddedness are crucial, whereas the impact of emotional support on ill health is mostly mediated by neuroendocrine and immune processes. It remains subject to future studies to further explore in which ways different forms of social support are related to the various physiological parameters that play a role in the etiology and progression of CVD.

4. Conclusions

Prospective, retrospective, and cross-sectional studies provide substantive evidence that both social integration and social support are linked to mortality, health, and illness. Studies of sociodemographic differences have also shed further light on the nature of this relationship and helped to derive more concrete hypotheses about the intervening mechanisms. In addition, laboratory and intervention trials have uncovered some of the behavioral and physiological effects associated with manipulated change in social support and/or social integration.

Findings confirm that those who are well-embedded and receive social support live longer and are healthier. Moreover, their recovery from heart surgery is faster. Cardiac events are more frequent and more severe in socially isolated and unsupported individuals. This effect is stronger for men than for women. The gender difference, however, has to be judged in terms of age and particular social circumstances [46]. Men benefit more from women than vice versa, and this refers above all to middle-aged men. Older widowers can also be well protected by a small network of other support providers who may compensate for the lack of a spouse. Research on life-span changes in gender-specific buffering is inconsistent because most studies use gross sociodemographic markers such as marital status and other structural indicators instead of fine-grained support process data. The composition and availability of social network ties likely changes during the life course, as do the support interactions.

Advances in the field can be made only on the basis of conceptual differentiation that includes a multidimensional definition of social support [44, 46]. It is necessary to disentangle diverse facets of social support, and to make a clear distinction between functions of support and their sources. Moreover, the psychometric properties of support measures call for improvement. It is more likely to detect buffering effects of social support when there is a reasonable match between the stressor type and the support function.

The same conceptual differentiation is needed for cardiovascular reactivity, CVD, cardiac events, and cardiac death. Some physiological indicators are not stable over time, or are not accurately documented. It would be desirable to examine more closely the link between different facets of support and specific physiological, psychological, and behavioral mechanisms. This includes the separation of short-term physiological reactivity from longer term effects which may be implicated in the degenerative changes of chronic disease. We see two major avenues for a better elaboration of this field, one being the thorough investigation of causal mechanisms in the etiology of cardiac disease, and the other the examination of dyadic and communal coping processes in cardiac patients, which includes the mobilization, provision, receipt, and evaluation of support [46, 47].

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