LOW SOCIAL SUPPORT AND DISTURBED SLEEP

Epidemiological and psychological perspectives

~ Maria Nordin ~

Umeå 2006
To Steven, Hanna, and Edvin
Foreword

My professional career has not been straightforward; those who know me second that. I have always dreaded the question; 'and what’s your background?' My answer to this common and friendly question is so long, that halfway through, no one listens anymore but when I finally have finished, the follow-up question typically reads; ‘and how did you end up writing a thesis in public health?’ Well let’s try to set things straight once and for all.

Despite my start in the humanities in high school, I ended up studying public administration at the university. Much too young and naïve, I went for an education that could give me a job. Needless to say, that education was of little joy to me, neither during the study years, nor after, since I never pursued a career as a bureaucrat. Instead, I struggled for a time at a stock brooking firm as an administrator. But even though this was in the hey-days of the yuppies, I did never fit in and always required more of a challenge. Fortunately, I met my partner in life at this time, and he brought me on unexpected adventures. Living abroad for a couple of years forced me to reconsider my life, my interests, and my priorities (which I later learned are not static). I returned to my roots in the humanities and set sail for a Ph.D. in history. As it happened though, life took another turn and I ended up working as a research assistant in psychology. It was now the bolt literally struck me, making me realize that it was research in itself that was interesting to me. Perhaps it did not matter if the topic was history, psychology, public health, or quantum physics (although I have to confess that my capacity could never be stretched that far); it was the process of ‘finding out’ that could satiate my curiosity. Again, I was fortunate because once this was figured out, I found myself employed as a research assistant at the clinic for Occupational and Environmental Medicine at Umeå University Hospital. The rest is history. I owe my mentor many thanks for coming up with the idea of studying the association between social support and sleep because, it may sound like an after construct, but I have always been intrigued by personal relationships—scouts honor. Finally, I was in a place where my ambition and curiosity was nothing to be ashamed of but a prerequisite to get work done. Everyday it has been a joy to get out of bed to get to work; a work that constantly has stimulated and challenged me, also, or perhaps particularly, in times of adversity. Finally I fit in. Also, I do not dread the question about my background anymore because during a couple of years of my time as a Ph.D. student, I had the opportunity to study psychology. So, now I proudly present myself as a behavioral scientist, with a Ph.D. in public health soon to come.

The wise is not learned;
the learned is not wise

~ Lao Tse ~
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The Swedish workforce underwent dramatic changes during an economic crisis in the 1990s. In the aftermath, sick leave increased at an unprecedented rate and stress-related disorders, such as burnout, depression, and sleep disturbances replaced earlier work-related diagnoses. Sleep disturbances have been demonstrated to both precede and succeed mental and physical illnesses, including burnout, depression, anxiety, and cardiovascular disease. Disturbed sleep is also a common complaint in Sweden as well as in the rest of the Western world. Sleep has been shown to easily be disturbed by cognitive, emotional, and physiological arousal (stress). However, several studies have demonstrated that social support has a protective effect against the adverse effects of stress as well as a generally beneficial effect on health. Other studies, though, suggest that lack of social support may increase the risk for mental and physical ill-health. The purpose of this thesis was therefore to investigate the association between social support and disturbed sleep; foremost in working populations.

Epidemiological methods were applied to investigate the association between social support and disturbed sleep. Three studies were used; a cross-sectional (MONICA, n = 1,179), a longitudinal (WOLF, n = 2,479), and a case-referent (SHEEP and VHEEP in conjunction, n = 6,231) study. The data was obtained by questionnaires, and social support was operationalized as network and emotional support. Disturbed sleep was defined as difficulties falling asleep, difficulties maintaining sleep, repeated awakenings, and disturbed sleep. Gender was taken into consideration throughout the studies.

Foremost, low network support was found to increase the risk for contracting disturbed sleep. Which source the network support was derived from did not alter the association between low network support and disturbed sleep—low network support at work increased the risk for disturbed sleep as did low network outside work. Prolonged low network support and impaired emotional support did also increase the risk for sleep disturbances in men who were under strain at work. Furthermore, open coping buffered against low network support in
the association with disturbed sleep five years later in women, whereas low network support increased the risk for developing disturbed sleep at a later date when interacting with covert coping both in women and in men. Moreover, disturbed sleep was shown to mediate low network support in myocardial infarction in women.

In conclusion, the association between social support and disturbed sleep is complex and includes both interactions with other personality variables and mediating associations. Previous research on negative effects of low social support was confirmed as was previously observed gender differences in social support.

 Förhållandet mellan socialt stöd och störd sömn har undersökts med epidemiologiska metoder. Tre studier har använts; en tvärsnitts- (MONICA, n = 1 179), en longitudinell- (WOLF, n = 2 479) och en fall-kontrollstudie (SHEEP och VHEEP sammanslagna, n = 6 231). Data har erhållits genom frågeformulär, och socialt stöd har operationaliserats som nätverksstöd och emotionellt stöd. Störd sömn har definierats som svårigheter att somna och behålla sömnen, upprepade uppvaknande samt störd och orolig sömn. Kön har beaktats i alla de inkluderade studierna. Lågt nätverksstöd var den dimension som främst ökade risken för att utveckla störd sömn. Vilken källa nätverksstödet kom ifrån spelade dock ingen roll för förhållandet mellan det låga nätverksstödet och störd sömn – lågt nätverksstöd på arbetet ökade risken för sömnstörningar liksom lågt nätverksstöd utanför arbetet gjorde. Lågt nätverksstöd över en längre tid samt försämrat emotionellt stöd ökade risken för sömnstörningar hos män som
Samtidigt rapporterade pressade arbetsförhållanden. Hos kvinnor skyddade öppen coping mot det låga nätverksstödets negativa effekter på störd sömn, medan lågt nätverksstöd i samverkan med dold coping ökade risken för att utveckla störd sömn vid en senare tidpunkt både hos kvinnor och hos män. Störd sömn påvisades också mediera lågt nätverksstöd vid hjärtinfarkt hos kvinnor.

Sammanfattningsvis har denna avhandling visat att förhållandet mellan socialt stöd och störd sömn är komplext och innefattar både samverkan med andra personlighetsvariabler samt medierande associationer. Tidigare forskning om det låga sociala stödets negativa effekter bekräftades i denna avhandling liksom tidigare observerade könsskilda mönster vad gäller socialt stöd.
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<td>AVAT</td>
<td>Availability of attachment (emotional support)</td>
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<td>AVSI</td>
<td>Availability of social integration (network support)</td>
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<td>CFS</td>
<td>Chronic fatigue syndrome</td>
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<td>CI</td>
<td>Confidence interval</td>
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<td>KSQ</td>
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<td>PLS</td>
<td>Partial least square of latent structure analysis</td>
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<td>VIP</td>
<td>Variable importance in the projection value</td>
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This thesis is based on the following studies, which are referred to by their Roman numerals I – IV.


II. Nordin, M., Knutsson, A., Sundbom, E., Åkerstedt, T., Westerholm, P., Alfredsson, L. Low social support and vulnerability in the association with disturbed sleep. Longitudinal results from the WOLF study. (Submitted to *Journal of Occupational Health Psychology*)

III. Nordin, M., Sundbom, E., Knutsson, A., Alfredsson, L., Westerholm, P. Low social support and coping strategies in the prediction of disturbed sleep. Main and interactive effects from the longitudinal WOLF study. (Submitted to *Personality and Individual Differences*)

IV. Nordin, M., Knutsson, A., Sundbom, E. Is disturbed sleep a mediator in the association between social support and myocardial infarction? (Accepted for publication in *Journal of Health Psychology*)
INTRODUCTION

The Swedish work force experienced difficult times in the beginning of the 1990s when a period of unprecedented recession hit the country. The traditionally secure labor market changed rapidly and was shattered and replaced by job insecurity and high unemployment rates as well as reorganizations (Hallsten et al., 1999). The Swedish economy picked up again but did not recover fully to meet the unemployment rates that had prevailed in the preceding booming post-war years.

At the turn of the century, sickness absenteeism, foremost in the shape of long term sick leave, skyrocketed despite the economical recovery. Mental diseases, such as depression, burnout and anxiety dominated, along with musculoskeletal complaints, the long term sick leaves and increased between 1999 and 2004. In women, these mental complaints along with sleep disturbances, increased significantly. For men, the prevalences of these disorders did also increase, but except for depression, not significantly (Riksförsäkringsverket, 2004:8).

Previous research has shown that insomnia, which core ingredient is disturbed sleep, is a common complaint in the general population; about 20% suffer from it in Sweden (Broman et al., 1996). Insomnia constitutes a severe health problem which affects the individual as well as society. For the individual, insomnia represents an increased risk for contracting poor mental and physical health, and disturbed sleep is also a main symptom in the DSM classification system for depression (APA, 1994). Work and family-related stress has been shown to be the most frequent cause of insomnia (Ancoli-Israel & Roth, 1999) and poor sleepers have been reported to experience more losses of social relationships and to be less satisfied with their social relations than good sleepers (Healy et al., 1981; Ohayon et al., 1997a). To society insomnia and disturbed sleep present a problem in the form of an economic burden because of the extended use of health services (both due to insomnia and disturbed sleep on their own, as well as to their co-morbidities), increased work absenteeism, and elevated risk for accidents (Kuppermann et al., 1995).
INTRODUCTION

Depression and anxiety have previously been demonstrated to correlate with disturbed sleep (Gillin, 1998), and recent research has also shown burnout to be associated with sleep disturbance. For example, Ekstedt and Fagerberg (2005) showed in a sample of persons at risk for burnout, that the time preceding the onset of burnout was characterized by sleep problems. Ekstedt and coworkers (2004) also showed that burnout patients displayed more fragmented sleep as well as less efficient sleep than is usual in a normal population. In her dissertation, Ekstedt (2005) furthermore suggested that burnout could be induced only by lack of recovery, without any increase in stress exposure.

The results referred to above show that there is a close association between stress and disturbed sleep and therefore it is motivated to study whether the widely acclaimed buffer against stress—social support—also is related to disturbed sleep. If so, adequate or improved social support could help in preventing the course of disturbed sleep from perpetuating itself into disease. Alternatively, inadequate or impaired social support could elevate the risk for disturbed sleep and consequently the risk for disease.
BACKGROUND

SOCIAL SUPPORT

Social support can be defined as the aid, comfort, and confirmation given by family, friends, coworkers and others, that makes the individual perceive that s/he is cared for, loved, esteemed, and part of a network of friends (Cobb, 1976). It provides a sense of integration in the community, and if adequate, it enhances health and well-being (Lakey & Cohen, 2000). Social support has been described in the form of its structure and function (House et al., 1985). The structure is referred to as the networks of friends, families and other sources of support whereas the functional support refers to the function of social support such as the provision and perception of instrumental, informational and emotional support.

SOCIAL INTEGRATION AND NETWORKS OF FRIENDS

Referring to the structure of social support, networks of friends, families and other sources of support are mapped and intricately analyzed assessing for instance size, density, content, durability, frequency, and reciprocity within the network. Network is a strictly quantitative measure which nevertheless has been found to correlate positively with health and well-being (Brissette et al., 2000). There is a popular saying that it is ‘not the quantity but the quality’ of the friendships that matters for well-being, but few studies have investigated whether this is true or not. However, in a study on mental health and network size, Brugha and coworkers (2005) found that a primary network of three persons or less predicted mental ill-health. Thus, there seems to be a lower limit for where network size becomes detrimental to health. A critical upper limit of the number of friends in the network has not yet been suggested, even though research has shown that large networks may become a stressor, especially for women who usually are those maintaining and caring for the networks (e.g., Belle, 1987; Kawachi & Berkman, 2001).
The network measurements have been regarded as an approximation of social integration which assesses to what degree an individual is integrated within its social setting. Social integration is defined as the individual’s extent of participation in social activities and/or social relationships and the start of this research can be dated back to Durkheim’s work on social stability in relation to suicide (for a description of the impact of Durkheim’s work on social support theory, see Cohen et al., 2000). Further development of Durkheim’s thoughts has led to the notion that social interaction regulates a sense of oneself in relation to the surrounding world, and a stable sense of the self affects well-being (Brissette et al., 2000). This idea was later on picked up in social cognitive theories in regarding social support as an integrated part in the cognitive systems and consequently also a part of the personality (Lakey & Drew, 1997). This is discussed more thoroughly under the heading ‘personality and social support’.

Social integration has proven to be a reliable and stable measure in predicting health outcomes. Scientists that have been of importance for the development of social integration theory such as Sieber (1974) and Marks (1977), have argued that inhabiting multiple roles are beneficial for psychological well-being because they include, for instance, status security and enhanced self-esteem (Sieber, 1974), as well as approval and favorable self-image (Marks, 1977). In line with Marks and Sieber, Thoits, (1983) proposed in the identity accumulation hypothesis that the identity of an individual is dependent on the set of social roles they play. These sets of roles inhabit behavioral expectations that provide a sense of predictability since they provide information on how to act and thereby give guidance, meaning, and purpose to the individual’s very existence. Cohen (1988) also suggested that the ability to meet role expectations have cognitive implications. Being part of a social network increases the sense of control since the network members have an influence on others. Moreover, they are influenced by others. This reciprocity in giving and receiving support gives a healthy balance among the network members and strengthens the cognitive processes that are manifested in a sense of self-worth (Antonucci, 1994; Cohen, 1988).

Individuals who are socially more integrated have been shown, for example, to live longer (Berkman, 1984), to be depressed less often (Cohen & Wills, 1985), and to be less susceptible to infections (Cohen et al., 1997). Lack of
social integration on the other hand has been shown to be a risk factor for psychological and physiological ill-health and it is noteworthy that the risk estimate for isolated individuals to develop poor health has been shown to be comparable with the risks associated with tobacco intake, hypertension, and obesity (House et al., 1988).

**EMOTIONAL SUPPORT**

The functions of social support arise in the dynamic processes that occur within the social networks. In its functional form, social support serves to validate and confirm the individual as well as to provide informational and instrumental support. Over the years of intense research, various dimensions have been identified and suggested to compose the functions. The dimensions that have prevailed and that have been most distinctly described, however, are emotional, informational, and instrumental support. Other terms flourish in the literature though, depicting basically the same dimensions.

Emotional support has been considered to be the most important function of social support. When adequate, it increases the individual’s self-esteem, and sense of self-worth, and it contributes to the confirmation of the self (Lakey & Cohen, 2000). Informational support refers to the provision of useful information for guidance in everyday life and in stressful situations and leads to the perception of increased control over the situation (House et al., 1985). Control is also an important aspect in instrumental support. However, instrumental support refers to a more tangible type of support than informational support in that it, for instance, includes services, lending of tools, or provision of assistance (Lakey & Cohen, 2000).

To be effective, the functional support should correspond to the stressor with regard to both the dimension measured (type) and the source it is derived from. Cutrona and Russell (1990) suggested in the stress-support matching hypothesis that the type of social support should match the type of stressor in order to promote positive coping strategies and to reduce adverse effects of a stressor. Each stressful event puts unique demands on the individual and thus the social support provided should match these demands. For instance, when grieving the loss of someone close, an offer to lend money would not reduce the stress elicited by the grief. Furthermore, LaRocco and coworkers (1980)
suggested that the source of support must match that of the stressor to be an effective buffer against stress. Thus, stress perceived at work would be best buffered by social support provided at work.

Empathy, emotional expressiveness, attachment, and social competence are all important characteristics in providing social support. Having the abilities to show concern for the well-being of others as well as to express and communicate it, not only verbally but also through warmth and sympathy, makes it easier for the recipient to receive support. Furthermore, being securely attached and having interpersonal skills helps in effectively in the provision of social support (Reis & Collins, 2000).

PERSONALITY AND SOCIAL SUPPORT

Personality is a complex phenomenon that is difficult to measure as it depends on both nature and nurture. However, Costa and McCrae, developed in the mid eighties, a five factor model that described the basic personality traits neuroticism, extraversion, openness to new experiences, conscientiousness, and agreeableness and is known as the Big Five model (for more details see e.g. Eysenck, 2001). Occasionally this model has been investigated with regards to the perception of social support. The results have shown that the agreeableness factor is the dimension most often related to the positive perception of social support, but also extraversion has been shown to positively affect patterns of social interaction (e.g., Roberts & Gottlib, 1997). Moreover, neuroticism has been found to mediate the relationship between social support and depression (Henderson et al., 1980). However, since also depending on nurture, personality may be portrayed in other words than in factor models.

Personality plays an important role in the interpretation and perception of social support, and cognitive schemas set a framework for how to interpret and perceive the enacted social support that is received and available. The attachment theory, formulated by John Bowlby (for a discussion about the importance of attachment theory in social support theory, see Lakey & Cohen, 2000), has been important in the development of social support theories. Bowlby suggested that the cognitive schemas of oneself and others are related to the attachment style that has dominated the relationship with the care givers in the early years. Mankowski and Wyer (1997) further suggested relational schemas,
including schemas of the self, of others, and of the interaction with others, to be present when judging persons in our surroundings. Thus, positive experiences from previous relationships will create positive schemas of others and social support will be perceived and interpreted as something good. On the contrary, adverse experiences of relationships may have the consequence that social support is perceived negatively (Blatt, 2004). The self-determination theory (Deci & Ryan, 1980) argues that autonomy, competence, and relatedness to others are three basic psychological needs that must be satisfied for personal growth, integrity (Ryan, 1995) and well-being (Reis et al., 2000). These basic needs may be hampered if social support is perceived as a way of interfering with one’s autonomy, questioning one’s competence, or having strings attached on the relationships with others (Solky Butzel et al., 1997).

Coping strategies are crucial for the perception, interpretation, and the subsequent response to stress and are necessary for maintaining stability and control in life. Coping has been defined as thoughts and behaviors used to handle situations that are appraised as stressful and demanding (Lazarus & Folkman, 1984). When applying effective coping strategies, immediate distress is reduced and psychological and physiological well-being enhanced (Snyder & Dinoff, 1999). In much of the literature about coping, seeking social support is one of the identified strategies. Social support has also been suggested to have a beneficial impact on other coping strategies since it can assist both in solving problems and in dealing emotionally with a stressor (e.g., Holahan et al., 1997). The relationship between social support and coping is, however, more complex than that. On the quest to pursue a stable self-schema and to obtain control, reality is negotiated with. As social networks shape the individual’s actions and goals through norms, rewards, and punishments, the self is to a large extent built up by the appraisal and confirmation from others. Thus, the social network is part of the reality that needs to be negotiated with in order for the self to remain stable and in control (Higgins & Leibowitz, 1999). Coping strategies vary and depend on the situation and on the stressor, but also on the social resources at hand and personality disposition (Folkman & Moskowitz, 2004). Thus, cognitive schemas are important in the appraisal of the stressor (primary appraisal) as well as in appraising the resources at hand, such as available social support, to help in dealing with the stressor (secondary appraisal) (Lazarus & Folkman, 1984).
HEALTH AND SOCIAL SUPPORT

Research over the past decades has provided evidence that social isolation and loneliness are risk factors for mental and physical ill-health (Cohen et al., 2000; Cacioppo et al., 2002; Steptoe et al., 2004). In the course of heart disease, low social integration has been found to be an independent risk factor for myocardial infarction in both men (Orth-Gomér et al., 1993) and women (Orth-Gomér et al., 1998). Furthermore, both low social integration and low emotional support have been found to be independent risk factors for narrower (clogged) coronary arteries in women by Wang and colleagues (2005).

Physiologically, adequate social support has been found to affect the catecholamines positively (Uchino et al., 1996) and salivary cortisol levels have been shown to be suppressed by oxytocin in the presence of social support in stressful situations (Heinrichs et al., 2003).

Two complementary hypotheses have had a major impact on the attempt to explain the relationship between social support and health; the stress buffer and the direct (main) effect hypotheses. The stress buffer hypothesis (Cohen & Wills, 1985) states that in the case of stressful events adequate social support will protect against the adverse effect of a stressor. Previous research has found emotional support to be the dimension most likely to act as a buffer against the perception of stress. Adequate support may intervene in either primary or secondary appraisal, thereby altering the interpretation of and coping with the stressor, subsequently attenuating the physiological effects of stress (ibid.).

The direct effect hypothesis (Cohen & Wills, 1985) postulates that social support has a beneficial effect on health in general, i.e., also when the individual does not experience stressful events. Social control and peer pressure is assumed to regulate health behaviors among members in a network through the influence of norms and coping strategies by role-modeling peers. The peer pressures may for instance result in healthy behaviors such as exercising and smoke cessation, subsequently increasing physical health. These regulating measures prevent extreme responses that, if unregulated, can lead to dysfunctional cognitive processes, behaviors, and emotions (Cassel, 1976; Lakey & Cohen, 2000) as well as to altered responses in the cardiovascular, neuroendocrine, and immune systems. As a consequence, both physical and psychological health can be compromised (Cohen, 1988; Uchino et al., 1996).
BACKGROUND

Yet other models have been put forward in the attempt to explain the complex relationship between social support and health. The vulnerability hypothesis (Dohrenwend & Dohrenwend, 1984), for instance, suggests that due to personal and social factors, such as relational schemas and the perception of social support, the individual becomes more or less vulnerable to the adverse impact of stress. The chronic burden hypothesis (ibid.) further states that a lack of social and personal resources may develop into ill-health in the form of, for instance, depression and anxiety because lack of support becomes a permanent stressor. Lack of social support, may accordingly decrease the sense of control and self-worth, and loneliness may become a stressor not buffered against which may be detrimental to health. Furthermore, healthy behavior may not be encouraged and, as stated above, an alteration in the cognitive, emotional, and physiological response can lead to physical and psychological ill-health (Uchino et al., 1996; Brisette et al., 2000).

PSYCHOSOCIAL WORK FACTORS AND SOCIAL SUPPORT

Much research has been conducted to establish the impact that psychosocial work factors may have on health; perhaps foremost on cardiovascular health. The model on psychosocial factors that has been mostly explored is the demand-control model which was proposed by Robert Karasek at the end of the 1970s, and later on tested and validated by himself and Theorell and coworkers (see Karasek & Theorell, 1990). The demand-control model proposes that individuals who perceive excessive demands at work (both physical and psychological) in combination with low control over what to do at work and how to do it, may experience strain. The imbalance between demand and control has been shown to lead to ill-health, such as cardiovascular disease and high blood pressure (e.g., Karasek & Theorell, 1990; Theorell & Karasek, 1996). Social support was investigated in conjunction with the demand control model by Johnson (1986) and shown to interact with the control variable in protecting against cardiovascular disease. The demand-control model was thereafter extended to a three dimensional model referred to as the demand-control-support model.

Even if the literature on psychosocial work factors has been dominated by the demand-control model, the model has not gone undisputed. Criticism has
been raised against the underlying notion that the demand-control model can be fitted into every workplace regardless of occupation or time period even if working life is dynamic and differs today compared to the 1970s. Furthermore, no distinct cut-off point has been identified in the demand and control dimensions that can separate those exposed to strain from those not exposed. Therefore the research regarding the demand-control is not always comparable. Moreover, most of the results have been based on cross-sectional studies and thus it cannot be concluded that strain precedes disease rather than the other way around (Kasl, 1996; Kristensen, 1996). Hypothetically, certain personality styles can be more vulnerable to (cardiovascular) disease and as a consequence of this vulnerability, they may more easily perceive strain at work. Other models have been put forward in attempting to explain the relationship between psychosocial factors and health (see e.g., Siegrist, 1996). However, these are not central to this thesis and therefore excluded from further discussion.

**Gender and Social Support**

The present thesis does not have the ambition to complete a full gender analysis. Instead, gender is regarded through a variable perspective. In an extensive review of the literature on gender and social support, Antonucci (1994) pointed out many similarities between the genders in both the structure and function of social support. She did, however, also conclude that women include more members in their closest network of family and friends along with generally giving and receiving more support to and from their networks compared to men. In addition, Shumaker and Hill (1991) argued that men have less intense and less emotional networks than women, whose networks are more multi-facetted and serve multiple purposes (see also Gurung et al., 2003). Along the same line, Kawachi and Berkman (2001) concluded that women are involved in more emotionally intimate relationships, they mobilize more social support during periods of stress, and they provide more social support to others compared to men. However, since women often take on responsibilities for the networks, these networks can become stressful rather than buffering (Schuster et al., 1990; Shumaker & Hill, 1991). On the other hand though, women handle adverse life events better than men since they seek more support in times of need (Kawachi & Berkman, 2001).
Work has been suggested to be a more common source for social support for men than for women (Burke, 2002). However, men do also turn to their partner for emotional support more often than do women. The consequences of this often manifest itself in isolation of older and retired men since their natural sources for social support (the work and the partner) may no be longer present (Gurung et al., 2003). Consequently, divorced and widowed men have been demonstrated to have an increased risk for impaired mental and physical problems (Belle, 1987; Gurung et al., 2003) as well as for early mortality, compared to non-divorced and non-widowed men (e.g., Berkman & Syme, 1979; House et al., 1982). Due to the differences that have been found between the genders in their perception of social support, there may evolve a ‘support gap’ between the genders, which may lead to demoralization and depression for the more support providing part, i.e. the women (Belle, 1987).

**DISTURBED SLEEP**

Sleep is the opposite to stress. Stress puts the body in an alert state whereas sleep is the state in which the body can rest, rebuild the worn out cells, and consolidate memory in order to be ready for the next day’s challenges of wear and tear. Even though not completely investigated or understood, sleep has been attributed to have many beneficial effects for the organism. The process of releasing anabolic hormones during sleep helps restoring the body (Weitzman, 1975) and sleep promotes health by enhancing the immune system (Irwin et al., 2003). Sleep does also seem to play an important role in memory consolidation (Huber et al., 2004).

Sleep can be disturbed by different causes. For instance, physical and mental diseases as well as pain have been demonstrated to be common causes for disturbing sleep (Ford & Kamerow, 1989; Morin et al., 1998). Also, external factors, such as light and sound, can alter sleep as can internal factors such as cognitive, emotional and physiological hyper arousal (Morin, 1993; Espie, 2002; Harvey, 2002). Disturbed sleep may in turn cause various problems, and previous research has shown it to be a possible precursor of depression (Gillin, 1998), cardiovascular disease (Schwartz et al., 1999), and burnout (Ekstedt, 2005). Moreover, if not sleeping properly, the next day’s performance may be affected (Bonnet, 1985). Similarly, Pilcher and Huffcutt (1996) showed that short-
term, long-term and partial sleep deprivation had a profound effect on motor, mood, and cognitive performance.

Disturbed sleep is a broad and general term which can include any sleeping disorder, such as restless legs, hypersomnia, narcolepsy, sleep apnea, and chronic fatigue syndrome (CFS). In this thesis though, disturbed sleep refers foremost to problems with initiating and maintaining sleep along with early awakenings and disturbed sleep. These problems are included as core ingredients in the concept of insomnia which, in brief, includes subjective sleep complaints three nights per week or more, negative daytime symptoms that are associated with the disturbed sleep, and impairment in important areas in life such as social relations or at work, according to the DSM-IV criteria (APA, 1994).

The cognitive and emotional aspects of sleep disturbance are of specific interest for this thesis. Stress is often a product of cognition and/or emotion since a stressor is first perceived and appraised by our cognitive systems (Lazarus & Folkman, 1984) and/or reflected as an emotion, triggering the autonomous nervous system (Sonnby-Borgström, 2005). Healy and coworkers (1981) suggested stress to be the most disruptive factor to sleep which was confirmed by Hall et al., (2000) who showed that subjective stress attenuated delta waves (brain waves occurring during the important deep sleep). Healy and coworkers (1981) further showed that in addition to other stressors, those who reported poor sleep had experienced twice as many losses and/or departures of friends compared to those reporting good sleep. The poor sleepers also reported poorer achievement and less sense of affiliation than did the good sleepers. Friedman and coworkers (1995) showed that even if there was no difference in the average level of life stress reported by poor and good sleepers, those who reported poor sleep appraised the stressors negatively more often than did the good sleepers. Morin and Espie (2003) concluded, along the same lines, that insomniacs perceived a lower level of control over stress than did good sleepers and that the effects of daily stressors were larger in insomniacs.

THEORIES OF INSOMNIA

Theories of insomnia have pointed toward the impact of the cognitive and emotional components in disturbed sleep. Morin’s micro-analytic model of insomnia (1993) states that hyper arousal may manifest itself in the emotional,
cognitive, or physiological systems. Various stimuli (such as apprehensions and worries about not being able to fall asleep) may elevate the arousal levels and disturb temporal and contextual stimuli (e.g., bedtime routines and sleeping environment). Sleep is dependent on daytime activities and stimuli perceived during the day may include adverse events. Such adverse events may be interpersonal conflicts and other stressful situations which can be internalized and arouse the cognitive, emotional, and physiological functions involved in insomnia. The inability to fall asleep may perpetuate itself by worry and rumination about sleep loss and daytime consequences, fuelling the arousal responses further.

Harvey (2002) proposed the cognitive model as an explanation for the initiation and maintenance for insomnia. Harvey stated that excessive negatively toned cognitive activity (based on erroneous beliefs about performance and thoughts about safety, i.e. being alert in case of a threat) triggers both autonomic arousal and emotional distress, activating the sympathetic nervous system and creating a stressful state of anxiety for the individual. The anxiety gives the individual a reason to attend to threats, such as intrusive thoughts about not getting enough sleep, and worry about not being able to cope or function the following day. These negative thoughts and emotions enhance the cognitive activity the following night and thus, the individual is trapped in a vicious circle of cognitive and emotional activity, arousal of the sympathetic nervous system, and performance anxiety, both with regard to sleep and to daytime performance.

Yet another model of insomnia, the psychobiological model, was proposed by Espie (2002). Taking on a salutogenic perspective, this neurobehavioral model views insomnia as a ‘failure of automated sleep activation and maintenance’ (p. 229). Good sleep, Espie claims, is the normal state in which homeostatic processes of the body’s internal rhythms and circadian processes are synchronous. Plasticity (the capability in the sleep-wake system to adjust to external and internal variance in normal life) and automaticity (the involuntary nature of a well-adjusted schedule and habits) are regarded as properties that defend the core of good sleep. The physiological and cognitive systems work in parallel because as the cognitive system de-arouses, so does the physiological system and sleep will be able to take over the mental state. If these systems fail to de-arouse (due to either positive or negative intrusive thoughts), they interact instead in an affective state, leaving the individual in an aroused state which is
not compatible with sleep. Ordinary daytime attitudes and behaviors facilitate a normal sleep-wake rhythm since dissociating irritability and fatigue with disturbed sleep takes the pressure off the onset of sleep.

**SOCIAL SUPPORT AND DISTURBED SLEEP**

Several studies have taken an interest in examining the association between social support and disturbed sleep as items within larger concepts. Understandably though, when included in larger ideas, the complexity of social support tends to disappear in favor for themes more central to the research question at heart. However, social support and sleep have been studied within topics such as adolescents’ sleep quality (e.g., Tynjälä et al., 1999), older women with coronary heart disease (e.g., Sherman et al., 2003), depression in younger and older populations (e.g., Allgöwer et al., 2001), and in post partum depression (e.g., Sheppard, 1994). Several studies on these topics report an association between social support and disturbed sleep. Moreover, low social support has been demonstrated to be a primary complaint in CFS patients (Kelly et al., 1999). There are however, also some studies that have not been able to discern any associations between disturbed sleep and social support such as those by Paulsen and Shaver (1991), and Nakata and colleagues (2004).

The studies that have focused specifically on the association between social support and disturbed sleep in a work setting have foremost been cross-sectional. In a Swedish intervention study, though, aiming at investigating the health effects (e.g., by studying the effects on sleep) resulting from reorganization, Wahlstedt and Edling (1997) concluded that individuals who perceived impairment in the contact with coworkers and/or supervisors between baseline and the first time of follow-up, had a higher risk for reporting disturbed sleep. Pelfrene and coworkers (2002) studied sleeping problems in relation to, among other psychosocial variables, social support from the supervisor and the coworkers in a large Belgian cross-sectional study. They found that low social support, both from coworkers and supervisors, was associated with poor sleep. Based on the cross-sectional WOLF study from northern Sweden, Åkerstedt and colleagues (2002) concluded that poor social climate (a concept closely related to social support) was associated, among other variables such as worry, and being female, with disturbed sleep. Nakata and collaborators (2001) showed that
Japanese shift workers who perceived poor coworker support had an increased risk for suffering from disturbed sleep when compared to shift workers who reported adequate support. However, when extending this hypothesis to a daytime working sample, Nakata and coworkers (2004) could not confirm the previous results.

In a population of postmenopausal women with coronary heart disease, Sherman and coworkers (2003) found that lack of social support and chest pain were the most prominent factors associated with disturbed sleep. Vosvick and colleagues (2004) studied the role of social support on sleep disturbance in HIV positive adult Americans and found that emotional support from friends was associated with lesser sleep disturbance, whereas instrumental support from friends increased the reports of disturbed sleep. Hanson and Östergren (1987) showed that sleep disturbance was more prevalent in Swedish older men who had a low contact frequency and non-fulfilling emotional support. Poor emotional support has also been shown to add to sleep disturbances in elderly American women (Bazaragan, 1996). However, contrary to these results favoring an association between social support and disturbed sleep, Paulsen and Shaver (1991) reported in a study on women that social support did not have any effect, neither on subjectively rated nor on objectively assessed sleep (measured by EEG).

Ohayon and collaborators (1997a) reported from a Canadian sample that those who perceived their sleep as dissatisfactory also were those who most frequently complained about inadequate interactions with friends, spouses, and children. Women diagnosed with insomnia, who simultaneously reported dissatisfaction with their sleep, also reported absence of support. Furthermore, Ohayon and colleagues (1997b) demonstrated in a British sample that women who were unemployed, home-makers, divorced, or widowed (i.e., more likely to have a diminished network for support), reported higher prevalence of sleep disturbance and dissatisfying sleep when compared to their employed, and married counterparts. In investigating the other side of the coin, Undén and coworkers (1991) found that adequate social support at work lowered maximum heart rate, especially at night. In a study on men, Rau and colleagues (2001) confirmed these findings by showing that high social support at work was correlated with lower heart rate at work, at night and during recovery.
AIMS AND HYPOTHESES

Since previous research has shown merely associations between low social support and disturbed sleep, there is a need to study this association more at depth. The overall aim of this thesis was therefore to further explore this topic with different research questions and hypotheses in different epidemiological designs. The specific research questions and hypotheses are presented below.

- Are network and emotional support differently associated with disturbed sleep? It was hypothesized that both dimensions would affect disturbed sleep.

- Does social support at work differ from that outside work in the association with disturbed sleep? According to the stress-support-match theory, the support that fits the stressor (with regards to both type and source) is the most health beneficial one. Since evidence for the stress-support match theory have been found mostly in studies on emotional support, it was hypothesized that, since strain was measured at work in this thesis, emotional support perceived at work would affect disturbed sleep. However, since the stress-support match theory has not been confirmed within the research on social integration, source of support was hypothesized not to matter in the association between network support and disturbed sleep.

- Is social support related to strain in the association with disturbed sleep? Network support was expected to be associated with disturbed sleep in a direct manner, whereas emotional support was hypothesized to buffer against the adverse effects of strain on sleep. Also, it was expected that low social support, irrespective of dimension, would increase the vulnerability to strain which could manifest itself in disturbed sleep.

- Is there an association between social support and different coping strategies in the association with disturbed sleep? Since social support
Aims and Hypotheses

has been found to protect against stress, it was hypothesized that social support would interact with various coping strategies in the association with disturbed sleep.

- Is there a mediating association between low social support and disturbed sleep in the course of cardiovascular disease? Disturbed sleep was expected to mediate the negative effects of inadequate support, both in the form of network and emotional support, in myocardial infarction.

- Are there gender differences in the association between social support and disturbed sleep? It was hypothesized that since women typically include more persons in their close networks and typically provide more support to others, they would, compared to men, be more affected by the impact that network support may have on disturbed sleep. Both genders were expected to be affected by emotional support in a similar manner.
MATERIAL AND METHODS

OVERVIEW

The table below presents an overview of the key variables and their corresponding instruments, the designs, the analyses, and statistical models that have been used in the studies making up this thesis.

TABLE 1.
Overview of the instruments, designs, statistical analyses, and models used in the studies respectively.

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MATERIALS AND METHODS

INSTRUMENTS

All the instruments used in this thesis and how they have been handled are described in the appendix. The instruments measuring the core issues, social support and disturbed sleep, are however described more extensively below. Even if somewhat altered, the same instruments measuring social support and disturbed sleep have been central to almost all the studies included in this thesis.

ASSESSING SOCIAL SUPPORT

The instruments Availability of Social Integration (AVSI) and Availability of Attachment (AVAT) (Henderson et al., 1980) were applied throughout the studies in this thesis. AVSI assesses network size along with qualitative aspects of social integration, and AVAT estimates aspects of emotional support. These instruments were originally included in the Interview Schedule for Social Interaction (ISSI) which was developed to assess the psychological needs for satisfying deep affectional relations (measured by the AVAT) and social integration provided by membership in networks with persons sharing the same interests and values (measured by the AVSI) (Henderson et al., 1980).

The AVSI and AVAT instruments have been criticized for mixing qualitative and quantitative measures of social support and social integration and for not assessing the pure support functions which they aim at measuring (Wills & Shinar, 2000). Foremost, the original AVSI scale includes functions of emotional, instrumental, and informational support as well as companionship (Henderson et al., 1980) and is therefore not a pure measurement of social integration (i.e., an assessment of to what degree an individual participates in social activities and/or social relationships). Most of the questions constituting the AVSI are measured by quantitative response alternatives (no friends, 1-2 friends, 3-5 friends, etc.) and therefore the instrument also assesses network size and structure (although it does not hold for a true network analysis). However, even if the instrument is not pure in the assessment of neither network nor social integration, it bears important aspects of both measures since it assesses the number of relationships as well as qualitative aspects of integration (such as how many there are around to share interests with). A problem with this instrument
therefore is that since combined, the measure of network and social integration can confound each other (see House et al., 1985 for a discussion).

In all the studies, the AVSI and AVAT were derived from a Swedish and shortened version validated by Undén and Orth-Gomér (1984). Interestingly, factor analyses in all the studies included in this thesis showed that two questions (‘There are persons in my surroundings from whom I easily can ask for things e.g., borrow tools or kitchen ware’, and ‘Apart from those at home, there are others I can turn to if I am in trouble’) originally included in the AVSI-index, loaded on a separate factor and were therefore excluded from the studies. Thus, the validation by Undén and Orth-Gomér (1984) can be questioned, and considering that their validation was performed in a restricted sample on men, the results from the three substantial data bases used in this thesis that included both men and women may be of interest for future use of the instruments. The dichotomization point used for the AVSI was set to identify those reporting to have ‘3-5’ friends or less as having a small network. This figure was chosen to correspond to the results from the study by Brugha and colleagues (2005) that showed that networks of three persons or less, predicted impairment in mental health. The AVSI is referred to as the network support index in this thesis.

The AVAT is used in its original Swedish form in Study I and IV. In Study II and III, however, only three questions were included. These three questions measured three central concepts in emotional support; support per se, closeness to someone else, and appreciation by others. These concepts are core issues in emotional support research and therefore the AVAT in Study II and III still had good face validity. The AVAT is referred to as the emotional support index since it reflects emotional aspects of the dynamic processes in relationship. The AVSI and AVAT are treated as separate concepts in all the studies included in this thesis. However, they are not completely different in nature and correlate significantly ($p < .01$), although not perfectly (Spearman’s rho = .26 - .36 for men and .19 - .45 for women throughout Study I to IV).

The response scale for the emotional support index differed between the studies. In Study I, the scale was dichotomous (‘Yes’ or ‘No’) whereas the response alternatives in Study II, III, and IV were ‘Agree completely’, ‘Agree to some extent’, ‘Hardly agree’, and ‘Disagree completely’. Those who had a maximum score on the emotional support index in Study I were identified as having good emotional support and contrasted with those who scored low. In the
other studies the dichotomization point was set so that poor emotional support was considered as those reporting that they ‘hardly agreed’ or ‘disagreed completely’ with the questions making up the AVAT index.

ASSESSING DISTURBED SLEEP

Disturbed sleep was used as the dependent variable in Study I, II, and III. In Study IV, however, disturbed sleep was used as a mediating variable and myocardial infarction as the dependent one. In Study I, sleep was assessed by the question ‘Changes within one-self occur over the years. Try to mark (by marking the figure that best indicates) how you feel now.’ The participants responded by marking on a seven point scale where they would estimate their sleep; score one indicating the sleep to be ‘very poor’, and score seven indicating the sleep to be ‘perfectly fine, could not be better’. Based on the literature, that has shown sleep disturbances to be prevalent in about 20% in Swedes (Broman et al., 1996), this question was dichotomized so that the 22% (as close as possible to 20%) of the study population who scored the lowest were identified as ‘poor sleepers’.

The Karolinska Sleep Questionnaire (KSQ) (Åkerstedt et al., 2002) was used for assessing sleep disturbances in Study II, III, and IV. The KSQ contains 14 questions measuring three dimensions of disturbed sleep; sleep quality, impaired awakening, and fatigue during the day. Factor analyses with varimax rotation confirmed these three dimensions, all in concordance with the instrument’s properties (Kecklund & Åkerstedt, 1992; Åkerstedt et al., 2002) in all the studies in which the instrument was included. Disturbed sleep is, however, the only dimension used in this thesis. Since insomnia (identified as sleep disturbances three times or more per week) has been shown to affect health and well-being, the disturbed sleep index was dichotomized in such a way that those who experienced disturbed sleep ‘some times per week’ or more were categorized as having disturbed sleep in Studies II and III. In study IV the dichotomization point was set on the highest quintile. Similar to Study II and III though, this dichotomization point also identified those who experienced disturbed sleep ‘some times per week’ or more often. The reason for choosing this dichotomization point was to follow the DSM-IV diagnostic criteria for insomnia as closely as possible (APA, 1994).
MATERIALS AND METHODS

DESIGNS AND POPULATIONS

STUDY I

The cross-sectional data base from the Multinational Monitoring of Trends and Determinants in Cardiovascular Disease (MONICA) Project in northern Sweden was used for the purposes of Study I. The objective of the MONICA study is to assess the relationship between changes in cardiovascular risk factors in the population and changes in the incidence of coronary heart disease and cerebrovascular disease. The sampling procedure in the MONICA study included stratification on gender and age, and in Study I only the participants who were working at the time for the survey were included. The data base came to include 1,179 participants (out of whom 623 were women) after exclusions. The survey of 1999 was used for the purposes of Study I since it, besides assessing the more traditional risk factors for cardiovascular disease, also included an extended questionnaire about psychosocial factors. (For a further description of the MONICA study, see Stegmayr et al., 2003).

STUDY II AND III

Study II and III were based on the longitudinal Work Lipids and Fibrinogen (WOLF) study. The WOLF study aims at investigating the effects of work organization and psychosocial factors on health and was carried out the first time (T1) between 1996 and 1998 in Västernorrland and Jämtlands län. The follow-up time was on average 5 years with a range of 11 months, and the second data collection (T2) took place between the years 2000 and 2003. The data was gathered through questionnaires and medical exams provided by the Occupational Health Services (OHS). All participants at T1 were re-invited at T2, either through the OHS or by mail invitation from the researchers. In both Study II and III though, those who reported disturbed sleep at T1 (19%) were excluded from the data base in order to be able to separate the effect of social support on sleep disturbance from other causes. Furthermore, only those who were still working at T2 were included. Consequently, the data base used for the purposes of Study II and III contained 2,479 participants out of whom 384 were women, leaving the gender distribution in the WOLF study skewed in favor of men.
MATERIALS AND METHODS

The network and the emotional support indexes were assessed both at work and outside work in Study II and III. To study how the social support developed over time in Study II, the two dichotomized network and emotional support indexes were combined into four categories each; ‘unchanged good’ support from T1 to T2; ‘improved’ support from T1 to T2; ‘impaired’ support from T1 to T2, and ‘unchanged poor’ support from T1 to T2. The category labeled ‘unchanged good’ served as referent category in the statistical analyses.

In Study II, the demand-control model (Karasek & Theorell, 1990) was used to separate the participants who reported strain at work from those who did not at T2. The demand and control variables were dichotomized into tertiles and the participants who reported a combination of high demand and low control were identified as being under strain.

In Study III, coping strategies applied in the face of a conflict with a supervisor and/or coworkers at T1 were used as independent variables in addition to the social support measures. The instruments for open and covert coping developed by Harburg and coworkers (1973) were used for these purposes. Open coping is defined as protesting and reasoning with the counterpart directly and extrovertly in a conflict, whereas covert coping refers to a strategy of walking away from the conflict dealing with it indirectly and introvertly. Psychological variables rarely work alone but interact with each other. Interaction occurs when two or more independent determinants act in combination in causing an outcome. When the presence of two determinants is required for an outcome, the interaction is synergistic. However, when the presence of one determinant together with the absence of another is required, for an outcome to occur, the interaction is called antagonistic (Rothman & Greenland, 1998). Interactions can be displayed on an additive or a multiplicative scale and in Study III (as well as in Study II), multiplicative interaction analyses were performed to investigate the interactive relationship between social support and the coping strategies presented above in association with disturbed sleep.

STUDY IV

Study IV included the populations of the Stockholm Heart Epidemiological Program (SHEEP), and the Västernorrland Heart Epidemiological Program (VHEEP). These case referent studies aimed at investigating first time non-fatal
and fatal myocardial infarction. However, in Study IV only non-fatal cases were included. The combined SHEEP and VHEEP study base comprised 6,231 persons (out of whom 2,046 were women), and was based on all Swedish citizens living in the county of Stockholm, aged 45-70 years, and in the county of Västernorrland being 45-65 of age. The two studies are identical and except for the age span of the participants and the period of case identification (male cases in the SHEEP study were identified between 1992 and 1993; female cases between 1992 and 1994; and all the cases in the VHEEP study were identified between 1993 and 1995). The referents were selected by random sampling and five referents were chosen for each case in order not to lose power in the case of decline of participation. Myocardial infarction was used as outcome variable. Myocardial infarction was diagnosed according to the criteria set by the Swedish Association of Cardiologists (Stockholms läns landsting, 1991). For a further description of the SHEEP study, see Reuterwall and coworkers (1999).

In Study IV, the model of mediation, suggested by Baron and Kenny (1986) was used. According to this model, four steps must be confirmed in order to establish a mediating relationship. First, the independent variable (here low social support), must correlate with the dependent variable (here myocardial infarction). Secondly, the independent variable must correlate with the hypothesized mediating variable (here disturbed sleep). As a third step, the mediating variable must be shown to correlate with the dependent variable. In the last step, the direct effect of the independent variable on the dependent must be reduced to insignificance in order to establish a mediating association between the variables included in the model.

**STATISTICAL METHODS**

Different statistical analyses are needed for different purposes and for different classes of variables. The analyses used in this thesis are summarized below. Common for the statistical analyses in this thesis is that they all were performed separately for the genders.
MATERIALS AND METHODS

CHI-SQUARE, T-TESTS, SPEARMAN’S RHO, AND LOGISTIC REGRESSION

Chi-square analyses were used in all the studies for univariate comparisons since the instruments were measured on nominal and ordinal scales. T-tests were used for testing age differences between men and women. Spearman’s rho has been used for analyzing correlations between the ordinal variables, and since the dependent variables were binary (disturbed sleep vs. no disturbed sleep and cases vs. referents in myocardial infarction), logistic regression was used for predictive purposes in Study II, III, and IV.

PARTIAL LEAST SQUARE OF LATENT STRUCTURES

The data in Study I were analyzed by using the multivariate analysis Partial Least Square of Latent Structure-analysis, (PLS) (Wold et al., 1983). The PLS is a useful technique, among others, when there are correlations between the variables under study and when the distributions of these are non-normal. In this thesis it was used as a soft-modeling technique to map the pattern making up disturbed sleep. Since it is not a very common tool applied in these circumstances, it here deserves a closer presentation.

The PLS-analysis is a regression extension of the Principal Component Analysis (PCA). A minimal number of significant orthogonal components (latent variables) are extracted from the manifest variables, both independent (X) and dependent (Y), included in the analysis. This is done independently for each of the two sets of data (X and Y), and the correlation between these data sets is simultaneously maximized. A regression analysis is thereafter performed based on the scores of the latent variables and the method of least squares is used in an iterative procedure in order to minimize the residuals (Henningsson et al., 2001).

In an analysis such as this, the pattern of the variables is of interest and the Variable Importance in the Projection (VIP) value expresses the relative contribution from each variable to the significant PLS model and a value larger than 1.0 indicates a variable’s significant contribution to the pattern. VIP values below .8 indicate only a minor contribution to the model (Henningsson et al., 2001).
The validity of a PLS model is investigated by cross-validation of each component. This gives a measure of how well the manifest independent variables can predict the dependent variables when new cases are added. It is thus a measure of goodness of prediction (Q$^2$ value) of the model. A Q$^2$ value larger than .1 indicates that the model has a significant predictive power. The Q$^2$ value is different from the more traditional R$^2$ value in that the R$^2$ value estimates the variation in the data actually involved in the model computation whereas the Q$^2$ indicates how well Y can be predicted for cases in another sample (Henningsson et al. 2001).

**METHODOLOGICAL ISSUES**

Certain issues and procedures pertaining to the research process are worth pointing out more closely. In this thesis, the procedures regarding how confounding variables have been treated and how the thoughts have evolved around dichotomization are important to discuss. The issue of ethics is important in all research and will be discussed under this heading as well.

**CONFOUNDING**

A confounding variable is a ‘hidden’ variable in a statistical or a research model. It affects the variables in question but is not acknowledged. Thus, it may distort the relationship between the variables under study. By definition, a confounding variable correlates with the independent variable simultaneously to being a risk factor for the dependent.

In Studies II-IV the issue of confounding played an important role. In Study IV, confounding variables were partly controlled for through the design by matching the cases and referents on age and gender. Furthermore, the control over confounding was obtained in the statistical analyses in Study II, III, and IV. The potential confounding variables were first hypothetically selected and thereafter tested according to the above definition. Thus, different confounding variables were included in the different multivariate analyses since the analyses were tailored according to the data.
DICHOTOMIZATION

In epidemiology and psychology the views on how to identify exposed groups sometimes differ. In epidemiology it is common to define these groups by dividing the data into for example quartiles and quintiles whereas in psychology it is typically preferred to define exposed groups from a standardized criterion. The advantage with the procedure used by epidemiologists is that groups large enough for statistical comparison can be identified whereas the disadvantage is that neither comparisons between studies nor generalizations to other populations can be made. The procedure more commonly used by psychologists can be used for inference between studies, however, when no standardized cut-off exists, the procedure is impossible to use. Therefore, in this thesis, a standardized cut-off has been used for identifying exposed groups where so has been possible (e.g., when identifying disturbed sleep). However, when no cut-offs have previously been established, the procedure common among epidemiologists has been performed.

ETHICS

Investigating personal matters may be perceived as invading ones private sphere. Especially emotional support has been argued to be affected by social desirability (Seeman & Syme, 1987; Orth-Gomér et al., 1993) and can thus be influenced by denial (Ketterer et al., 1998; Ketterer et al., 2004). This indicates that it may be difficult for some individuals to confront their social life in questionnaires, and the researcher must take on the responsibility not to impose more hardship on the participant than necessary. Therefore, ethics committees (at Umeå University for the MONICA study, and at the Karolinska Institute for the WOLF and SHEEP/VHEEP studies) have reviewed and approved the studies included in this thesis.
RESULTS

STUDY I

AIM

The first study included in this thesis aimed at investigating whether there were any associations between social support and sleep disturbance in a working population. An additional aim was to examine whether this association differs with regards to network and emotional support and gender.

MAIN RESULTS

Chi-square analyses showed that there was a difference between the genders, in reporting low network support simultaneously to poor sleep (37% women vs. 17% men; p < .001). Furthermore, compared to the 21% of women who reported high network support simultaneous to reporting poor sleep, the 37% who reported low network support and poor sleep constituted a significantly larger proportion (p < .001). There were also differences between the genders regarding reported poor sleep and low emotional support; 35% of the women compared to 22% of the men with low emotional support also reported poor sleep (p < .05). Moreover, these 35% of the women who reported low emotional support and poor sleep constituted a significantly larger group compared to the 22% of the women who reported high emotional support along with poor sleep (p < .001).

The PLS-analysis ($Q^2 = .12$) (see Table 2) showed that self-reported poor sleep was associated with poor mental (e.g., depression and anxiety) and physical health (e.g., subjectively rated ill-health and prescribed medication). Aspects of low network support and low emotional support also contributed significantly to the pattern of poor sleep, as did pain and gender.
TABLE 2.
The model of poor sleep derived from the PLS-analysis

<table>
<thead>
<tr>
<th>MANIFEST VARIABLES</th>
<th>VIP-RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspects of mental and physical ill-health</td>
<td>1.3 - 3.1</td>
</tr>
<tr>
<td>Aspects of low network support</td>
<td>1.2 - 2.0</td>
</tr>
<tr>
<td>Aspects of low emotional support</td>
<td>1.0 - 2.0</td>
</tr>
<tr>
<td>Pain</td>
<td>1.2 - 1.8</td>
</tr>
<tr>
<td>Woman</td>
<td>1.0</td>
</tr>
</tbody>
</table>

CONCLUSIONS

A larger proportion of women with low than with high network and emotional support reported poor sleep. A larger proportion of women than men with low network and emotional support did also report poor sleep. Moreover, aspects of the two support indexes were part of the manifest variables making up the pattern of disturbed sleep in the PLS analysis.

STUDY II

AIM

The aim of Study II was to investigate whether social support buffered against disturbed sleep in a stratum characterized by strain at work or had a direct effect on disturbed sleep in general over time. Furthermore, it aimed at examining whether prolonged lack of support or impaired support would enhance vulnerability to stress, alternatively become a chronic stressor (burden) in its own right, and thereby increase the risk for disturbed sleep. Yet another aim was to study whether the effect of social support at work differed from that outside work in the association with disturbed sleep.

MAIN RESULTS

Low social support at the first occasion for data collection (T1) did not independently predict disturbed sleep at the second occasion for collecting data.
RESULTS

(T2), neither in men nor in women. Men in the stratum defined by strain at work at T2, who also reported low network support at work, both at T1 and T2, had a nearly four-folded increase in the risk for contracting disturbed sleep at T2 (OR 3.92; 95% CI 1.30-11.83). Also, impaired emotional support between T1 and T2 increased the risk for disturbed sleep by three times in men who reported strain at work at T2 (OR 3.08; 95% CI 1.00-9.49). Furthermore, men who reported low network support outside work, both at T1 and T2, had an increased risk for developing disturbed sleep when they also reported strain at work at T2 (OR 8.62; 95% CI 2.14-34.67). The OR showed that the risk for contracting disturbed sleep due to unchanged low network support outside work to increase by eight times. However, the very wide CI indicated that the sample (12 persons) included in the analysis was too small for consistent results. Thus, the magnitude of the OR should be interpreted with caution. It is also worth noting that there were participants at T1 who reported low network support along with good sleep.

Results from multiplicative interaction analyses showed that strain and low social support at T1 did not interact in the prediction of disturbed sleep at T2. However, the risk for disturbed sleep increased significantly in men under strain at T2 who also reported low network support at work at T1 (OR 2.96; 95% CI 1.02-8.55) as well as in men reporting low network outside work at T1 (OR 2.95; 95% CI 1.10-7.93).

In men, network support at work correlated with network support outside work (Spearman’s rho = .62; p < .001). The same relationship was found for emotional support at and outside work, but this correlation was not as strong (Spearman’s rho = .35; p < .001). For women, the corresponding correlation coefficients were .62 (p < .001) for network, and .40 for emotional support at and outside work (p < .001).

CONCLUSIONS

In testing the stress buffering, the direct effect, and the vulnerability (alternatively the chronic burden) hypotheses in the association between social support and disturbed sleep, evidence could only be provided for the vulnerability (alternatively the chronic burden) hypothesis in men who reported strain at T2. The risk for contracting disturbed sleep at T2 only increased in men who were strained by work at T2 and who reported low network support both at T1 and T2.
(thus reporting an unchanged low network support over time), or who had perceived impaired emotional support over time. Low network support at work at T1 did, moreover, increase the risk for developing disturbed sleep at T2 in men who reported strain at work at T2. So did low network support outside work at T1 as well, even though strain was assessed at work. The relatively high correlations between social support at work and outside work may be an indicator that social support represents a personality characteristic that perceives making friends more or less easy.

STUDY III

AIM

The aim of Study III was to explore the interactive relationship between social support and different coping strategies in the face of a conflict, either with the supervisor or with the coworkers, in the association with disturbed sleep.

MAIN RESULTS

Neither of the independent variables (network support, emotional support, open, or covert coping) predicted disturbed sleep at T2 independently. In women though, covert coping toward coworkers at T1 had a protective main effect on disturbed sleep at T2 (OR at work .51; 95% CI .26-1.00; OR outside work .49; 95% CI .26-.95). However, low network support at work at T1 did also interact with covert coping toward coworkers at T1 (OR 3.12; 95% CI .99-9.85; Figure 1), as did low network outside work at T1 in predicting disturbed sleep at T2 (OR 3.80; 95% CI 1.28-11.25; Figure not shown since the pattern was the same as for the interaction with low network support at work).

Moreover, for women, main effects were found for low network support at work in relation to open coping toward coworkers at T1 in increasing the risk for disturbed sleep at T2 (OR 5.46; 95% CI 1.55-19.26; Figure 2). Interaction effects were found for women with low network support at work who applied open coping behavior in the face of a conflict with coworkers at T1, reducing the risk for contracting disturbed sleep at T2 (OR .12; 95% CI .03-.49; Figure 2). Similar results were found for low network support outside work at T1; a main effect was
found for low network support outside work in relation to open coping toward coworkers in increasing the risk for disturbed sleep at T2 (OR 4.71; 95% CI 1.40-15.83) and interaction effects were found between low network support outside work and open coping toward coworkers (OR .19; 95% CI .05-.72; Figure not shown since the pattern was the same as for the interaction with low network support at work).

**Figure 1.** Graphic illustration of interaction between low network support at work and covert coping toward coworkers in women.

**Figure 2.** Graphic illustration of interaction between low network support at work and open coping toward coworkers in women.
RESULTS

In men, interaction effects were found between low network support at work and covert coping at T1, both toward supervisors (OR 1.84; 95% CI 1.02-3.32; Figure 3) and coworkers (OR 1.75; 95% CI .98-3.12; Figure not shown since the pattern was the same as for the interaction with covert coping toward supervisors) in increasing the risk for disturbed sleep at T2.

Open coping at T1 showed a protective main effect against disturbed sleep at T2 in men, regardless of type (network and emotional) or source (at and outside work) of support, and source of conflict (ORs ranged between .62-.68 and 95% CI between .43-1.00). No interactions were found for emotional support in combination with the coping variables in predicting disturbed sleep.

Please note that Figures 1-3 are drawn purely for depicting the interaction and main effects. Please also note that some of these results are bordering on the criteria for significance. However, they are important for the overall pattern detected in both men and women and therefore presented here.

FIGURE 3. Graphic illustration of interaction between low network support at work and covert coping toward supervisors in men.

CONCLUSIONS

Different patterns were found for men and women in predicting disturbed sleep. Whereas low network support at work and outside work interacted with open and covert coping only toward coworkers in the association over time with disturbed sleep.
sleep in women, covert coping toward both supervisors and coworkers at T1 interacted with low network support at only at work T1 in men. Moreover, covert coping at T1 protected against disturbed sleep at T2 in women. However, in combination with low network support at T1 the risk for disturbed sleep increased. Moreover, open coping at T1 showed to be protective against low network support in predicting disturbed sleep at T2 in women. In men, open coping at T1 protected against disturbed sleep at T2 irrespective of low network support.

STUDY IV

AIM

The aim of Study IV was to investigate whether there was a mediating association between social support and disturbed sleep in the association with myocardial infarction.

MAIN RESULTS

Results from unconditional logistic regression analyses revealed that the three initial steps in the model for mediation were fulfilled for women displaying significant associations between low network support and disturbed sleep (OR 1.34; 95% CI 1.06-1.69); between low network support and myocardial infarction (OR 1.32; 95% CI 1.05-1.67), and between disturbed sleep and myocardial infarction (OR 2.03; 95% CI 1.63-2.53). The final step in the model for mediation is shown in Table 3. The OR depicting the association between low network support and myocardial infarction in Model II shows that the association between low network support and myocardial infarction in women (Model I) was reduced to an insignificant level when disturbed sleep was included. The impact of low network support on myocardial infarction was furthermore replaced by disturbed sleep.
Results from examining the fourth step in Baron and Kenny’s model of mediating factors. Odds ratios and 95% confidence intervals for women presented as indicators of myocardial infarction in relation to low network support.

<table>
<thead>
<tr>
<th>MYOCARDIAL INFARCTION</th>
<th>MODEL I</th>
<th>MODEL II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low network support</td>
<td>1.32(1.05-1.67)</td>
<td>1.24(.98-1.58)</td>
</tr>
<tr>
<td>Disturbed sleep</td>
<td>2.00(1.59-2.50)</td>
<td></td>
</tr>
</tbody>
</table>

Adjusted for physical inactivity

Conclusions

In women the requirements for mediation were fulfilled, and thus the conclusion drawn was that disturbed sleep may mediate low network support into myocardial infarction in women. However, consideration has to be taken to the study design.
The results presented in this thesis confirm previous cross-sectional (e.g., Hanson & Östergren, 1987; Undén et al., 1991; Bazaragan, 1996; Ohayon et al., 1997a; Ohayon et al., 1997b; Nakata et al., 2001; Rau et al., 2002; Pelfrene et al., 2002; Åkerstedt et al., 2002; Vosvick et al., 2004) and longitudinal results (Wahlstedt & Edling, 1997) regarding an association between social support and disturbed sleep. However, the results presented here point toward a more complex association than has previously been shown. These results suggest that low network support and impaired emotional support increase vulnerability to stressors or may be interpreted as a stressor per se, which increases the risk for disturbed sleep. The results also indicate that low network support increases the risk for disturbed sleep through the interaction with other personality characteristics such as coping ability and they also suggest that low network support may act together with disturbed sleep in mediating serious illnesses such as cardiovascular disease. Furthermore, the results show that there are gender differences in the association between low social support and disturbed sleep.

LOW NETWORK AND LOW EMOTIONAL SUPPORT IN DISTURBED SLEEP

Throughout the four studies included in this thesis, low network support (an indication of low social integration) was most prominently associated with disturbed sleep. In accordance with these results, previous research has shown that measures of social integration correlate more often with health outcomes than do measures of emotional support (Brissette et al., 2000; Cohen, 1988; House et al., 1985).

It can only be speculated on why social integration is more relevant to health than emotional support. Logically, however, the very existence of networks must precede emotional support. Without relations to other individuals and without a network of friends and family, no emotional support can arise (House et al., 1985), and being accepted by the community is essential for control, safety, and well-being (Brissette et al., 2000). Moreover, fulfilling a role
that provides benefits for the community may increase the feeling of security and status and consequently a sense of meaningfulness and belonging (compare Antonovsky, 1987).

The role expansion theory (Sieber, 1974; Marks, 1977; Thoits, 1983) may shed some further light on these results. A multitude of roles generate social support, more opportunities for success, increased self-complexity, and esteem (Barnett & Hyde, 2001). Within a smaller network, though, there will be less room for taking on different roles which consequently may impair mental well-being and self-esteem. In a small network, there will not only be fewer opportunities for appreciation, and confirmation, there will also be fewer ‘role models’ that can guide and give information on how to act and behave in (and perhaps even interpret) certain situations (Thoits, 1983) which may increase the risk for vulnerability to other stressors (Dohrenwend & Dohrenwend, 1984) since social resources may be compromised. Interestingly, in line with the role expansion theory and the results presented in this thesis, Nordenmark (2004) found that the number of social roles was negatively correlated with the risk for contracting insomnia, i.e., the fewer the social roles the more prevalent the insomnia.

Life events may play an important role in determining the number of social relationships available. Individuals may enter and exit from ones social arena over time. Exits, i.e. losses of persons in the network, have been found to be detrimental to sleep (Healy et al., 1981) and it is thus plausible that some of the participants in the studies in this thesis may have experienced exits from their social networks which consequently may have increased the risk for occurrence of disturbed sleep.

Moreover, in a context with not very many persons around, it may be difficult to create and maintain networks large enough. Considering that the populations in Study I, II, III, and partly in Study IV were from areas with low population density (northern Sweden), it may be speculated that some of the participants may not have had the opportunity to include a large enough number of persons in their networks, neither at home nor at work. However, in Study II and III, where the data collection was based on work organizations, most of the participating companies where quite substantial and the participants typically worked in the more urbanized areas of northern Sweden. In Study I and IV though, other sampling techniques were used, ensuring a better representation of the region. Possibly some participants in the studies making up this thesis had
too few persons around to create a large enough network. However, it can be easier to interact with others in less dense areas where the community spirit may be more profound than in larger cities, creating both a larger sense of social integration and a broader base for emotional support (House et al., 1982; compare Durkheim, 1993).

Adequate emotional support has been shown to enhance self-esteem and confirm the individual’s self-worth (Lakey & Cohen, 2000), whereas low self-esteem has been demonstrated to correlate with mental ill-health (Jonson, 1997). Inadequate or impaired emotional support may consequently lower self-esteem which could increase the vulnerability for disturbed sleep. Despite the fact that emotional support was assessed slightly differently in the studies in this thesis, the results pertaining to this dimension of social support point in the same direction. In Study I, aspects of low emotional support was part of the pattern that defined disturbed sleep in the PLS model. Also, women with low emotional support more commonly reported poor sleep than did both women with high emotional support and men in general in Study I and impaired emotional support from T1 to T2 increased the risk for disturbed sleep in men who reported strain in Study II. Taken together, these results support the vulnerability hypothesis (Dohrenwend & Dohrenwend, 1984), i.e., lack of social resources at hand may contribute to ill-health (which may be reflected by disturbed sleep). Alternatively, impairment in emotional support may have been perceived as a stressor per se which may have increased the risk for occurrence of sleep disturbance. This reasoning would, however, rather support the chronic burden hypothesis (ibid.).

The fragmented results shown in this thesis regarding the association between emotional support and disturbed sleep can partly be explained by the fact that emotional support may be a matter of social desirability (Orth-Gomér et al., 1993; Seeman & Syme, 1987). Whereas the network support index is a quantitative measure, the emotional support index is qualitative in nature. It may be hard to confess, even for oneself, that the resources for, for example, comfort, support, and appreciation are inadequate, and denial may therefore serve as an explanation for response bias (Ketterer et al., 1998; Ketterer et al., 2004). However, the fact that low emotional support occasionally did show an association with disturbed sleep hints that this topic may be worth exploring with more appropriate methods.
DISCUSSION

Even though not defined in the same way as in this thesis, it is interesting to note that the sleep disorder CFS has been shown to correlate with low social support (Kelly et al., 1999). Moreover, the adverse effects of changes in perceived social support was shown to be mediated by life stress in CFS patients (Lim et al., 2003) which further confirms the association between low social support and sleep.

LOW SUPPORT AT WORK AND OUTSIDE WORK IN DISTURBED SLEEP

House (1981) argued that social support derived from sources outside work would not compensate for the stress perceived at work. However, small social networks and low social support outside work combined with strain at work was found to increase the risk for mortality in a Swedish study by Falk and coworkers (1992). Low network support, both at work and outside work, also mattered according to the results in Study II and III (where strain and conflicts were measured at work) in increasing the risk for disturbed sleep. Social integration has previously been shown to protect against ill-health regardless of the source it is derived from (Cohen & Wills, 1985; Brissette et al., 2000). Thus, not being socially integrated may increase the risk for developing disturbed sleep.

In studies on received support (e.g., Schwarzer & Giutiérres-Doña, 2005), the source of support was found to be more important than the type of support. This may be true when studying the reception of support, whereas in the study of perceived availability of support, as in this thesis, both type and source of support seem to be important, at least when studying disturbed sleep. Main effects were found in Study II for low network support, both from at and outside work at T1 in increasing the risk for developing disturbed sleep at T2. However, this was only found in men who reported strain at work. Also, in men under strain who reported a constant low network support over time, both from work and from outside work, the risk for contracting disturbed sleep increased. Furthermore, in Study III, low network support both at and outside work interacted with open and covert coping in women. Thus, even if the results presented here cannot support the direct effect hypothesis, it does confirm that network support (indicating social integration) acts across sources. A possible explanation to these results may be that the sense of not being integrated in the community may enhance a feeling of isolation (Cacioppo et al., 2002; Steptoe et al., 2004). The sense of
isolation may subsequently be perceived as a stressor and perhaps lead to rumination (Kirkegaard Thomsen et al., 2003), which in turn may lead to disturbed sleep (Cacioppo et al., 2002; Steptoe et al., 2004; Kirkegaard Thomsen et al., 2003); possibly due to cognitive, emotional, and physiological arousal (Morin, 1993; Espie, 2002; Harvey, 2002).

The relatively high correlations between network support at work and outside work in Study II and III may indicate that persons who report low network support at work also do so outside work. This may be an indicator that the perception of social support (or lack thereof) is part of a certain personality characteristics, being able—or unable—to make friends.

The findings in Study II and III, that the correlation between emotional support at and outside work was not as strong as for network support, may however imply that the participants seek emotional support from more than one source. One may speculate whether the individuals choose source of emotional support depending on the nature of the stressor, which would confirm the stress-support match theory (LaRocco et al., 1980; Cutrona & Russell, 1990). Further support for this hypothesis is the fact that strain was assessed at work in Study II and the risk for disturbed sleep was elevated only when emotional support at work was impaired, only in men reporting strain. Thus, the perceived emotional support did not suffice to match the stressor since it was impaired and subsequently removed from the participant; consequently the proposed buffer effect was reversed, possibly leaving the individual more vulnerable to the adverse effect of another stressor or regarded as a stressor per se (Dohrenwend & Dohrenwend, 1984).

**SOCIAL SUPPORT HYPOTHESES AND DISTURBED SLEEP**

Different hypotheses have been suggested to explain why social support may affect health. The results in Study II could not confirm the buffer hypothesis (Cohen & Wills, 1985) in the investigation of emotional support and strain at work in the association with disturbed sleep, rather a reversed buffer effect was found. Neither could the direct effect hypothesis (ibid.) be confirmed since network support did not show any protective main effects on disturbed sleep, regardless of perceived level of strain.
DISCUSSION

It has been suggested that the relationship between lack of social support and depression may be explained more accurately by the chronic burden hypothesis than by the buffering or direct hypotheses (Väänänen, 2005). Furthermore, in reanalyzing previous results on the association between social support and depression, Vilhjalmsen (1993) concluded that low social support can create a vulnerability (even though not exactly defined as Dohrenwend & Dohrenwend, 1984) that increases the risk for depression. The results in Study II showed that men who reported low network support both at T1 and T2 did not necessarily suffer from sleep disturbance at T1. However, when still reporting low network support and when being under strain at T2, the risk for disturbed sleep increased significantly. Interpreted in the light of the vulnerability hypothesis (Dohrenwend & Dohrenwend, 1984) low network support may have made the men vulnerable to other stressors, such as strain at work, which in turn may have increased the risk for disturbed sleep. Since both disturbed sleep and strain were measured at T2 though, it is not possible to know which of the two variables that preceded the other. An alternative explanation may thus be that low network support may have increased the risk for disturbed sleep and made the participants more vulnerable to perceiving strain at work (see Ekstedt, 2005).

LOW SOCIAL SUPPORT AND COPING IN DISTURBED SLEEP

Coping is an important tool in handling stressors (Lazarus & Folkman, 1984). Coping strategies vary between personalities and situations. Adequate social support has been shown to aid across coping strategies, both in helping out in solving problems and in regulating emotions (Holahan et al., 1997). In general, supporting these previous findings, the results in Study III showed that low network support interacted with open and covert coping in the face of a conflict with coworkers and supervisors.

In Study III, open coping strategy was found to buffer against the potentially adverse effects (indicated by disturbed sleep) of low network support in women, whereas in men it independently protected against disturbed sleep. These beneficial results confirm those from the cross-sectional Stockholm WOLF study by Theorell and colleagues (2000, 2005) and the study on prisoners by Härenstam and coworkers (2000). These previous studies have indicated protective effects of open coping strategy on hypertension, control at work, and
coronary heart disease. Open coping bears resemblance with problem focused coping because it entails issues of directly handling stressors as they occur (such as protesting in the face of a conflict) and problem focused coping has also been shown to be beneficial to health (e.g., Lazarus & Folkman, 1984).

In men, covert coping both toward supervisors and coworkers, interacted with low network support at work in increasing the risk for disturbed sleep. These results are also in line with previous results that have shown an increased risk for hypertension and coronary heart disease in individuals who apply covert coping strategies (Theorell et al., 2000; Härenstam et al., 2000; Theorell et al., 2005). Covert coping may inhabit elements of emotional coping because dealing with conflicts introvertly may require emotional handling with the stressor and emotional coping has previously been found to have adverse effects on health (Lazarus & Folkman, 1984).

An interesting result in Study III though, was the protective main effect that covert coping toward coworkers had on disturbed sleep in women. Covert coping may thus not be a negative way of coping altogether, but rather an intelligent way of dealing with stressors that may not be solved in any other way (Salovey et al., 1999). Perhaps an even more intriguing result was that in combination with low network support, covert coping was found to develop into a risk factor for contracting disturbed sleep at a later date. A possible interpretation of these results may be that covert coping as such may be a wise coping style in certain situations. However, it may be an unwise coping strategy if network support is perceived to be low; possibly due to the feeling of not having anyone around to help in handling the stressors along with the lack of opportunity to reflect openly on what has happened. This may trigger rumination about the events that occurred and rumination has proven to be a detrimental coping strategy (Salovey et al., 1999) and a risk factor for disturbed sleep (Kirkegaard Thomsen et al., 2003). However, strong network support is assumed to prevent rumination from becoming a coping strategy (Salovey et al., 1999). The low network support reported by some women in Study III may thus not have been adequate to prevent rumination and disturbed sleep. These results further confirm the vulnerability hypothesis (Dohrenwend & Dohrenwend, 1984) because low network support may have increased the vulnerability to the adverse effects of stress that the women experienced in the face of a conflict, perpetuating itself into disturbed sleep.
Personality and context have been shown to be important for both the perception of social support and the choice of coping strategy (for a discussion regarding state and trait in social support and coping, see Lazarus & Folkman, 1984; Pierce et al., 1997). Even though neither low network support nor open nor covert coping strategies at T1 predicted disturbed sleep at T2 independently, they did so in combination. This may further strengthen the idea that perceived social support is a personality variable. The results foremost in Study III, but also in Study II, suggest that this personality characteristic may be stable over time and more (as in the case of covert coping) or less (as in the case of open coping) sensitive to disturbed sleep. However, since different individuals react differently to stressors and the vulnerability that a low network support may impose on them, and there is not one way to portray such a complex phenomenon. Everyone bring their own set of experiences and patterns of interpretation in meeting with others. Thus, there is probably interdependence between low network support, various coping strategies, strain at work, and disturbed sleep which may make the causal chain between these variables look different in different persons and in different situations. However, one possible illustration may be that since social support is a cognitive and emotional process, the interpretation of it is based on and developed from schemas of beliefs on how persons in the surroundings relate to us and whether they are supportive or not (Mankowski & Wyer, 1997). These schemas are derived from the initial attachment with the care givers (Lakey et al., 2000; Blatt, 2004), and good predictors of how a person will rely on others later on in life (Solky Butzel et al., 1997). Individuals who have experienced the relationship with their care givers to be compromised by harsh criticism, conditional love (Blatt, 2004) and/or by having their needs of autonomy, competence, and relatedness intruded upon or questioned, may experience difficulties in relying on others (Solky Butzel et al., 1997).Relating to the results in this thesis, low network support, either from persons at or outside work, may be a result reflecting a personality type who unfortunately has had the schemas of others compromised and who may subsequently be more susceptible to disturbed sleep.

Outcomes of conflicts at work may depend on what context they arise in, and according to Frone (2000), the outcome becomes more personal and may be expressed in, for instance, depression, when the conflict arises between coworkers. In conflicts with supervisors though, the outcomes may be expressed
against the organization instead, manifesting itself in increased sick leave for example. In men and women in Study III, the interaction between low network support and the coping strategies occurred foremost in the face of a conflict with coworkers which further supports Frone’s hypothesis since disturbed sleep is very much a personal reaction. The result regarding the interaction between low network support and covert coping toward supervisors in men, however, contradicts this hypothesis. It must be noted though that no other outcomes than disturbed sleep were studied in Study III, but disturbed sleep could very well have preceded and caused sick leave. Thus, depending on both dispositional (certain personality characteristics) and contextual factors (conflicts with coworker or supervisor), low network support may increase the risk for disturbed sleep.

Considering that covert coping in combination with low network support indicates silence as well as no friends to turn to, bullying and harassment may also be an explanation of the results in Study III. Bullying at work has been found to correlate negatively with social support both from coworkers and supervisors, and persons reporting bullying have been demonstrated to have an increased risk for ill-health which partly has been shown to be mediated by low social support (Hansen et al., 2006). Thus, some of those reporting covert coping along with low network support in Study II may have been subject to bullying and harassment.

DISTURBED SLEEP MEDIATING LOW NETWORK SUPPORT

It is important to take the whole life situation into consideration when examining health in general and stress-related ill-health in particular (Hallsten et al., 2005). In line with this, Study IV took a step beyond working life in investigating a population that had health problems in the form of myocardial infarction. Both low network support and disturbed sleep have been shown to independently cause cardiovascular disease (Orth-Gomér et al., 1993; Orth-Gomér et al., 1998; Wang et al., 2005; Schwartz et al., 1999). The results from Study IV showed, however, that low network support and disturbed sleep could possibly work together in myocardial infarction in women since the results indicated that disturbed sleep mediated low network support in this disease. It has previously been shown that women, more often than men, take on the responsibilities for maintaining
networks of friends and families and care for their needs (Belle, 1987). Consequently, low network support may have increased the women’s vulnerability for sleep disturbance or may have been perceived as a stressor as such and disturbed the sleep. Subsequently, the detrimental health effects of disturbed sleep may have come into play, spiraling further into causing myocardial infarction. Thus, the findings from Study IV indicate that one of the pathways that may make disturbed sleep cause such serious illnesses as myocardial infarction can start with low network support, at least in women.

LOW SOCIAL SUPPORT AND GENDER IN DISTURBED SLEEP

This thesis does not set out to interpret its results in the light of a gender perspective. However, gender differences are apparent in all four studies included and deserve a discussion.

It has previously been demonstrated that there are gender differences in the perception of social support. To women, interpersonal relationships are more central and more valued than to men (Belle, 1987; Shumaker & Hill, 1991; Antonucci, 1994; Kawachi & Berkman, 2000). Except for in Study II (where the number of women was not large enough to obtain systematic results), low network support showed the strongest association with disturbed sleep in women. The research on social support and gender has shown that women report more network members to be included in their innermost circle of friends and family than men do (Antonucci, 1994). Confirming this, Kendler and coworkers (2005) showed in an opposite-sex twin study that the female siblings were at larger risk for depression than their brothers when social support was perceived as low. Considering the importance that networks of friends and family have to women, a small network may impose a vulnerability for disturbed sleep foremost in women (as seen in Study I, III, and IV). Men do also have networks of friends, but they have typically been shown to turn to their networks for distractions and for sharing activities (Bolton & Oatley, 1987). Interestingly though, unchanged low network support over a period of time increased the risk for disturbed sleep also in men under strain at work (Study II). Thus, having a small network, perhaps not large or vital enough for sharing activities with or distracting intrusive thoughts, over a period of time, may impose disturbed sleep also in men.
The gender differences visible in this thesis may also be related to gender roles. Connell (2002) showed that women are expected to be gentle and nursing, whereas it is more accepted for men to speak their mind. In using open coping strategies, protesting and reasoning (i.e., ‘speaking their mind’) are prerequisites. If this kind of behavior is not expected or accepted by key persons in a conflict, as may be the case for some women, alternative coping behaviors, such as covert coping may be employed. For this type of coping behavior though, it seems important to have support from a large enough network of coworkers, friends, and family to help diminishing psychological and physiological arousal (Salovey et al., 1999) in order not to increase the risk for developing disturbed sleep (Study III). Gender roles may further have manifested themselves in the course of myocardial infarction as women in Study IV may have felt the need or pressure to take care of the network of friends and family; a need or pressure that may have created a gap between the genders in the provision of support (regarding the support gap theory, see Belle, 1987).

The differences between the genders may also depend on positions at work. Study I, II, and III were all derived from working populations and it is well-known that men typically inhabit higher position at work than women do. Thus, the men may have felt more at power to protest and reason with both coworkers and supervisors. They may, however, also have been more exposed to conflicts with supervisors which may be an explanation as to why covert coping toward supervisors and low network support interacted in disturbed sleep only in men.

The discussion regarding gender has only brought the socialization aspect of gender to surface. Whether genetics may have anything to do with how social support is perceived has not yet been established in humans. However, Westenbroek and collaborators (2003) found that stress was attenuated by social support only in female but not in male rats. This gives food for thoughts.

**Methodological Considerations**

Much of the literature on social support and health has shown that adequate social support will improve health and protect against the negative impact of stress. This thesis has, however, confirmed the part of the literature that has demonstrated low social support will increase the risk for ill-health (for a good review see Cohen et al., 2000). In Study II though, the men who reported strain
DISCUSSION

at work but who also had perceived improvement in both network and emotional support both at and outside work over time, showed a tendency for a decreased risk for developing disturbed sleep. Still, these results were not significant. The statistical analyses in this thesis have been performed in such a way that disturbed sleep has been the variable tested, and in the longitudinal studies (Study II and III) only those without disturbed sleep at T1 were included in the analyses. Therefore, it has not been possible to draw any conclusions regarding whether adequate or improved social support can improve sleep quality.

The instruments used for measuring social support are rather crude. In this thesis, the definition of low network support has been forced to be set at ‘3-5’ friends. The network support instrument would benefit from being assessed on a continuous scale so that a definition of low network support can be more sensitive. Furthermore, since the network support index mixes important aspects of social support (network size and social integration) it is not possible to know whether it is the sheer number of friends or if it is the lack of quality and low sense of integration that increases the risk for disturbed sleep.

Originally, the network and the emotional support indexes were followed by adequacy scales measuring how satisfied the individuals were with their social support (Henderson, 1980; Undén & Orth-Gomér, 1984). These additional instruments have not been included in the studies used in this thesis, but would have been of great interest since satisfaction with the available support matters to health (Sarason et al., 1990). However, Hanson and Östergren (1986) reported that adequacy scales (even if other than those that could have been used here) typically are skewed and they argued that the more subjectivity demanded from the participants when filling out the questions, the more skewed the distributions. Subsequently the instruments would be subject to social desirability.

Even though social support in Study II and III was measured at work and outside work the measurement of sources in this thesis was rather crude. The work place consist of at least two sources, coworkers and supervisors, and outside work there may be many different sources that can provide social support; spouses, friends, neighbors, children, parents etc. More information could be obtained in studies with more specified questions.

Relating back to the issue of dichotomization, yet another question is the problem regarding the construction of the job strain variable in Study II. Since
there are no established cut-off scores for when strain becomes detrimental to a
count of participants who were identified
with strain in Study II was representative. Moreover, when combining strain with
low social support, the groups became very small, decreasing the sensitivity in
the analyses. The problem with too small analyzing units is also reflected in the
wide confidence intervals that sometimes have appeared foremost in Study II
and III. Therefore, the magnitude of these odds ratios should be cautiously
interpreted.

Within epidemiological research, longitudinal studies are not so common
due to the heavy costs involved and most of the research is performed on cross-
sectional studies. A strength in this thesis is therefore the use of the longitudinal
WOLF study. However, disentangling the cause and effect in disturbed sleep is
not easy, not even in a longitudinal design. Disturbed sleep as well as social
support are complex concepts that may show reversed causation. Even though
the population in Study II and III was screened for disturbed sleep at T1, sleep
may have been disturbed by other causes than low network support during the
five year period that elapsed until T2. A reverse interpretation may imply that
disturbed sleep may have caused mood changes (Bonnet, 1985) and
subsequent withdrawal from friends. Moreover, all the studies included in this
thesis are based on self-reported data, and the answers may have reflected
mood more than ‘reality’. However, Wahlstedt and Edling (1997) showed in their
intervention study that impaired social support from coworkers and supervisors
increased the risk for disturbed sleep. Five years, however, may be an induction
time too long for studying the effects of social support on disturbed sleep
perfectly accurate.

Two of the studies used for the purposes of this thesis were not
prospective studies: Study I is of cross-sectional and Study IV of case-referent
design. Even if common and cost-efficient, these types of design cannot be used
for studying cause and effect. Moreover, in a case-referent study, the
participants are asked to answer the questions in retrospect. Therefore, this type
of study is more sensitive to recall bias than prospective studies since the study
cases typically answer the questions in the light of some kind of trauma (such as
myocardial infarction as in Study IV) and may therefore exaggerate the answers
one way or the other.
Response bias is important to discuss when dealing with self-report studies. Persons interpret situations differently, and their responses may be biased by their subjective beliefs that they have something to gain from answering from a worst case scenario. There may also be aspects of social desirability and denial (Ketterer et al., 1998; Ketterer et al., 2004) included when filling out the questionnaire and as previously discussed, emotional support has been suggested to be subject to this phenomenon (Seeman & Syme, 1987).

One of the hypotheses in this thesis was to study gender effects. Unfortunately, the gender distribution was skewed in the longitudinal WOLF study and the women were too few to hold true for the analyses performed in Study II. This undermined some of the persistent results that were found in Study I, III and IV where low network support was associated with disturbed sleep primarily in women.

Age has been shown to correlate both with disturbed sleep and social support. In this thesis though, age did not classify as a confounding variable. This may partly be due to the sampling techniques applied in Study I and IV and partly due to the fact that Study II and III were performed on a working population. In Study I the sampling procedure was stratified on age and in study IV the referents were age matched with the cases. Thus, control for age was obtained already in the study designs. Working populations typically have an upper limit of about 65 years and there is a natural selection effect in working populations since health and well-being correlate strongly with the ability to work. If a deterioration in social support is perceived it most often occurs after retirement (Gurung et al., 2003) and even though many (especially women) suffer from disturbed sleep at all ages, older age marks a further decline in sleep quality (Åkerstedt, 2003). Thus, the healthy worker effect may have come into play in Study I, II, and III.

In virtually all studies there are participants that are lost to follow-up. Out of those lost to follow-up in the longitudinal WOLF study, more women complained about disturbed sleep than did those who returned in the study. This may have contributed to bias in the results pertaining to women in the results presented in Study II and III.
CONCLUSIONS AND IMPLICATIONS

In general this thesis has confirmed an association between low social support and disturbed sleep, however a more complex one than previously has been shown. More specifically the results showed that:

- Foremost low network support was associated with disturbed sleep even though low emotional support also showed associations with sleep disturbances.

- Both low network support at work and outside work played a significant role in increasing the risk for contracting disturbed sleep, both as an individual variable in men reporting strain at work as well as in interaction with covert coping strategies in women. Low emotional support at work showed a reversed buffer effect in increasing the risk for developing disturbed sleep.

- Foremost the vulnerability hypothesis was confirmed in this thesis, since low network (as well as low emotional) support, indicating lack of social (and personal) resources, increased the risk for disturbed sleep. However, also the chronic burden hypothesis may serve as an explanation to the findings presented here since it cannot be excluded that low support also may be perceived as a stressor in itself.

- The association between social support and disturbed sleep is complex because low network support was shown to interact with other personality characteristics such as coping strategies. The complexity was further indicated by the results that disturbed sleep may act as a mediator between low network support and myocardial infarction in women.

- Men and women react somewhat differently to low social support in the association with disturbed sleep. Even if low network support over time had an impact on disturbed sleep in men, the results on the association between low network support and disturbed sleep were more pronounced and consistent in women.
CONCLUSIONS AND IMPLICATIONS

IMPLICATIONS FOR PUBLIC HEALTH

Even though psychological in scope, this thesis is written within the trans-disciplinary subject of public health. Thus, it is here motivated to outline some implications that the results presented here can have on public health.

Disturbed sleep is a common complaint in society (Ancoli-Israel & Roth, 1999; Broman et al., 1996) and yet more importantly, it may cause many severe mental and physical diseases, such as anxiety, depression (Ford & Kamerow, 1989), heart disease (Schwartz et al., 1999), and burnout (Ekstedt, 2005). This thesis has contributed to further map what social (and personal) resources that may be associated with disturbed sleep, which may further increase the understanding of the phenomenon. The effects of low social support was shown to be quite substantial in association with disturbed sleep, which is in accordance with previous population studies on low social support and mortality (for a review, see House et al., 1988). Thus, the opportunity for prevention is fairly large and worth considering.

In times of economic productivity and efficiency, downsizing is a popular word in companies and organizations which may lead to diminishing the networks of coworkers. According to the results presented in this thesis, too few friends at work may increase the risk for contracting disturbed sleep and therefore cutting down personnel may increase the risk for contracting disturbed sleep.

This thesis further indicates that personality disposition matters in the association between low social support at work and disturbed sleep. Our personality is shaped from our past experiences and new experiences continue to reshape it. Experiencing working environments with low network support may increase the risk for disturbed sleep. This may especially be the case if there is no opportunity to display health promoting coping strategies, such as open coping or possibility to discharge emotions built up due to internalized coping strategies (such as covert coping) with a large network of coworkers and friends. This further confirms that cut-downs in personnel may be detrimental to the development of disturbed sleep.

Furthermore, the results that indicated a mediating relationship between network support and disturbed sleep may be taken into consideration when studying myocardial infarction in women. Measures taken to promote the
perception of social support or to prevent disturbed sleep in women at risk for heart disease should be considered.

**FUTURE RESEARCH**

Research generates new research questions. The four studies included in this thesis have generated more questions which would be interesting to investigate further.

The association between social support and sleep should be studied in designs that more properly can establish cause and effect (e.g., in longitudinal designs with shorter induction periods). Furthermore, it would be imperative to study the mediating effects between low network support and disturbed sleep in a longitudinal design in order to understand the mechanisms at work here. Moreover, specifying the sources of social support may help in further understanding the impact that work and private life may have on sleep. Also, the influences that social desirability and denial may have on emotional support seem to be important to investigate in the future in order to validate instruments of emotional support. Finding out whether it is the vulnerability or the chronic burden hypotheses, or perhaps both, that are best for explaining the association between low social support and disturbed sleep is important since it could help in distinguishing measures taken to prevent sleep disturbance due to low social support. Furthermore, more focus on what role the personality and different contexts may play for the association between low social support and disturbed sleep would be interesting to investigate, and finally, it would be most intriguing to further examine what impact adequate and improved social support could have on good sleep.
‘Oh, I get by with a little help from my friends’
~ The Beatles ~

Even though only my name appears on the front cover of this thesis, this is not the work of a single hand. Without the collaboration with, and support from many persons this book would never have seen the break of dawn. As this thesis points out, social support is important for sleep quality, and during my time as a Ph.D. student my sleep has always been excellent—almost always anyway.

First of all I want to extend my deepest gratitude to my two mentors Anders Knutsson and Elisabet Sundbom. I want to thank Anders for introducing me to the interesting topic of public health and for guiding me through the mysterious ways of epidemiology. Elisabet is worth the warmest of thanks for always encouraging me, for making me perceive that there is always support around when needed, and for all the great discussions on the exciting topic of psychology.

My beloved Steven is next in turn. Being a scientist yourself you have certainly understood what I have gone through at times and been able to support me on many levels in life, making me understand that I was never alone. Thank you for listening to me, encouraging me, and discussing everything from bringing up children to how to illustrate interactions.

I also want to extend a bunch of thanks to Greg Neely and Berndt Karlsson first and foremost for being great friends, but in this particular context also for scrutinizing this thesis in an early version, helping it grow into what it is today.

Peter Westerholm, Torbjörn Åkerstedt, and Lars Alfredsson have served as excellent critics, supporters, and co-authors. I hope there will be more opportunities for collaboration in the future!

The rest of the WOLF-group, consisting of Chatrine Höckertin, Malin Bolin, Annika Härenstam, Staffan Marklund, Monica Söderholm, and Maud Hagman, has been tremendously important for me on my research journey in creating a stimulating research environment. I especially want to give my warmest thanks to
Chatrine and Malin for serving as true ‘research sisters’. Together we are unbeatable, girls!

Also, thank you Hans Goine and Göran Fahlén for many rewarding research discussions and for sharing your great knowledge, experiences, and places of living!

The division of Occupational and Environmental Medicine at the Department for Public Health and Clinical Medicine, has provided me with both instrumental and informational support. The coworkers at this division along with the coworkers at the AB-Center (both “new” and “old”) have, moreover, been excellent in providing emotional support over the years. It is hard to find a better work place, of that I am absolutely sure! Thank you all for the wonderful atmosphere and spirit you provide and for all the laughter we have shared!

Hanna och Edvin! Tack vare er är livet fullkomligt. För vad vore livet utan er och vad vore livet utan hästar (ja, det kan man verkligen undra!), kaniner, fotbollsmatcher, simträningar, pianoläxor, glosor, veckans ord och mattetal. Jo, helt meninglossö. Tack för all er omtanke om mig! Jag älskar er så innerligt!

Mum, dad, Greta, Jane, Nisse, Emil, and Emelie. Thank you for being a great family and for being around. I want to thank mum and dad especially for putting up with my being too tired to be nice over the phone at times, and for always encouraging my whimsical ideas.

I would definitely not have been able to complete this thesis without the discussions and laughter about everything between heaven and earth along with various fun activities (such as eating (!), walking, jogging, down-hill skiing, horse-back riding, etc.) with Anna, Erica, Lars, Åsa, Bert and Anna.

What would life be without a little help from my friends?

Umeå, October 22, 2006

María Nordin
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Danderyds sjukhus, Ersta sjukhus, Huddinge sjukhus, Karolinska
sjukhuset, Löwenströmska sjukhuset, Nacka sjukhus, Norrtälje sjukhus,
Sabbatsbergs sjukhus, S:t Görans sjukhus, Södersjukhuset, Södertälje sjukhus.


APPENDIX

This appendix aims at providing a full description of the instruments included in the four studies making up this thesis.

SOCIAL SUPPORT

STUDY I-IV

AVAILABILITY OF SOCIAL INTEGRATION (AVSI)

This index is referred to as the ‘network support index’ in this thesis. The questions were asked under the headings ‘outside work’ and ‘at work’ in Study II and III.

1. How many persons do you know who have the same interests as you?
2. How many persons who you know do you meet or talk to during an ordinary week?
3. How many friends can come home to you at anytime and feel at home?
4. How many are there, in your family and among your friends, who you can talk freely with?

Response alternatives

<table>
<thead>
<tr>
<th>Nobody</th>
<th>1-2</th>
<th>Low network support</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>6-10</td>
<td></td>
</tr>
<tr>
<td>11-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than 15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The horizontal line represents the dichotomization point used in all four studies.
AVAILABILITY OF ATTACHMENT (AVAT)

This index is referred to as the ‘emotional support index’. In Study I, the statements were posed as questions. All the statements (questions) were used in Study I and IV, the bold statements were used in Study II and III and used under the headings ‘outside work’ and ‘at work’.

1. There is a special person that I know I really can get support from.
2. There is someone special who feels very close to me.
3. There is a special person with whom I can share my happy feelings.
4. There is a special person in whom I can confide and share my deepest feelings with.
5. There is someone who holds me for comfort and support sometimes.
6. Other persons really appreciate me for what I do for them.

Response alternatives used in Study I:

Yes
No

In question 1, the response alternative ‘yes, but I do not need it’ was included but coded as ‘yes’; in question 2, the response alternative ‘am not sure’ was included but coded as ‘no’; in question 6 the response alternative ‘not enough’ was included but coded as ‘no’.

Response alternatives used in Study II-IV.

<table>
<thead>
<tr>
<th>Agree completely</th>
<th>Low emotional support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree to some extent</td>
<td>Hardly agree</td>
</tr>
<tr>
<td>Disagree completely</td>
<td></td>
</tr>
</tbody>
</table>

The horizontal line represents the dichotomization point used in Study II-IV.
DISTURBED SLEEP

STUDY I

Changes within oneself occur over the years. Try to mark (by marking the figure that best indicates) how you feel now (regarding)…

Sleep

Very poor 1 2 3 4 | 5 6 7 Perfectly fine

Disturbed sleep

The vertical line represents the dichotomization point used.

STUDY II-IV

KAROLINSKA SLEEP QUESTIONNAIRE (KSQ)

Only the dimension ‘disturbed sleep’ is used in this thesis.

During the past twelve months have you had…

1. Difficulties falling asleep
2. Repeated awakenings with difficulties falling asleep again
3. Premature awakenings
4. Disturbed/uneasy sleep

Response alternatives

Never
Rarely/A few times per year
Sometimes/ A few times per month
Most of the time/ some times per week
Always/ every night

Disturbed sleep

The horizontal line represents the dichotomization point used in Study II-IV.
APPENDIX

JOB STRAIN

STUDY II

DEMAND

1. Do you have to work fast?
2. Do you have to work very hard?
3. Does your work require a too large effort?
4. Do you have enough time to complete your work?
5. Do you experience conflicting demands at work?

Response alternatives

<table>
<thead>
<tr>
<th>Yes, often</th>
<th>High demands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, sometimes</td>
<td></td>
</tr>
<tr>
<td>No, rarely</td>
<td></td>
</tr>
<tr>
<td>No, almost never</td>
<td></td>
</tr>
</tbody>
</table>

CONTROL

1. Do you have the possibility to learn new things at work?
2. Does your work require skill?
3. Does your work require ingenuity?
4. Does your work require you to do the same thing over and over again?
5. Do you have the freedom to decide how your work should be accomplished?
6. Do you have the freedom to decide what should be accomplished at work?

Response alternatives

<table>
<thead>
<tr>
<th>Yes, often</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes, sometimes</td>
</tr>
<tr>
<td>No, rarely</td>
</tr>
<tr>
<td>No, almost never</td>
</tr>
</tbody>
</table>

The horizontal lines represent the dichotomization points used.
Job strain was created by combining high demands with low control.
COPING STRATEGIES

STUDY III

How do you typically react if you are unfairly treated or in conflict with a) a supervisor or b) a coworker?

OPEN COPING

1. Protest directly
2. Reason with the counterpart immediately

Response alternatives

<table>
<thead>
<tr>
<th></th>
<th>Yes, most of the time</th>
<th>Yes, sometimes</th>
<th>No, rarely</th>
<th>No, never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open coping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not open coping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COVERT COPING

1. Let things pass without saying anything
2. Walk away

Response alternatives

<table>
<thead>
<tr>
<th></th>
<th>Yes, most of the time</th>
<th>Yes, sometimes</th>
<th>No, rarely</th>
<th>No, never</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covert coping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not covert coping</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The horizontal lines represent the dichotomization points used.