

Gender-differences in social health concepts

A cross-sectional study on interpersonal stress, social support and companionship with dog: correlations to sleep-problems

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Master's thesis

Master's program in the Health Sciences:

Health promotion and Health Psychology

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autumn 2012

ACKNOWLEDGEMENTS

Ever since I went on maternity leave, I have been looking forward to put my teeth into the data and explore it. When I finally did, I went through the whole spectrum of what it is to write a master's thesis, periods when my fingers step-danced eager on the keyboard, and periods when it all went in syrup. Now when the thesis has been written and my survival manual on SPSS has gone all rugged, I find myself much more knowledgeable about the way scientific research is done. It is so important to have a basic understanding of how analysis are executed, to be able to read research articles and to interpret them in the right way. I have learned how important it is to have someone special in our lives, -for better or for worse. I wish to thank my supervisor Oddrun Samdal for all her wisdom and support, corrections of my rusty English and guidance through the statistical jungle.

The data collection was conducted as part of HUSK (the Hordaland Health Study '97-'99) in collaboration with the Norwegian National Health Screening Service, and I want to thank the HEMIL centre for allowing me to use the data. I also want to thank the University in Bergen for access to the computer program IBM SPSS Statistics 20.

Last but not least, I wish to thank my family and friends, especially my special someone Torbjørn for accepting my absence, supporting me and helping me with computer issues when I were about to pull my hair in frustration.. This is dedicated to you and our very dear daughter, Lina Sofie!

Siv Elin Skille

Bergen, December 2012

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ABSTRACT

Background and overview: Social ties have profound effects on health and well-being, and men and women are found to differ in the concepts of it. Findings are however somewhat inconclusive on some aspects. This study contributes to existing knowledge about gender-differences in interpersonal stress, sleep-problems, social support, companionship with dog and correlations between these variables. As there are few studies on gender-differences in relation to companionship with dogs, this study contributes with some new knowledge.

Method: The study used data from The Hordaland Health Study (HUSK). This study was conducted during 1997 to 1999, as a collaboration between the National Health Screening Service, the University of Bergen and local health services. The sample size is 4217 respondents aged from 40 to 44 years. Correlation analysis and logistic regression analysis were performed.

Results: The results showed statistically significant, but low correlations of gender-differences. Women compared to men, reported a high degree of interpersonal stress, nocturnal sleep-problems, emotional support and security-feeling due to owning a companion-dog. Interpersonal stress was significantly correlated to nocturnal sleep-problems for both men and women, with women reporting a higher degree than men, although the effect was small. Logistic regression showed that the model on nocturnal sleep-problems for female dog-owners explained up to 14.7 % of the variance, which was the highest in the study.

Significance and conclusions: Men and women differ in aspects of social ties, and interventions in health promotion must take this into consideration. Gender-differences can be explained by a combination of a fundamental need to belong, inherited adaptations and stress-theory.

Key words: Gender, interpersonal stress, sleep, social support, emotional support, instrumental support, companionship, dog.

NORSK SAMMENDRAG

Bakgrunn: Sosiale relasjoner har dyptgående effekter på helse og vel-være, og studier viser at menn og kvinner er forskjellige på visse konsepter i relasjonene. Noen studier viser at det fins kjønnsforskjeller på stress i nære relasjoner, søvnproblemer, sosial støtte og i korrelasjoner mellom disse variablene, men funnene er ikke alltid entydige. Få studier har sett på kjønnsforskjeller i relasjon med å ha hund som følgesvenn, og denne studien bidrar derfor med noe ny kunnskap.

Metode: Studien brukte data fra Helseundersøkelsen i Hordaland (HUSK), som foregikk fra 1997 til 1999, som et samarbeid mellom Statens Helseundersøkelser, Universitetet i Bergen og kommunehelsetjenesten i Hordaland. Inkludert i studien er 4217 respondenter i alderen 40-44 år. Korrelasjons-analyser og logistisk regresjon ble utført.

Resultat: Resultater viste statistisk signifikante, men lave korrelasjoner i kjønnsforskjeller. Kvinner sammenlignet med menn, rapporterte høye nivåer av interpersonlig stress, nattlige søvnproblemer, emosjonell støtte og sikkerhets-følelse ved å eie hund. Interpersonlig stress var signifikant korrelert med nattlige søvnproblemer hos begge kjønn, og kvinner rapporterte høyere grad av dette sammenlignet med menn, selv om effekten var liten. Logistisk regresjon viste at modellen for nattlige søvnproblemer hos kvinnelige hunde-eiere kunne forklare opp til 14.7 % av variansen, og var den høyest forklarte variansen i studien.

Konklusjoner: Menn og kvinner er forskjellige i aspekter av nære relasjoner, og intervensjoner i helsefremmende arbeid bør ta dette med i planlegging av tiltak. Kjønnsforskjellene ble forklart ved å kombinere tilhørighets-teori med et Darwinistisk perspektiv på kjønnsforskjeller og en stress-teori.

Nøkkel ord: Kjønn, interpersonlig stress, søvn, sosial støtte, emosjonell støtte, instrumentell støtte, følgesvenn, hund.

1 INTRODUCTION

In an evolutionary perspective, it is easy to comprehend the benefits of having relations, and to be part of a group (Baumeister & Leary, 1995). Belonging to a group meant living and hunting together, sharing the catch and having access to potential partners. Due to the protection the group provided, chances of survival and reproduction was greater, thus, through selection, it is likely that having relations and belonging to a group became an internalized mechanism (Baumeister & Leary, 1995). Both earlier and more recent research findings (Baumeister & Leary, 1995; Carvallo & Gabriel, 2006), have concluded that the need to belong is a basic human motivation, and thus, the Belongingness hypothesis was formed by Baumeister and Leary (1995). Lack of belongingness has been connected to ill effects on health, adjustment and well-being, whereas people with strong, social ties are found to be happier, healthier and more capable of coping with life-stress (Baumeister & Leary, 1995).

An important topic in social research is the mechanisms and pathways of the connections in social health concepts (Uchino, 2006). Among identified concepts are companionship and social support. Companionship is the sharing of time in leisure activities with a companion (Rook, 1987), and studies show that it can buffer stress and increase well-being (Rook, 1987). When expanding the concept of companionship with people to companionship with pets, there are evidence that the presence of a dog or cat can lower responses to stress (Allen, Blascovich & Mendes, 2002). Findings in research on social support show a negative correlation to distress (Bancila, 2005), and an easing of the impacts stress can have (Mittelmark, 1999).

Unfortunately, negative social interactions are common (Rook, 1984), and stress in social relations is found to be related to subjective health complaints (Aanes, Mittelmark & Hetland, 2010), psychological distress due to arguing and conflicts (Helgeson, 2003), and sleep-problems (Aakerstedt, 2006). In scientific research, the connection between stress and sleep is a well known finding (Hall et al 2000; Aakerstedt, 2006; Aakerstedt, Kecklund & Axelsson, 2007; Aanes, Hetland, Pallesen & Mittelmark, 2011). Sleep problems are common, and considered a subjective health

problem (Eriksen, Hellesnes, Staff & H. Ursin, 2004), that is to say that there are none or few objective findings, although there is evidence that sleep-problems can affect health by reducing peoples quality of life, cause long-term sickness compensation (H. Ursin & Eriksen, 2004) or lead to accidents due to sleepiness (Grønli & R. Ursin, 2009).

According to Mittelmark (1999), social ties may have positive effects and sometimes adverse effects, however, knowledge about the processes leading to health are still scarce, and thus, there is a need for further, theory-grounded investigation of the connections between social ties and health. There are indications of gender-differences in social ties (Mittelmark, 1999; Baumeister & Leary, 1995), that should be taken into consideration when carrying out health promoting interventions. This study is a contribution to expanding the knowledge about the gender-differences. Also, as there is evidence that companion-animals can lower stress in people (Allen et al., 2002), it is interesting to see if ownership of a dog can have an effect on stress in close relationships and on sleep-problems, as these topics are rarely or never studied, according to searches in pubmed. Neither are gender-differences in the human-animal bond (Smith, 2012). This study will limit the focus to four concepts of social ties, -namely gender-differences in interpersonal stress, sleep-problems, social support and companionship with dog, inter-correlations between these variables and connections to sleep-problems. For explaining why people are drawn towards social ties, an evolutionary perspective, -the Belongingness theory, will be set forward. The cognitive activation theory of stress, CATS (H. Ursin & Eriksen, 2004), will be used to explain the process of stress and its' relation to the other variables. As it does not include considerations about gender, an evolutionary perspective will also here be offered, as the Sexual Selection theory (Troisi, 2001) can explain gender-differences.

1.1 Health promotion and social ties

The approach of this study, is health promotion. Health promotion is a science, a process and a way to work with promoting health (Mittelmark, Kickbusch, Rootman, Scriven & Tones, 2008), and complements *the treatment of illness*-perspective, that has a goal of curing disease. Historically, health promotion was developed after the 1980's policies of World Health Organization (Kickbusch, 2003), with the Ottawa Charter as a

template for a new understanding of health promotion. In 1948, WHO defined that "health is not only the absence of disease, but a state of complete well-being in a physical, mental and social meaning" (Eriksson & Lindström, 2008), a definition that expanded the view on health, greatly influenced by Antonovsky's salutogenic health model and its focus on health, rather than disease. Besides asking what factors causes disease, one started to explore the factors maintaining and increasing health (Suominen & Lindstrom, 2008). An aqueous metaphor, is that while the treatment of illness is about helping people who has fallen in the river and almost drowned, health promotion is about making a barrier so people do not fall in the first place, and also, -empowering people by training them in self-rescue (Mittelmark et al., 2008).

WHO's definition of health establishes that health has three dimensions, -the health of the body, the mind and one's social health (WHO, 1986). To improve these dimensions, one should focus on creating supportive environments (WHO, 1986) and to strengthen positive social ties. These two goals are among the precedences in health promotion (Mittelmark, 1999), with the goal of better functioning people, families and society, and also improved mental and physical health. The importance of social ties in relation to health, is stated in the Ottawa charter (1986): *health is created and lived by people within the settings of their everyday life, where they learn, work, play and love.*

1.2 Definitions and introduction to variables in the study

1.2.1 Stress and interpersonal stress

To define what stress is, can be a challenge as it is used in so many ways (Morrison & Bennett, 2006). Stress is here defined as a subjective experience, an external stimulus, a minor, major or catastrophic event, the body's physiological and psychological reaction to the event and how one experiences, processes and adjusts to it (Morrison & Bennett, 2006). In other words, stress is the result if transactions between the individual and the environment lead to a discrepancy between what the individual perceives as situational demands and what his or her perception of handling these demands are (Morrison & Bennett, 2006). Further, stress sets off an alarm, that is both normal and necessary to evoke the individual to take some kind of action, but if this alarm lasts, it may have

negative consequences for health due to what H. Ursin and Eriksen (2004) called “allostatic load”, shortly summarized, systems dealing with adaptation to stress gets overworked and in turn their functions become inadequately, making the body more susceptible to disease (McEwen, 1998).

Interpersonal stress or social stress is the type of stress experienced in stressful interpersonal relationships (Mittelmark, Aaroe, Henriksen, Siqveland & Torsheim, 2004). This variable is in the study defined as: *a transactional, cognitive process involving appraisal and not completely satisfactory coping, to resolve dissonance among cognitions about a significant other*. Further, according to Mittelmark et al. (2004), interpersonal stress may be evoked in burdensome, social situations. Examples of situations like these are when one perceives having inept social support, experience of role conflict as one has to juggle with multiple roles, performance demands due to high expectations from others, criticism that causes distress, social conflicts in relations where giving and receiving is unbalanced, or feeling like a helpless bystander unable to do anything about a certain situation (Mittelmark, 1999). Originally, these situations were set forward by Karen Rook (Mittelmark et al., 2004), and were melted into the Bergen Social Relations Scale (BSRS) by Maurice Mittelmark and colleagues (2004). Both the BSRS and the items apart will be used as measurements of interpersonal stress in this study. The items are universal, meaning that they can be used with people from different backgrounds and situations, and thus are not thought to be gender-specific.

1.2.2 Sleep

Adults sleep approximately 7 hours per day, varying between 6 to 9 hours, and although the reasons for why we sleep are still somewhat unclear, it is hypothesized that the function of sleep is to restore the body's energy levels (Grønli & R. Ursin, 2009). According to Grønli and R. Ursin (2009), sleep problems can be chronic or vary in periods of time, and in Norway, estimates show reports of respectively 10 % with chronic sleep problems and 30 % with periodical sleep-problems.

In research, diaries, self-reports, polysomnography (Kim & Dimsdale, 2007) and wrist actigraphy (Mezick et al., 2009) are common ways of measuring sleep. This study uses

self-reports as the measurement.

1.2.3 Social support

Social support can be defined as the feeling of being supported, belonging to a network with mutual obligations and being cared for and valued by someone, either the support is actual or mere perceptual (Rook, 1987; Cobb, 1976; Morrison & Bennett, 2006).

Weiss (1974) proposed that different relationships have different functions and an absence or loss of one or more of these functions will evoke distress, and even if one function is satisfied to a greater extent, it can-not compensate for the deficiency of another. In this study, the subcategories of social support are emotional support and instrumental support, and these two are the most common distinctions of social support (Morrison & Bennett, 2006; Thoits, 1986; 2011). Emotional support can be defined as support from others by their empathy and caring, resulting in a sense of belongingness and well-being, and instrumental support is defined as available assistance and financial help if needed (Morrison & Bennett, 2006). Thoits (1986; 2011), argues that social support is a concept for coping and emotional sustenance. External assistance from others changes or eliminates potential threats, and thereby works as a stress-buffer (Thoits, 2011). Further, behaviours of support such as emotional, instrumental and informational kind, is thought to bolster the sense of belonging, feeling of being important for others and sustain ones feeling of self-worth (Thoits, 2011; Cobb, 1976).

1.2.4 Companionship

A different type of social support is companionship (Rook, 1987). While social support is thought to satisfy extrinsic goals, such as helping others cope with stress, companionship satisfies intrinsic goals like discussions, joy of sharing leisure time and recreational activities (Rook, 1987). Having companionship with someone means that one has acceptance and inclusion in a relation, and may give a sense of belonging (Thoits, 2011).

Other people are not the only source of companionship, and a number of studies have

been executed on human-companion animal relations and interactions (A.M. Beck & Meyers, 1996), especially with cats and dogs. Dogs and cats are common as pets, and according to an article on the Norwegian website of Folkehelseinstituttet (2005/2011), the prevalence in Norway is approximately 300.000 dogs and 340.000 cats.

2 THEORETICAL FRAMEWORK

The study will make use of the Belongingness hypothesis (Baumeister & Leary, 1995), the cognitive activation theory of stress, CATS (Eriksen & H. Ursin, 2002) and Sexual Selection theory (Troisi, 2001) to explain gender-differences in interpersonal stress, sleep, social support, companionship with dog and gender-differences in the associations between these variables.

Further, research shows that men and women differ in both psychosocial (Murphy, 1998) and biological aspects of stress (Troisi, 2001). Thus, the evolutionary perspective of Alfonso Troisi (2001), building on Darwinian theory, is used to explain gender-differences.

2.1 The Belongingness hypothesis

The Belongingness hypothesis will be used to explain why close, social ties are of so much importance for people. In light of the findings in their review of scientific studies, Baumeister and Leary (1995) drew the conclusion that humans have an inherited need to form and maintain stable, interpersonal relations with people of significance to them. Also, they concluded that this need is a fundamental motivation that controls the mindset, emotions and behaviour of people towards having positive interactions with significant others on a regular basis, resulting in happier, healthier individuals who are better able to cope with life-stress (Baumeister & Leary, 1995). Relations are characterized by positive affect, a sense of belonging, inclusion, acceptance and reciprocal bond with a small number of other people caring about each other. Interactions with strangers or people one recently have met, can-not give the same feeling of belongingness or satisfaction (Baumeister & Leary, 1995). The study by Watt

and Badger (2009) supports this, as they found that studying abroad or away from home and not feeling accepted at a new place, led to homesickness, even when the participants reported having more friends than before.

Summarized, the Belongingness hypothesis stresses the importance of close, positive, social ties as being evolutionary rooted and a fundamental motivation for all humans, as social ties may be essential for survival (Baumeister & Leary, 1995), and that lack of belongingness may lead to ill effects to health and well-being. Building on the Belongingness hypothesis, and linking it to the variables in the study, one may hypothesize that interpersonal stress is a threat to belongingness as humans according to the hypothesis are motivated for positive relations. Further, sleep-problems can be interpreted as the ill effects due to lack of belongingness, and finally, it may be hypothesized that positive social support and companionship with a dog are ways of satisfying the need to belong.

Both men and women should have a fundamental need to belong, according to the Belongingness hypothesis, and one may expect this to be reflected in the results, such as that a majority of respondents should report a low degree of interpersonal stress and sleep-problems, and a high level of social support and companionship with dog. However, men and women's need to belong seem to differ when they are divided into relational and collective belongingness, -women respond the most to threats to interpersonal relations, and men to threats to social status and belongingness to a group (Brewer, 2004).

2.1.1 Substitution and satiation in the need to belong

Quality is more valuable than quantity in the interactions between people, for both women and men (Baumeister & Leary, 1995), and satiation will occur when one reaches a sufficient number of relations with others. Wheeler and Nezlek (1977) found that the mean number of meaningful relations students had, where with six people. The maintenance of relations requires time and effort, thus, more important than having many relations, is that the few relations one has, is coloured by intimacy, mutual caring and regular gatherings, especially for women (Baumeister & Leary, 1995). Lawson

(1988) found that women in marriages coloured by intimacy and satisfaction of the need to belong, were less likely to seek extramarital relations, and women in marriages that did not satisfy their needs for intimacy, were more likely to cheat on their husbands with substitute relationships. Such a replacement of a social relation is called *substitution* (Baumeister & Leary, 1995). Studies show that female prisoners form «families», thought to substitute their real family or other relations outside of prison (Baumeister & Leary, 1995). These findings suggest that not all relations can be substituted, a love-partner can substitute friends and family and satiate the number of relations one requires (Milardo, Johnson & Huston, 1983), while a love-relation can-not necessarily be substituted by another type of relation (Baumeister & Leary, 1995). Linking companionship with dog to the Belongingness hypothesis, a high degree of companionship should be associated with a low degree of interpersonal stress, as companionship with dog can be thought to substitute and satiate the need to belong with humans to a certain degree. Whether animal companionship can substitute human relationships have been discussed in the literature, but conclusions vary (Hines, 2003; Archer, 1997). Archer (1997) found companion-animals to be substitutes for children and partners, and argued that the substitutions are often a result when people with fewer or less rewarding relations attribute human feelings and thoughts on to their pets, thus creating perceived relationships.

2.2 The cognitive activation theory of stress (CATS)

The cognitive activation theory of stress, CATS (Eriksen & H. Ursin, 2002) will be used to explain how interpersonal stress may result in sleep-problems. According to CATS, stress has four aspects, -stimuli, the experience of the stimuli, an unspecific and general response (activation) and a further experience of the stimuli and response (H. Ursin & Eriksen, 2004). In a system working for homeostasis, expectations that are not satisfied, cause alarm. This alarm, both arousal and activation, is normal and important for survival, as it is proposed to drive individuals towards solutions. However, physiologic responses that normally occurs in presence of a stressor, can, -if sustained, result in strain and ill effects to the person experiencing it.

CATS suggests that synapses in the neural system that repeatedly are activated may

change, either to become more sensitive or less sensitive (H. Ursin & Eriksen, 2004), -sensitization or habituation. Sensitization will lead to an increase in response due to stress, while habituation will lead to a decrease in response. Expectations are important in this theory. If responses to the arousal have a positive outcome, arousal will be lowered and one learns to expect positive results of ones actions. If responses result in negative outcomes, the individual will via conditioning develop a feeling of *hopelessness*. Further, hopelessness, -feeling that there is no hope of a positive outcome, will result in a feeling that anything one does, will have a negative outcome, a feeling of *helplessness* (H. Ursin & Eriksen, 2004). Feelings of hopelessness and helplessness are according to H. Ursin and Eriksen (2004) somewhat the opposites of coping and associated with sustained arousal. They are also thought to contribute to the effect of sensitization and further ill effects to health. Learning-processes where the individual learn to expect a positive outcome, will according to CATS result in coping, a feeling of mastery and a lowering of arousal.

Linking the theory to interpersonal stress, one can hypothesize that enduring stress in close relations will lead to arousal, that can be seen as normal. If one experiences that a number of responses to interpersonal stress have negative outcomes, one may begin to expect that no matter how one responds, the outcome will be negative, and develop a feeling of hopelessness. Experiencing that responses to interpersonal stress have no connection with the outcome, may lead one to develop a feeling of helplessness. The sustained arousal that is connected to these feelings can be thought to explain the connection between interpersonal stress and sleep-problems, as arousal is an important component in sleep-problems (Hall et al., 2000).

2.3 The Sexual selection theory

The Darwinian model is a theoretical framework with an evolutionary perspective for understanding the relation between social stress and mental illness, and gender-differences in social stress (Troisi, 2001). As CATS is used to explain stress in general, this sub-chapter will focus only on the components in the model explaining gender-differences.

The Sexual selection theory are in this study used to explain how differences between men and women in reports of interpersonal stress and social support may have evolved through adaptations. Initially, men and women are alike as they both strive to achieve goals and reproductive fitness in the environment (Troisi, 2001). This strive guides the human behaviour. Factors that come in the way for achieving goals, are stressors. Although reproduction is the ultimate goal for both sexes (Troisi, 2001), it is notable that reproduction is not the main goal of all kinds of behaviour. Some of the major goals according to Troisi (2001) are requirement of resources, making friends, involvement in intimate relations, achieving high status and reducing the effects of unpleasant emotions. Subjective experience of emotions work as a guidance of how well one does in the strive for certain goals. According to the Sexual selection theory, characteristics of the sexes have evolved due to different problems in adaptation that the sexes have met with (Troisi, 2001), and these differences have further led to men and women striving for different biological goals, and thus also differences in how men and women respond to stressors. Adaptations that increased the likelihood of reproduction were led on by evolution. According to Troisi (2001), due to the evolved gender-differences, women will strive for goals enhancing female fitness, such as attracting males who will be faithful, motherhood and strive for engagement in social supportive networks, all thought to increase the chance to reproduce. Men on the other side, will according to Troisi (2001) strive to accomplish high status, obtain resources and having access to a number of potential partners. The Sexual selection theory predicts that women are more vulnerable to negative life events due to the greater likeliness of being interdependent on someone, and as an example is that women are twice as likely to be depressed during the life course, compared to men (Troisi, 2001; Murphy, 1998). However, despite of women being depressed more often than men, men are more likely to commit suicide than women (Murphy, 1998). One of the explanations for this is that because women are more interdependent, they seek out for help more often than men, while men are less likely to talk about their problems with others and to isolate themselves (Murphy, 1998). Due to the evolutionary view that female fitness depends on close networks, women are more goal-oriented towards being part of a social supportive network and motivated to spend more time and effort on close relations than men. Linking this to interpersonal stress and social support in the study, one can expect to find gender-differences such as women reporting more interpersonal stress and also more social support than men, as women according to the Sexual selection theory is more likely to belong to a close and

supportive network. However, gender-differences exist as certain adaptive responses, and goals have been developed for the sexes through evolution (Troisi, 2001). Thus, women's experience of stress in social relations can first of all be seen as adaptive, as the stress motivates them to invest time and effort to maintain relations.

3 EMPIRICAL FINDINGS

In this chapter, research relevant to the variables in the study will be presented. This includes findings about the variables when gender is not considered, and connections to health or ill health. Further, as it is the main goal of this study to explore differences in gender, this chapter contains findings of gender-differences in all variables, respectively interpersonal stress, sleep, the stress-sleep relation, social support and companionship, and also gender-differences in the correlations between all variables, with an exception of correlations between companionship and sleep, where no research on the topic were found in the literature.

Studies on the relations between humans and companion-animals are lacking (Chur-Hansen, Stern & Winefield, 2010). Also, by a search in pubmed, there were found some studies using gender as a predictor, however, very few studies compared men and women on animal- or dog-companionship, which according to Smith (2012) can be due to that research on animal companionship, does not often consider gender as a contributing factor. Thus, there is a scarce amount of research in this domain, and also, the few identified studies on animal or dog-companionship did not use interpersonal stress as a variable. However, a small number of studies have investigated stress in general in relation to companion-animals, and these results are included here as it may give an indication of how dog-companionship is related to interpersonal stress.

3.1 Gender-differences in interpersonal stress

Interpersonal stress is shown to be connected to ill health. There are significant connections between interpersonal stress and subjective symptoms such as psychological distress (Bancila, 2005; Mittelmark, 1999), stomach pain, fatigue,

headache (Aanes et al., 2010), and also symptoms that are objectively examined, such as cancer, psoriasis (Tausk, Elenkov & Moynihan, 2008) and physiological inflammation (Miller, Rohleder & Cole, 2009). There have been identified gender-differences in subjective health complaints, with women reporting more intense and higher prevalences of musculoskeletal, pseudoneurological and allergic symptoms (Ihlebaek, Eriksen & H. Ursin, 2002). Possible explanations offered for these gender-differences are differences in amounts of stress, how men and women respond to stress, different coping styles to stress or that women and men differ in thresholds of complaining (Ihlebaek, Eriksen & H. Ursin, 2002).

Mittelmark and his co-authors (2004), studied respondents from the HUSK-study ranging from 40-44 years of age (n=6821), the same as this thesis, although the study sample here is somewhat smaller (n=4217). Their results showed that women reported significantly more interpersonal stress than men. On 4 of the 6 statements in the BSRs, women reported a significantly higher prevalence than men (Mittelmark et al., 2004). In addition, a review from 2001 (Kawachi & Berkman) on studies comparing gender on reports of stress, showed that a number of studies have found women to report more psychological distress than men. Suggestions offered by the authors (Kawachi & Berkman, 2001) were that differences in social networks may explain these findings, due to women having few but close relationships with others, compared to men, it was thought that women are more affected when others are stressed and also mobilizes more social support than men.

Interesting findings were revealed in a study that used experimentally induced stress, imagery situations of breakups and arguments with significant others, or losing one's job, to measure gender-differences in blood pressure, heart rate and subjective reports (Chaplin, Hong, Bergquist & Sinha, 2008). Women reported greater sadness and anxiety than men, although they did not differ from men in heart rate or blood pressure, or actually had lower rates of physiological arousal compared to men. According to the authors (Chaplin et al., 2008), this was an expected finding as other studies had showed the same, and they suggested that reasons for this may be that women ruminate more on sad emotions, and men are more likely to distract one selves from such feelings. Another suggestion is that the cardiovascular fight or flight response may be more

expressed in men than in women (Taylor et al., 2000). A number of studies have according to Kelly, Tyrka, Anderson, Price & Carpenter (2008) found gender-differences in self-reports but not in physiological measures, and the study by Kelly (et al., 2008) with the Trier Social Stress Test, a well-established test measuring psychosocial stress, also showed these findings, -women reported significantly higher stress than men and no differences in levels of cortisol and heart rate. However, these results may be a consequence due to type of measurement. A psychosocial stress measure may reveal different results than when one uses an interpersonal stressor. Studies that use interpersonal stressors show in addition to high levels of stress in self-reports, also an increase in cortisol reactivity in women (Fehm-Wolfsdorf, Groth, Kaiser & Hahlweg, 1999; Stroud, Salovey & Epel, 2002). In the study by Fehm-Wolfsdorf and colleagues (1999), there was also found differences between relationships coloured by positive, mixed or negative interaction-patterns within the relations. Women in the positive and the mixed (mostly negative wives and positive husbands) showed increases in cortisol levels under the interpersonal stress situations, while the relationships coloured by negative interactions showed a non-response of increase in cortisol. The authors suggested that chronic interpersonal stress may lead to a desensitization of the cortisol response, either due to endocrinological or psychological inhibitions (Fehm-Wolfsdorf et al., 1999).

3.2 Gender-differences in sleep

A French self-report study (Marquié, Folkard, Ansiau & Tucker, 2012) found women to have more sleep-problems than men, -difficulties falling asleep, maintaining asleep and falling asleep again if awoken. A British study (Arber, Bote & Meadows, 2009) also reached the same conclusions about women reporting more sleep-problems than men. However, controlled for socio-economic variables, these occurrences were halved, showing that low socio economic status are linked to sleep-problems. On the contrary, an American study on participants without sleep-problems (Bixler et al., 2009), using polysomnography as measurement, showed that women slept significantly more and better than men, and that women first at 50 years of age experienced a significant drop in sleeping time. Another American study (Redline et al., 2004) that used polysomnography as measurement, showed the same results with regard to women as

better sleepers than men. In a British study (Groeger, Zijlstra & Dijk, 2004), results showed that women and men reported the same amounts of sleep. However, women also reported more sleep-problems than men, which is a somewhat contradictory finding.

Studies on how age affects sleep show that sleep-duration and sleep-efficiency significantly decreases with age, and wake ups after falling asleep significantly increases (Ohayon, Carskadon, Guilleminault & Vitiello, 2004). In the study by Arber, and colleagues (2009), age was found to be a significant predictor for sleep-problems in women but not for men, and women in the age group of 45-54 had the most sleep-problems.

3.3 The relation between interpersonal stress and sleep: gender-differences

The connection between stress and sleep is well known (Hall et al., 2000; Aakerstedt, 2006; Aakerstedt et al., 2007; Aanes et al., 2011), and in long-term insomnia, stress is considered the primary cause (Morin et al., 2003). Aanes and colleagues (2011) found a significant relation between interpersonal stress and sleep among 7074 respondents in the HUSK-study, however not in the same age-group as this study. Their study included middle aged people of 47-49 years old and older adults aged 71-74 years. However, by a search in pubmed, number of studies on interpersonal/social stress in relation to sleep were somewhat scarce, and the two studies also measuring gender-differences showed mixed results (Mezick et al., 2009; Bixler et al., 2009). Mezick and her colleagues (2009) found in their study, that used wrist-actigraphy as a measure, that individuals, who were experiencing larger amounts of life stress had more sleep-problems. Their ages ranged from 46-78 years. Considering gender, women had more variations in sleep-duration than men. However, Bixler and his co-authors (2009) found that the sleep of young women (aged 19-31 years old) without sleep-problems was less disturbed compared to young men's sleep, when exposed to external stressors. This last study was performed in a laboratory setting, and participants that had reported daytime sleepiness, insomnia, sleep apnea and problems with sleeping due to obesity, were excluded from the study (Bixler et al., 2009), and may not be generalisable to findings in this study.

3.4 Gender-differences in social support

Findings indicate that there are a number of variables having impact on the success of social support. Among these are perceived versus received support, the source and kind of support, age, gender and also, the seriousness of the stressor and available resources to control it (Helgeson, 2003). Thus, social support is a complex variable to study.

Actual support is the support one receives from a provider, while perceived support is support one thinks available if needed (Helgeson, 2003). Effects social support have on quality of life are found to differ between men and women (Helgeson, 2003), as women most often are both providers and receivers of support, and that both women and men turn to women for support, this may become a burden for women, and further affect women's quality of life. Other findings have shown that the kind of support women receive and provide, is to a great extent emotional support, and the kind of support men receive in a greater extent than women, is instrumental support (Fuhrer & Stansfeld, 2002).

Studies have also found gender-differences in relational connections. Women have more frequent contact with their relations (Kafetsios, 2007), they report a larger number of close relationships and a larger satisfaction with the relationships than men, while men have been found to report larger networks than women, be more dissatisfied with their relations and more often than women report their spouse as the closest person (Fuhrer & Stansfeld, 2002). In marital relations, men benefit more from marriage than women, in terms that married men are more satisfied with their personal relationships than unmarried men, and also, men report receiving more instrumental support from their closest relation, most often their wives, while women report having more instrumental support from their second closest person (Fuhrer & Stansfeld, 2002). A study of married, older couples, showed that for women, the perception of having marital support available if needed, was more strongly correlated with better well-being and satisfaction with their marriage, compared to men (Acitelli & Antonucci, 1994). Acitelli and Antonucci (1994) suggested that gender-differences may be because men and women require different types of social support. Emotional closeness and emotional support is according to findings more important for women than for men, while sharing of activities is more important for men (Aukett, Ritchie & Mill, 1988; Barbee et al., 1993; Bell, 1991). The gender-differences in support needs suggested by S. Cohen &

Wills (1985) may be attributed to differences in coping, differences in the experience of stressors or ways of socializing.

3.5 Relations between social support and interpersonal stress: gender-differences

A number of studies have shown that social support can moderate the effects of stress and have a direct effect on people's well-being (S. Cohen & Wills, 1985). The perception of support shows a positive effect on stress and is more strongly related to quality of life than received support, as often have been shown to have negative effects (S. Cohen, 2004; Bolger & Amarel, 2007; Helgeson, 2003).

In a Greek study on connections between gender, social support and well-being (Kafetsios, 2007), perceived satisfaction with social support was associated with well-being, but only for men. Explanations provided by Kafetsios (2007) is that men and women differ in both their social networks and who they see as their providers of support. Males have few close relations compared to women, and often report their wives as their closest providers. Women have more close relations than men and thus report friends and family as their closest providers of support (Kafetsios, 2007). In an experiment by Bolger and Amarel (2007) on situational stress and social support in females, the results showed that support, when invisible, reduced stress. However, distress can be the outcome in support failures, where an intention of support ends up as not being supportive (Helgeson, 2003).

3.6 Relations between social support and sleep: gender- differences

A significant connection was found between quality of perceived social support and sleep quality in a study of Brazilian elderly (Costa, Ceolim & Neri, 2011), with sleep-problems being associated to a low degree of social support. In a study of male, Japanese daytime workers (Nakata et al., 2004), lack of social support was linked to insomnia, although the link was weak. Further, a study on Taiwanese adults above 20

years (Nomura, Yamaoka, Nakao & Yano, 2010) showed that being female and having low social support was related to experiencing sleep-problems, a finding consistent with results in a Swedish study (Nordin, Knutsson, Sundbom & Stegmayr, 2005). Also a Vietnamese study on male twins (Fabsitz, Sholinsky & Goldberg, 1997), found social support to be associated with reduced sleep problems. Although all these three studies were cross-sectional, the findings indicate that social support, or lack thereof, have implications for sleep. Reasons for this may be that social support leads to a sense of belongingness (Troxel, Robles, Hall & Buysse, 2007), that reduces stress, affects peoples moods and thereby promotes sleep. Thus, social support may dampen the relation between stress and sleep (Morin et al., 2003; Aakerstedt, Fredlund, Gillberg & Janson, 2002; Hall et al., 2008).

3.7 Gender-differences in companionship

Evidence for gender-differences in relation to companionship-animals or companion-dogs are scarce, as research on companion-animals often does not consider gender (Smith, 2012). However, Allen and colleagues (2002) found that female pet-owners reported lower levels of anger and aggression, compared to female non-owners, male non-owners and male pet-owners.

In despite of the lack of studies on gender-differences in companionship, there are found substantial evidence in the literature for the positive advantages of animal companionship for children, the elderly, the socially isolated and people with disabilities (A.M. Beck & Meyers, 1996). Examples are the findings that animals can encourage children to spend more time in leisure activities and also, help older adults in interacting with other people (A.M. Beck & Meyers, 1996). Animals have also been connected to human health. A study (Shintani et al., 2010) on disabled dog-owners showed that they had significant better mental health and physical functioning compared to disabled non-owners. Other studies on the link between human health and companionship have demonstrated both physiological and psychological advantages, lowered symptoms of depression, bettered self esteem in children and rise in activity level for dog-owners compared to non-owners (Edney, 1995). In addition, a review by Walsh (2009) showed that companion-animals can lower blood pressure and cholesterol, boost the immune

system and ease coping with dementia, cancer and heart disease. Most studies on companion animals are cross-sectional. However, the longitudinal study by Headey and Grabka (2007) revealed that pet-owners appeared 15 % less in the general practises than non-owners. Social health has also been found to be better in pet-owners than non-owners (Wood, Giles-Corti & Bulsara, 2005), especially dog-owners have more social interactions in their suburbs, and find it less hard to get to know other people. A study by Garrity, Stallones, Marx and Johnson (1989) showed that having companionship in an animal can be a social buffer for people in lack of human social support.

Although the findings above are promising in regards to health, other studies show mixed results. Chur-Hansen and colleagues (2010) concluded that this may be partly due to methodological issues, such as cross-sectional designs. Another important issue that is not always assessed, is the participants' attachment to the pet (Smith, 2012; Peacock, Chur-Hansen & Winefield, 2012), which have been considered as more important than to simply owning the pet. Being highly attached to an animal is not uncommon (Hines, 2003), and this attachment can for some be stronger than attachment to other people. However, it is not considered a substitute for a human-human relation, or due to failing to interact with other humans (Hines, 2003; Kurdek, 2009).

3.8 Companionship with dog and interpersonal stress: gender-differences

The effects social companionship can have on stress, is thought to occur because of fulfilment of the need to belong (S. Cohen & Wills, 1985), distracting one from concerns and facilitating a positive mood. Lack of companionship is linked to avoiding medical attention and to be more stressed than non-lonely people (Cacioppo, Hawkley & Berntson, 2003). Rook (1987) found differences between degree of stress and the effects of companionship compared to social support. When individuals were exposed to major life stress, social support was a better predictor of stress-reduction, while in minor life stress situations, companionship revealed to be a better predictor. However, both of the articles above (Cacioppo et al., 2003; Rook, 1987) investigated *human* companionship, and also did not consider gender-differences.

Positive effects of companion animals have been found for reduction of stress. Pet owners were found to report fewer stressful life-events, and suggests that companion animals can help to buffer stress (Siegel, 1990). Also, owning aquarium fish has been found to reduce stress (A.H. Kidd & R.M. Kidd, 1999), and Allen and colleagues (2002) found in their study that both cats and dogs buffered acute stress, measured by cardiovascular reactivity in their owners, compared to non-owners. Also, both pet-owners and non-owners with presence of their spouse or friend during a stressful test, had a higher level of stress compared to when they were alone or in presence of their dog. When the pet-owners were in presence of both their dog and spouse during the test, their stress level was lowered (Allen et al., 2002). Kurdek (2009) reported an interesting finding in gender-differences in times of emotional distress. Men preferred to turn to their dogs rather than their mothers, sisters and best friends, although they preferred their wives over their dogs. This finding may mirror that men have less psychological intimate relationships than women (Kurdek, 2009).

There are some drawbacks to having companionship-animals, such as the risk of getting bitten and kicked (Edney, 1995), catching zoonoses and developing allergies. Also, animals can be a source of nuisance and pollution of faeces and urine, making life miserable for neighbours (Edney, 1995). Also, attachment to a pet that dies, can result in grief reactions and distress (Adrian, Deliramich & Frueh, 2009). A recent study (Peacock et al., 2012) concluded that attachment to a companion animal was associated with psychological distress, such as anxiety, depression and somatic symptoms. Negative health effects were also found in an Australian study of older adults (Parslow, Jorm, Christensen, Rodgers & Jacomb, 2005). Pet-owners and carers reported significantly more symptoms of depression and usage of painkillers, than those without pets. Parslow and her colleagues (2005) suggested that this may be because the study did not use attachment as a measure, but ownership and primary caring for an animal, thus one could not know if the owners saw walking and caring for the dog as a chore, and not as a positive bond. Further, ill effects to health may be due to that the responsibility for the animal becomes a burden, rather than an enjoyment (Peacock et al., 2012).

3.9 Companionship with dog and relation to social support: gender-differences

Findings show that companion-animals are associated with increased feelings of emotional and social support (Chur-Hansen et al., 2010; McConnell, Brown, Shoda, Stayton & Martin, 2011; Wood et al., 2005). When gender is considered, female dog-owners were found to report more social support than male dog-owners, and non-owners (Allen et al., 2002).

4 STUDY AIMS AND RESEARCH-QUESTIONS

Empirical findings show that there is gender-differences in all four variables and in correlations between them, although there is a lack of studies on gender-differences in the companionship with dog variable. This study thus will contribute to the pool of information and display some initial information on gender-differences in companionship. The Belongingness hypothesis, the sexual selection theory, the cognitive activation theory of stress and empirical findings will be used to explain gender-differences found in the data. The research questions are listed below:

Research question 1.

To what degree are there gender-differences in interpersonal stress, nocturnal sleep-problems, daytime sleepiness, emotional support, instrumental support and companionship with dog?

Research question 2.

To what degree are there gender-differences in the correlations between interpersonal stress, nocturnal sleep-problems, daytime sleepiness, emotional support, instrumental support and companionship with dog?

Research question 3.

To what degree are there gender-differences in the correlations between the independent

variables (interpersonal stress, emotional support, instrumental support and companionship with dog), and the dependent variables (nocturnal sleep-problems, daytime sleepiness)?

Research question 4.

Are there gender-differences in which of the independent variables that correlates most strongly with nocturnal sleep-problems and daytime sleepiness?

5 METHOD

5.1 Sample and sampling procedures

The Hordaland Health Study '97-'99 (HUSK) was conducted during 1997 to 1999 as a collaboration between the National Health Screening Service, the University of Bergen and local health services. The main purposes of HUSK were to acquire knowledge that may become useful in preventing illness, promote health and display prospective needs in the Health services. All participants were sent personal invitations, and met up at examination places voluntarily. The study population originally included all individuals in Hordaland county born 1953-57 (28.775 individuals), and the rate of attendance to examinations was 63 %. Of these, 50 % of the women ('women 1' in the HUSK-protocol) and 50 % of the men ('men 1' in the HUSK-protocol) completed the questionnaires with only two sleep-questions (the other group was in addition given 13 more questions related to their sleep), and this group were included as participants in this study. As there was a number of missing responses on the variables in this study, some of the cases were excluded. Criteria for exclusion were missing responses on all variables of interest. A number of 4217 participants were finally included in the dataset of this study.

There were several sub-studies in HUSK, and the data applied in this study are from these studies: Social support and social stress in relation to health, led by Maurice Mittelmark at the HEMIL-centre, the University of Bergen. This project studied the relationship between social connectedness, physical and psychological health. The study

on dogs as companions and relations to physical and psychological health, was led by Frode Lingås at the Norwegian School of Veterinary Science. The project about sleep was led by Reidun Ursin at the Department of Physiology, University of Bergen, and measured the prevalence of sleep-problems, delayed sleep-phase, characteristics of people with sleep-problems and their amount of sleep and usage of sleep-medicines. The survey questions on sleep were mainly divided into two categories, daytime sleepiness and sleep-problems during night-time. Data in the above mentioned projects were collected with self-completed questionnaires, and thus, the design in this study is cross-sectional. Additional information about the HUSK-study can be viewed at: <http://husk.b.uib.no/>.

5.2 Ethics

The study protocol was approved by the Regional Ethics Committee (see appendix E) and by the Norwegian Data Inspectorate (see appendix F). Participation in the study was voluntary, the attendees were given thorough written information prior to the project and signed a written consent when appearing for the survey. Respondents are anonymous by identification-numbers in the dataset.

5.3 Measures/health determinants

5.3.1 Interpersonal stress

Interpersonal stress was measured by the Bergen Social Relationships Scale, BSRS (Mittelmark et al., 2004). This is a six-item scale containing statements measuring self-reported chronic interpersonal stress. The items are: social conflict, helpless bystander, inept support, criticism, performance demand and role conflict. The scale can be used across gender variables, and has in previous studies had a Cronbach alpha coefficient of 0.76 (Mittelmark et al., 2004). Ideally, Cronbach alphas should be above 0.7 (Pallant, 2007) In the current study, the Cronbach alpha coefficient was 0.76, and thus may be considered high.

All six statements in BSRS is introduced with: 'think of everyone, -children, parents, siblings, spouse or significant other, partner, neighbour, friends, colleague or others, when you decide to what extent:' followed by the statements: 'there are people in my life whom I care about, but who dislike one another' (social conflict); 'there is a person in my life who needs my help, but whom I don't know how to help' (helpless bystander); 'there is an important person in my life who wants to support me, but who hurts my feelings instead' (inept support); 'there is a person that I have to be with almost daily who hen-picks me' (criticism); 'there are people who make my life difficult because they expect too much care and support from me' (performance demand); 'there is a person I care about who expect more of me than I can manage' (role conflict). There were four response alternatives, indicating degree of agreement: *to a great extent, somewhat, very little* and *not at all*. See Appendix A for the Norwegian questionnaires.

5.3.2 Sleep difficulties

Sleep problems were measured by questions about daytime sleepiness and nocturnal sleep problems. See Appendix B for questionnaires.

Daytime sleepiness

For measuring daytime sleepiness, the following question was asked: 'in the last year: has sleep-problems had an impact on your ability to work?' Response alternatives were *yes* or *no*.

Nocturnal sleep problems

Nocturnal sleep problems were measured by the question: 'how often do you experience sleep-problems?' The response alternatives were *never or a few times a year, 1-2 times a month, approximately once a week, more than once a week*. These were later dichotomized so that the two first alternatives indicated a low degree of sleep-problems, and the last two indicated a high degree of sleep-problems.

5.3.3 Social support

Social support was measured by emotional support and instrumental support. See Appendix C for the Norwegian questionnaires. To measure emotional support, the participants were asked to think of everyone they knew, -children, parents, siblings, spouse or significant other, partner, neighbour, friends, colleague or others, and answer on a 4-point Likert-scale to what degree the statements were true: 'I have someone I care about, with whom I can talk about my personal problems.' As for instrumental support, participants responded to what extent the following statement on financial support was true: 'there is at least one person who would loan me money for a shorter period.' The response alternatives for both measures indicated how much one agreed to the statement: *to a great extent, somewhat, very little and not at all.*

5.3.4 Companionship with dog

Companionship is here defined as having one or more dogs in the household. This was determined by the question 'Are there dogs in the household?' See Appendix D1 for the questionnaire. Response alternatives were *yes* or *no*. Further, companionship was measured by the Bergen Dog Scale, developed by Maurice Mittelmark at the HEMIL centre. The scale includes four statements: 'the dog eases my contact with other people'; 'dog-keeping has a positive impact on mental health'; 'the dog gives me an increased sense of security'; 'the dog increases my physical activity.' Response alternatives were: *strongly agree, partly agree, unsure, partly disagree, strongly disagree*. In the current study, the Cronbach alpha coefficient for the scale was 0.77. As mentioned above, Cronbach alphas should be above 0.7 (Pallant, 2007), so the alpha value may be considered strong here.

5.4 Statistical analyses

The computer program «IBM SPSS statistics» version 20 was used in the statistical analysis. The following steps were taken:

1. All variables were checked for errors and missing data. There were some missing data for all the variables, ranging from 2 % and up to 12 %. However, these appeared to emerge randomly throughout the data. Due to small

differences in mean and 5 % trimmed mean percent, and a consideration of each of the outliers, the missing data were not considered as having impact on mean values. Some of the cases (25) were deleted, due to that these participants had missing responses on all or up to 3 out of 4 of the variables of interest. Further, to avoid possible effects of missing data, pair-wise deletion was used for all the analyses.

2. All variables were checked for normality distribution, variance and outliers. According to the Kolmogorov-Smirnov tests, responses are not normally distributed, but this is a usual finding in studies with large samples (Pallant, 2007), and as the sample size in this study were large, this should not be a problem. For all four variables, skewness was under 2, the kurtosis level was under 3 and variance was over 0 (between .118 and 1.949).
3. Variables were recoded so that high scores indicated high values of each variable, with a low score of 0 to a maximum of 4. This recoding was done to prepare the variables for further analysis, and make it easier to interpret the results. The interpersonal stress and companionship variables were summed so they made up the Bergen Social Relations Scale (BSRS) and the Bergen Dog Scale (BDS). Due to a low Cronbach alpha coefficient (.38) when summed, emotional support and instrumental support were not summed and used as a scale.
4. The BSRS and the BDS were checked for reliability. Both scales showed good internal consistency, with Cronbach alpha coefficients of respectively .76 and .77.
5. All variables were explored by frequency-distributions with graphs, skewness, kurtosis, mean scores and standard deviation, distributed by gender. There were indications of curve-linear relationships on the variables measuring social support and companionship. The BSRS and BDS however, did not appear curve-linear.
6. Independent sample t-tests were performed to look for differences between men and women, in the descriptive analysis.
7. The data was further investigated with correlation analysis, split by gender. Cross-tabulation correlations were performed with Pearson chi-square tests for independence. The Eta-squared values were found with the means procedure.

Bivariate correlation-analysis were performed with Spearman Rho, due to that the variables were on a ranked level, thus requiring non-parametric statistics. Also, assumptions for normality distribution is not violated with the use of non-parametric statistics.

8. For usage in the logistic regression analyses, the two scales (BSRS and BDS) were divided into three categories. These indicated *low*, *middle* and *high* companionship and *low*, *middle* and *high* interpersonal stress. The two social support variables, -instrumental and emotional support, were dichotomized into *low* and *high* instrumental and emotional support and used separately in the logistic regression analysis. The low category of BSRS and BDS, and the low category of emotional support and instrumental support were used as reference-categories in the logistic regression-analysis. As the nocturnal sleep-problems variable had more than two response alternatives, it was dichotomized for the use in logistic regression. The two categories indicated *low* (0) and *high* (1) degree of sleep-problems.
9. As the dependent variables were categorical, logistic regression was chosen. Logistic regression analyse were run to investigate the impacts of the independent variables (interpersonal stress, emotional support, instrumental support and companionship with dog) on the dependent variables (nocturnal sleep-problems and daytime sleepiness). This was both done for the sample as a total (n=4217) split by gender and separately for dog-owners (n=6) split by gender. Assumptions of multicollinearity were found not to be violated, and thus do not violate the assumptions of logistic regression (Pallant, 2007).

6 RESULTS

6.1 Demographics

The number of participants in the study was 4217, with approximately even numbers for men and women (n=2104, n=2113). At the time the study took place, their ages ranged from 40-44 years old. Most of them were married or cohabitant (89.1 % of the women and 88.4 % of the men), living in Hordaland county (81 %) and having paid

employment (93 %). The mean family income lay somewhere between 300.000-399.900 Norwegian kroner a year. About one fourth of the respondents, equally distributed for men and women, worked night-shifts or shift work. Sixty-nine percent reported engagement in social leisure activities or politics less than three times a month, while the remaining 31 % were socially engaged once or more a week. The mean number of friends for both men and women was approximately 7 (women 7.56 and men 7.32). Women were significantly ($p < .001$) more satisfied with the number of friends, compared to men, with a t-value of -6.12. Nineteen percent ($n=789$) of the respondents, equally distributed between men ($n=390$) and women ($n=399$), had one or more dogs in their household, and most of them (91 %) had kept their dog(s) for over a year.

6.2 Descriptives

6.2.1 Interpersonal stress

Table 1 shows the results from the frequency-analyses of the interpersonal stress variables. The distribution of responses was skewed in a positive direction for all six variables, indicating that both men and women reported a low level of interpersonal stress. Further, looking at the columns *somewhat* and *to a great extent* in table 1, these indicate that women tended to report somewhat more interpersonal stress than men. There were some missing responses on all six statements, as one can tell from the *total* column in table 1, ranging from 1.5 % to 2.9 % for women and from 10.2 % to 11.6 % for men.

TABLE 1: Frequencies of interpersonal stress distributed by gender

	Females %					Males %				
	Not at all	Very little	Somewhat	To a great extent	Total n	Not at all	Very little	Somewhat	To a great extent	Total n
Social conflict	38.6	27.2	22.0	12.2	2051	36.3	29.0	23.5	11.2	1860
Helpless bystander	44.4	24.5	21.2	9.8	2054	49.3	26.2	17.7	6.8	1872
Inept support	58.1	21.9	14.9	5.1	2068	67.3	22.0	8.3	2.5	1884
Criticism	67.4	20.0	9.7	2.9	2081	64.4	22.2	11.0	2.5	1889
Performance demand	57.7	22.2	15.3	4.8	2071	67.2	22.6	8.5	1.6	1890
Role conflict	46.8	24.8	22.6	6.0	2063	47.5	29.5	18.8	4.2	1888

Note. Total sample $n=4217$. Females $n=2013$. Males $n=2104$

An independent sample t-test (table 2), identified significant differences between men and women on four of the six statements. On *helpless bystander*, *inept support* and *performance demand* the significant differences were at the .001-level, and *role conflict* was significant at the .01-level.

TABLE 2: Means, standard deviations and t-values for all variables distributed by gender

	Females			Males			t
	n	M	SD	n	M	SD	
Nocturnal sleep-difficulties	1818	.58	.93	2066	.51	.88	2.43 *
Daytime sleepiness	1692	.14	.35	2024	.14	.34	.31
Social conflict	2051	1.08	1.04	1860	1.10	1.02	-.52
Helpless bystander	2054	.96	1.02	1872	.82	.95	4.53 ***
Inept support	2068	.67	.91	1884	.46	.75	7.98 ***
Criticism	2081	.48	.79	1889	.52	.79	-1.40
Performance demand	2071	.67	.90	1890	.45	.72	8.78 ***
Role conflict	2063	.88	.96	1888	.80	.89	2.70 **
Emotional support	2085	2.66	.62	1895	2.51	.72	6.96 ***
Instrumental support	2071	2.53	.86	1886	2.50	.84	.98
Eases contact with people	386	2.43	1.35	378	2.53	1.34	-1.07
Positive for mental health	389	2.78	1.25	379	2.86	1.21	-.82
Increased security-feeling	392	2.63	1.34	374	2.09	1.39	5.49 ***
Increased physical activity	392	2.92	1.36	376	2.83	1.35	.96

Note. All variables have response values from 0 to 3, except daytime sleepiness (values 0 to 1) and the four Bergen Dog Scale variables (values 0 to 4). Low values indicate a low degree of interpersonal stress, nocturnal sleep-problems, daytime sleepiness, emotional support, instrumental support and companionship with dog
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (2-tailed).

6.2.2 Sleep

On *nocturnal sleep-problems* and *daytime sleepiness*, the distribution of scores was quite skewed in a positive direction, for both men and women. This clustering of scores

at the low end in a graph indicates that most individuals in the sample have few sleep-problems. Table 3 shows the distribution of responses of females, males, and the total sample responses. Although there seemed to be small differences between men and women on both sleep variables, women reported having sleep-problems somewhat more often than men. Using independent sample t-test, there was found significant differences between men and women on nocturnal sleep-problems (.05-level), as table 2 shows.

Table 3 shows that there were some missing values. On nocturnal sleep-problems, respectively 14 and 1.8 % for women and men, and on daytime sleepiness, respectively 19.9 and 3.8 % for women and men.

TABLE 3: *Frequencies of sleep-problems distributed by gender*

		Females <i>n (%)</i>	Males <i>n (%)</i>	Both <i>n (%)</i>
Nocturnal sleep-dificulties	Never/a few times a year	1182 (65)	1412 (68.3)	2594 (66.8)
	1-2 times a month	362 (19.9)	384 (18.6)	746 (19.2)
	Approximately once a week	127 (7)	139 (6.7)	266 (6.8)
	More than once a week	147 (8.1)	131 (6.3)	278 (7.2)
Daytime sleepiness	No, doesn't affect work ability	1457 (86.1)	1750 (86.5)	3207 (86.3)
	Yes, affects work ability	235 (13.9)	274 (13.5)	509 (13.7)

Note. Total sample n=4217. Females n=2013. Males n=2104.

6.2.3 Social support

Table 4 shows that there was a positive skewed distribution on both social support variables, for men and for women. This indicates that the majority reported a high degree of social support. Table 2 shows that there was a significant difference between men and women on the emotional support variable (.001-level), measured by an independent sample t-test. On the instrumental support measure, table 4 indicates a

curve-linear relationship, for both men and women. There were some missing responses on both support-variables. For women, 1.3 % were missing on the emotional support statement, and 2 % on instrumental support. For men, there were 9.9 % missing on the emotional support variables, and 10.4 % missing on instrumental support.

TABLE 4: Frequencies of social support by gender

	Females %					Males %				
	To a great extent	Somewhat	Very little	Not at all	Total n	To a great extent	Somewhat	Very little	Not at all	Total n
Emotional support	71.8	23.4	3.3	1.5	2085	61.6	29.8	6.4	2.3	1895
Instrumental support	70.1	20	2.8	7.1	2071	67.6	21.1	5.5	5.8	1886

Note: Total sample n=4217, females n=2013, males n=2104

6.2.4 Companionship

Frequency analyses showed a negative skewness, indicating a clustering of responses in the higher end of companionship (table 5). The distributions of responses in table 5 indicate that there were no gender-differences in companionship. However, table 2 shows that there was a significant difference between men and women (.001-level) on the security statement, *-the dog gives me an increased sense of security*.

Also, table 5 shows that there was a jump in responses for *totally disagree*, on all statements and for both men and women, indicating a curve-linear relationship. Missing values for women lay between 1.8 % and 3.3 %, and for men between 2.8 % and 4.1 %.

TABLE 5: Frequencies of companionship with dog by gender

	Totally disagree	Partly disagree	Not sure	Partly agree	Totally agree	n
Females %						
Eases contact with people	16.1	5.2	23.6	30.1	25.1	386
Positive for mental health	9.8	5.1	17.5	32.4	35.2	389
Increased security-feeling	12.5	8.4	14.3	32.9	31.9	392
Increased physical activity	12	5.6	8.2	27	47.2	392
Males %						
Eases contact with people	14.6	5.3	20.1	32.3	27.8	378
Positive for mental health	8.4	4	19.3	30.3	38	379
Increased security-feeling	21.7	10.2	22.7	28.3	17.1	374
Increased physical activity	12.5	6.1	8.2	32.7	40.4	376

Note. Dog-owners n=789, female dog-owners n=390, male dog-owners n=399

6.3 Correlations

The correlation analyses were performed with the sleep variables (nocturnal sleep-problems and daytime sleepiness), the two scales (BSRS and BDS) and the two social support variables. The two scales were categorized into three, *low*, *middle* and *high* interpersonal stress and companionship. Cross-tabulation analysis and bivariate correlations were run. While cross-tabulation analysis can determine whether there is an association between two variables or not, and also their strength or *effect sizes*, bivariate correlation in addition to strength analysis, describes the direction of the correlation (Pallant, 2007). The meaning of *direction* here is that a negative sign in front of the correlation coefficient indicates that when one variable increases, the other decreases,

and without a negative sign in front of the coefficient, it means that when one variable increases, the other also increases (Pallant, 2007). The cross-tabulations were performed with Pearson Chi-square test for independence, and Eta-squared was used to measure effect-sizes. The bivariate correlations were performed with Spearman rank order correlation, with correlation coefficient *Rho*, due to not meeting the criteria for use of the Pearson product-moment correlation.

According to Pallant (2007), small differences may easily become statistically significant in tests, and interpretations have to be done with carefulness, hence, effect-sizes/strengths and directions are important considerations. Guidelines for interpretation of effect size with Eta-squared is given by J. Cohen (1988): .01 is a small effect .06 is a medium effect and .14 is a large effect. For determining the strength of the correlations with *Rho*, J. Cohen (1988) classifies: a small $\rho = .10$ to $.29$, a medium $\rho = .30$ to $.49$ and a large $\rho = .50$ to 1.0 .

6.3.1 Correlations between independent and dependent variables

Pearson Chi-square test for independence was performed with the two dependent sleep variables and the three independent variables, split by gender (table 6). There was found no associations between neither of the sleep variables and companionship. On the categorical interpersonal stress variable, there was a significant association at the .001-level for both sleep-variables. According to the Eta-squared of the stress-sleep-relation, the effect sizes were small for both men and women, although table 6 shows a nearly medium effect (.05) for women on the correlation between interpersonal stress and nocturnal sleep-problems. Further, bivariate correlations with Spearman *Rho* (table 7, 8) indicated that when interpersonal stress increased, sleep-problems increased or vice versa, but the strength of the relationship was small, for both men and women.

With Pearson Chi-square test for independence, there were also found significant correlations (.001-level) between sleep and both social support variables (table 6). Bivariate correlations (table 7, 8) indicated an increased/decreased relationship. When social support increased, sleep-problems decreased, or vice versa, for both men and women. *Rho*-values indicated that the effect was rather small.

TABLE 6: Pearson Chi-square test for independence: associations between sleep variables and all other variables

		Nocturnal sleep problems				Daytime sleepiness			
		n	df	χ^2	η^2	n	df	χ^2	η^2
Interpersonal stress (low, middle, high)	Females	1707	6	78.7 ***	.05	1590	2	58.62 ***	.04
	Males	1780	6	40.01 ***	.02	1749	2	22.06 ***	.01
Emotional support	Females	1794	9	35.23 ***	.02	1668	3	19.07 ***	.01
	Males	1857	9	56.54 ***	.02	1821	3	31.43 ***	.02
Instrumental support	Females	1779	9	14.71	.01	1652	3	10.60 **	.01
	Males	1848	9	22.37 **	.01	1813	3	9.09 **	.01
Dog-companionship (low, middle, high)	Females	339	6	3.37	.00	310	2	.19	.001
	Males	365	6	10.24	.00	357	2	.62	.002

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.000$ (2-tailed)

6.3.2 Correlations between the independent variables

Further, correlations by Pearson Chi-square test for independence found a significant correlation between interpersonal stress (low, middle, high) and emotional support, for both men and women ($p < .001$), for women $\chi^2 = 59.47$ ($df=6$, $\eta^2=.03$) and for men $\chi^2=82.58$ ($df=6$, $\eta^2=.04$) The Eta-squares for both women and men indicated that the effect the variables had on each-other was small. Bivariate analyses (table 7, 8) indicated that when support increased, interpersonal stress decreased, or vice versa, for both men and women, but the strength of the association was small. Between interpersonal stress (low, middle, high) and instrumental support, there was also a significant correlation at the .001-level. For women, $\chi^2 = 32.31$ ($df=6$, $\eta^2=.01$) and for men $\chi^2=28.53$ ($df=6$, $\eta^2=.01$) The Eta-squares for both women and men indicated that the effect the variables had on each-other was small.

By Pearson Chi-square test for independence, there was also found a significant correlation at the .05-level between interpersonal stress and companionship for the male dog-owners, $\chi^2=11.45$ (df =4, p=.02), $\eta^2=.03$. The Eta-squared value indicates that the effect is small. Bivariate analyses (table 7) showed no significant associations between the variables for neither men or women, but the sign in front of the coefficients was different, indicating that for women interpersonal stress increased when companionship increased (or vice versa), and for men interpersonal stress increased when companionship decreased, or vice versa.

By Pearson Chi-square test for independence, there was found no significant correlations between emotional support and companionship for neither men nor women, women: $\chi^2=5.16$ (df=6, p=.52) and men: $\chi^2=4.18$ (df=6, p=.65). Neither was there a connection between instrumental support and dog companionship. Women $\chi^2=7.59$ (df=6, p=.27) and men: $\chi^2=5.29$ (df=6, p=.51). Bivariate analyses (table 7) did not indicate an association between social support and companionship for neither men nor women.

TABLE 7: Intercorrelations (by Spearman Rho) between all variables distributed by gender

	1.	2.	3.	4.	5.	6.
1. Interpersonal stress scale (BSRS)	.	- .05	- .21 ***	- .08 ***	.15 ***	.11 ***
2. The Bergen Dog Scale (BDS)	<i>.04</i>	.	.08	- .08	.05	- .02
3. Emotional support	<i>-.19 ***</i>	<i>-.01</i>	.	.25 ***	- .12 ***	- .07 *
4. Instrumental support	<i>-.07 ***</i>	<i>.03</i>	<i>.25 ***</i>	.	- .04	- .03
5. Nocturnal sleep-difficulties	<i>.20 ***</i>	<i>-.02</i>	<i>-.12 ***</i>	<i>-.06 *</i>	.	.55 ***
6. Daytime sleepiness	<i>.21 ***</i>	<i>.01</i>	<i>-.09 ***</i>	<i>-.05 *</i>	<i>.51 ***</i>	.

Note. Intercorrelations for women (n=2113. Female dogkeepers n=399) are presented in cursive under the diagonal. Intercorrelations for men (n=2104. Male dogkeepers n=390) over the diagonal in normal fonts.

*p< 0.05, ** p < 0.01, ***p< 0.001

TABLE 8: Intercorrelations (by Spearman Rho) for all variables distributed by gender

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Social conflict		.34 ***	.27 ***	.21 ***	.22 ***	.25 ***	-.03	.01	-.01	.04	.07	.07	.08 **	.05 *
2. Helpless bystander	.36 ***		.36 ***	.27 ***	.33 ***	.35 ***	-.13 ***	-.04	.03	.06	.01	.02	.09 ***	.04
3. Inept support	.35 ***	.39 ***		.44 ***	.42 ***	.39 ***	-.19 ***	-.09 ***	.02	.06	.02	-.02	.09 ***	.06 **
4. Criticism	.27 ***	.27 ***	.45 ***		.43 ***	.40 ***	-.19 ***	-.09 ***	-.03	-.01	-.03	-.09	.08 **	.06 *
5. Performance demand	.27 ***	.38 ***	.41 ***	.40 ***		.54 ***	-.20 ***	-.10 ***	-.04	-.01	-.11 *	-.02	.12 ***	.08 **
6. Role conflict	.29 ***	.39 ***	.45 ***	.38 ***	.63 ***		-.21 ***	-.11 ***	-.01	-.03	-.09	-.01	.13 ***	.11 ***
7. Emotional support	-.06 *	-.11 ***	-.21 ***	-.18 ***	-.15 ***	-.16 ***		.25 ***	.03	.07	.05	.02	-.12 ***	-.07 **
8. Instrumental support	-.01	-.05 *	-.06 **	-.05 *	-.09 ***	-.07 **	.25 ***		-.05	-.02	-.09	-.07	-.04	-.03
9. Eases contact with people	.05	.08	.06	.06	.03	.10 *	-.08	.01		.56 ***	.40 ***	.49 ***	.02	-.04
10. Positive for mental health	-.02	-.08	.01	-.03	-.02	.02	-.01	.07	.57 ***		.43 ***	.48 ***	.06	.02
11. Increased security-feeling	.08	.03	.07	.05	.01	.11 *	-.02	.01	.42 ***	.50 ***		.37 ***	.001	-.04
12. Increased physical activity	.01	-.02	-.05	-.04	-.05	.01	.03	.02	.41 ***	.49 ***	.34 ***		.07	.04
13. Nocturnal sleep-difficulties	.10 ***	.14 ***	.12 ***	.12 ***	.17 ***	.20 ***	-.12 ***	-.06 *	.07	-.06	-.02	-.08		.55 ***
14. Daytime sleepiness	.10 ***	.12 ***	.14 ***	.11 ***	.18 ***	.20 ***	-.09 ***	-.05 *	.10	-.02	-.00	-.02	.51 ***	

Note. Intercorrelations for women (n= 2113) are presented in cursive under the diagonal (female dogowners n=399). Intercorrelations for men (n=2104) are presented in normal fonts (male dogowners n=390).

*p<0.5, **p<0.01, ***p<0.001 (2-tailed)

6.4 Logistic regression

Direct logistic regression was run to investigate the impacts of interpersonal stress, emotional and instrumental support on the probability of reporting sleep-problems, measured by nocturnal sleep-problems and daytime sleepiness. Also, these analyses were performed separately with the dog-owners as respondents, with companionship, interpersonal stress, emotional and instrumental support as predictors. All logistic regression analyses were performed with the data split by gender to investigate gender-differences, and with the low categories of interpersonal stress and companionship as reference categories (hence their B values, standard errors and odds ratios are not reported in tables 9-12).

6.4.1 The nocturnal sleep-problems model

6.4.1.1 Gender and nocturnal sleep-problems

The whole model containing interpersonal stress, emotional and instrumental support as predictors, and nocturnal sleep-problems as outcome, was statistically significant ($p < .001$) for both men and women: women, $\chi^2 = 59.01$ ($df = 4$, $n = 1691$) and men, $\chi^2 = 33.38$ ($df = 4$, $n = 1763$). Thus, the model can distinguish between respondents reporting nocturnal sleep-problems and those not.

For women, the model explained between 3.4 % (Cox and Snell R square) and 6 % (Nagelkerke R squared) of the variance in nocturnal sleep-problems, and correctly classified 84.9 % of the cases. Only interpersonal stress was a significant predictor of sleep-problems, and thus made a unique contribution to the model (table 9). The strongest predictor of reporting nocturnal sleep-problems was to be a respondent in the high stress category, with an odds ratio of 3.43, and the middle category, with an odds ratio of 1.48. This means that women in the high and middle interpersonal stress category are respectively over three and one times more likely to report nocturnal sleep-problems than women in the low interpersonal stress category, controlling for the social support variables in the model.

For men, the full model could explain between 1.9 % (Cox and Snell R square) and 3.6 % (Nagelkerke R squared) of the variance in nocturnal sleep-problems, and correctly classified 87.6 % of the cases. All categories except instrumental support were significant, and thus made a unique contribution to the model (table 9). Emotional support was a stronger predictor than interpersonal stress, and the B-value had a negative sign in front, meaning that a man experiencing a high degree of emotional support is less likely to report nocturnal sleep-problems.

TABLE 9: Logistic regression predicting likelihood of reporting nocturnal sleep-problems, split by gender

		B	S.E	Wald	df	p	Odds Ratio	95.0 % C.I for Odds Ratio	
								Lower	Upper
Females	Interpersonal stress								
	<i>Low</i>	1.00		53.55	2	.000			
	<i>Middle</i>	.39	.17	5.61	1	.018	1.48	1.07	2.05
	<i>High</i>	1.23	.17	52.71	1	.000	3.43	2.46	4.79
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	-.40	.28	2.10	1	.148	.67	.39	1.15
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	-.34	.22	2.52	1	.113	.71	.47	1.08
	Constant	-1.45	.33	19.67	1	.000	.23		
Males	Interpersonal stress								
	<i>Low</i>	1.00		7.52	2	.023			
	<i>Middle</i>	.39	.16	5.67	1	.017	1.47	1.07	2.03
	<i>High</i>	.44	.22	4.04	1	.044	1.55	1.01	2.36
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	-.96	.21	20.30	1	.000	.38	.25	.58
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	-.24	.21	1.23	1	.267	.79	.52	1.20
	Constant	-1.09	.25	18.70	1	.000	.34		

Note. Females n=1691, males n=1763

6.4.1.2 Dog-owners and nocturnal sleep-problems

A test of the full model containing three predictors, -interpersonal stress, social support and companionship, and nocturnal sleep-problems as outcome, was statistically significant at the .001-level for women and at the .05-level for men. Women: $\chi^2=31.44$ (df=6, n=327, p=.000) and men: $\chi^2=14.48$ (df=6, n=307, p=.025). Thus, the set of predictors can distinguish between dog-owners reporting nocturnal sleep-problems and dog-owners reporting few nocturnal sleep-problems.

For women, the model explained between 9.2 % (Cox and Snell R square) and 14.7 % (Nagelkerke R squared) of the variance in nocturnal sleep-problems, and correctly classified 82 % of the cases. The only significant variable was interpersonal stress (table 10). These were the women in the high stress category, with an odds ratio of 7.16 (with a 95 % confidence interval (C.I) ranging from 3.36 to 15.25), and the middle category, with an odds ratio of 2.61. This indicates that women in the high interpersonal stress category are over seven times more likely to report nocturnal sleep-problems than women in the low interpersonal stress category, but this can according to the 95 % C.I range from three to fifteen times more likeliness. Women in the middle category are over two times more likely to report nocturnal sleep-problems, than women in the low interpersonal stress category, controlled for the other variables in the model.

For men, the full model could explain between 4.6 % (Cox and Snell R square) and 8.6 % (Nagelkerke R squared) of the variance in nocturnal sleep-problems, and correctly classified 87.9 % of the cases. Only the high category of interpersonal stress was statistically significant and made a unique contribution to the model (table 10). The high category of interpersonal stress had an odds ratio of 4.63 (with a 95 % confidence interval ranging from lower 1.89 to upper 11.33). This means that a man belonging to the high interpersonal stress category is almost 5 times more likely to report nocturnal sleep-problems than a man in the low interpersonal stress category, when controlled for other predictors in the model.

TABLE 10: Logistic regression predicting likelihood of dog-owners reporting nocturnal sleep-problems, distributed by gender

		B	S.E	Wald	df	p	Odds Ratio	95.0 % C.I. For Odds Ratio	
								Lower	Upper
Female dog-owners	Interpersonal stress								
	<i>Low</i>	1.00		26.16	2	.000			
	<i>Middle</i>	.96	.37	6.79	1	.009	2.61	1.27	5.38
	<i>High</i>	1.97	.39	26.07	1	.000	7.16	3.36	15.25
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	.73	.81	.81	1	.367	2.07	.43	10.02
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	-.73	.51	2.08	1	.150	.48	.18	1.30
	Companionship								
	<i>Low</i>	1.00		.19	2	.911			
	<i>Middle</i>	-.12	.39	.10	1	.755	.89	.37	1.77
	<i>High</i>	.02	.38	.003	1	.954	1.02	.50	2.15
	Constant	-2.30	1.00	5.31	1	.021	.10		
Male dog-owners	Interpersonal stress								
	<i>Low</i>	1.00		11.32	2	.003			
	<i>Middle</i>	.50	.42	1.43	1	.233	1.65	.72	3.77
	<i>High</i>	1.53	.46	11.28	1	.001	4.63	1.89	11.33
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	-.35	.54	.42	1	.515	.70	.24	2.04
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	-.57	.50	1.29	1	.255	.57	.21	1.51
	Companionship								
	<i>Low</i>	1.00		.05	2	.975			
	<i>Middle</i>	.10	.44	.05	1	.826	1.10	.46	2.63
	<i>High</i>	.03	.44	.01	1	.945	1.03	.43	2.45
	Constant	-1.62	.73	4.91	1	.027	.20		

Note. Female dog-owners n=327, male dog-owners n=307

6.4.2 The daytime sleepiness model

6.4.2.1 Gender and daytime sleepiness

Direct logistic regression was run, split by gender. The full model containing interpersonal stress and social support was statistically significant at the .001-level ($p < .001$) for both men and women: women, $\chi^2=64.11$ ($df=4$, $n=1573$) and men $\chi^2=36.03$ ($df=4$, $n=1732$). The model thus is able to distinguish between respondents reporting daytime sleepiness and respondents not reporting it.

For women, the full model explained between 4.0 % (Cox and Snell R square) and 7.2 % (Nagelkerke R squared) of the variance in daytime sleepiness, and correctly classified 86.2 % of the cases. Instrumental support and all interpersonal stress categories were significant and thus made a unique contribution to the model (table 11). The strongest predictors of reporting daytime sleepiness was to be a respondent in the high interpersonal stress category, with an odds ratio of 3.71, and the middle category, with an odds ratio of 2.15. This means that women in the high interpersonal stress category are respectively over three and almost four times more likely to report daytime sleepiness than women in the low interpersonal stress category. Women in the middle category are over two times more likely to report daytime sleepiness, than women in the low interpersonal stress category, controlling for the social support variables in the model. Instrumental support was significant at the .05-level, and the front sign in the B-value was negative, indicating an increase-decrease relationship between sleep problems and instrumental support.

For men, the full model could explain between 2.1 % (Cox and Snell R square) and 3.9 % (Nagelkerke R squared) of the variance in daytime sleepiness, and correctly classified 87.4 % of the cases. All categories of interpersonal stress and emotional support were significant, and thus made a unique contribution to the model (table 11). Similar to women, the high and the middle categories of interpersonal stress were the strongest predictors of reporting daytime sleepiness, with respectively 2.07 and 1.5 as odds ratios. This means that a man belonging to the high interpersonal stress category is over 2 times more likely to report daytime sleepiness than men in the low interpersonal stress

category, when controlled for social support in the model. Men in the middle category of interpersonal stress are somewhat more likely to report daytime sleepiness than men in the low category of interpersonal stress. The B-value of emotional support was negative, meaning that there is an increase-decrease relation between sleep-problems and emotional support for men.

TABLE 11: Logistic regression predicting likelihood of reporting daytime sleepiness, split by gender

		B	S.E	Wald	df	p	Odds Ratio	95.0 % C.I. For Odds Ratio	
								Lower	Upper
Females	Interpersonal stress								
	<i>Low</i>	1.00		49.57	2	.000			
	<i>Middle</i>	.76	.18	18.12	1	.000	2.15	1.51	3.05
	<i>High</i>	1.31	.19	48.67	1	.000	3.71	2.57	5.37
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	-.49	.29	2.94	1	.087	.61	.35	1.07
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	-.51	.22	5.30	1	.021	.60	.39	.93
	Constant	-1.48	.34	18.87	1	.000	.23		
Males	Interpersonal stress								
	<i>Low</i>	1.00		17.69	2	.001			
	<i>Middle</i>	.40	.17	6.01	1	.014	1.50	1.08	2.07
	<i>High</i>	.73	.21	16.35	1	.000	2.07	1.38	3.10
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	-.89	.22	16.69	1	.000	.41	.27	.63
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	-.13	.22	.35	1	.553	.88	.57	1.35
	Constant	-1.26	.26	23.65	1	.000	.28		

Note. Females n=1573, males n=1732

6.4.2.2 Dog-owners and daytime sleepiness

Direct logistic regression was run with the dog-owners as predictors, split by gender. The full model containing interpersonal stress, social support and companionship was statistically significant at the .001-level ($p < .001$) for women: $\chi^2 = 26.81$ ($df = 6$, $n = 300$) and statistically significant at the .01-level ($p = .006$) for men: $\chi^2 = 18.05$ ($df = 6$, $n = 301$). The model thus is able to distinguish between dog-owners that report daytime sleepiness and dog-owners who do not.

For female dog-owners, the full model explained between 8.5 % (Cox and Snell R square) and 14.2 % (Nagelkerke R squared) of the variance in daytime sleepiness, and correctly classified 84.7 % of the cases. The variables and categories that were statistically significant and thus making unique contributions to the model, were female dog-owners in the high interpersonal stress category and instrumental support (table 12). The strongest predictors of reporting daytime sleepiness were belongingness to the high interpersonal stress category, with an odds ratio of 4.71, and instrumental support, with an odds ratio of .21. This indicates that female dog-owners belonging to the high interpersonal stress category are over four times more likely to report daytime sleepiness than female dog-owners in the low interpersonal stress category, controlling for the other variables in the model. However, the 95 % confidence interval ranged from a lower level of 2.13 to an upper level of 10.42. The B-value of instrumental support was negative, indicating a decrease in one variable while the other increases.

For men, the full model explained between 5.8 % (Cox and Snell R square) and 11.4 % (Nagelkerke R squared) of the variance in daytime sleepiness, and correctly classified 88.4 % of the cases. Only the high category of interpersonal stress made a unique contribution to the model (table 12). The high interpersonal stress category had an odds ratio of 6.81. This means that a man belonging to the high interpersonal stress category is almost 7 times more likely to report daytime sleepiness, than a man in the low interpersonal stress category. However, the 95 % confidence interval was quite wide, reaching from a lower value of 2.74 to an upper level of 16.91.

TABLE 12: Logistic regression predicting likelihood of dog-owners reporting daytime sleepiness, split by gender

		B	S.E	Wald	df	p	Odds Ratio	95.0% C.I. For Odds Ratio	
								Lower	Upper
Female Dog-owners	Interpersonal stress								
	<i>Low</i>	1.00		14.73	2	.001			
	<i>Middle</i>	.66	.40	2.82	1	.093	1.94	.90	4.22
	<i>High</i>	1.55	.41	14.61	1	.000	4.71	2.13	10.42
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	.39	.81	23	1	.631	1.48	.30	7.23
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	- 1.57	.51	9.66	1	.002	.21	.08	.56
	Companionship								
	<i>Low</i>	1.00		.24	2	.885			
	<i>Middle</i>	- .14	.43	.10	1	.754	.87	.38	2.03
	<i>High</i>	.05	.41	.01	1	.905	1.05	.47	2.36
Constant	- 1.14	1.01	1.27	1	.261	.32			
Male Dog-owners	Interpersonal stress								
	<i>Low</i>	1.00		17.97	2	.000			
	<i>Middle</i>	.41	.46	.80	1	.372	1.51	.61	3.73
	<i>High</i>	1.92	.47	17.04	1	.000	6.81	2.74	16.91
	Emotional support								
	<i>Low</i>	1.00							
	<i>High</i>	.11	.63	.03	1	.861	1.12	.33	3.80
	Instrumental support								
	<i>Low</i>	1.00							
	<i>High</i>	- .01	.61	.00	1	.994	1.00	.30	3.27
	Companionship								
	<i>Low</i>	1.00		.74	2	.690			
	<i>Middle</i>	- .41	.48	.74	1	.390	.66	.26	1.69
	<i>High</i>	- .20	.45	.19	1	.663	.82	.34	1.98
Constant	- 2.46	.85	8.37	1	.004	.09			

Note. Female dog-owners n=300, male dog-owners n=301

7 DISCUSSION

7.1 Summary of results

The majority of respondents reported a lower degree of sleep-problems and interpersonal stress, and a higher degree of social support and companionship. There were found gender-differences in all four variables. Compared to men, women reported significantly ($p < .05$) more nocturnal sleep-problems, a higher degree of interpersonal stress on four of the six stress-statements, *performance demand*, *helpless bystander*, *inept support* ($p < .001$) and *role conflict* ($p < .01$), a higher degree of emotional support ($p < .001$) and also a higher degree of companionship ($p < .001$) on one of the BDS-items (feeling secure when with dog), compared to men.

Gender-differences in correlations

For both men and women, there were significant, positive correlations ($p < .001$) between interpersonal stress and both sleep-variables. The effect-sizes were somewhat larger for women than for men, almost reaching a medium effect (.05) on the nocturnal sleep-problems variable, while the same effect-size for men was small (.02). There was also a significant, negative correlation between interpersonal stress and both support-variables for both sexes, but the effect-sizes were small. Further, for both men and women, there were significant, negative correlations ($p < .001$) between emotional support and both sleep-variables. The effect-sizes were small for both sexes. The correlation between instrumental support and nocturnal sleep-problems were significant in a negative direction, but only for men ($p < .01$), however, the effect-size was small. For both men and women, there was a significant, negative correlation ($p < .01$) between instrumental support and daytime sleepiness, but the effect-sizes were small.

The nocturnal sleep-problems model (dog-owners and non-owners together) only explain between 3.4 % and 6 % of the variance for women, and 1.9 % to 3.6 % of the variance for men. However, for women, the model correctly identified 84.9 % and 87.6 % of the men. Also, for women in the model, a high degree of interpersonal stress was

the only significant predictor for sleep-problems. For men, in addition to a high level of interpersonal stress, an even stronger predictor was emotional support, and a high degree of emotional support predicted less nocturnal sleep-problems.

The daytime sleepiness model (dog-owners and non-owners together) could explain between 4 % and 7.2 % of the variance for women (86.2 % correctly identified). Instrumental support and interpersonal stress were significant predictors, and support was negatively related to sleep-problems. For men, the daytime sleepiness model could explain between 2.1 % to 3.9 % of the variance (87.4 % correctly identified), and emotional support and interpersonal stress was significant predictors.

Companionship

Correlations between companionship and interpersonal stress were not significant for neither men or women, however, the correlation coefficient was negative for men and positive for women, indicating that companionship with a dog correlates with lower interpersonal stress in men, and more interpersonal stress in women, or vice versa, as direction can-not be told from a bivariate correlation-analysis. Also, companionship was not correlated to neither of the support-variables. However, similar to gender-differences in the correlations between companionship and interpersonal stress, the correlation coefficients were inverted for men and women on the emotional support variable, negative for women and positive for men. On the instrumental support variable, the correlation coefficient was positive for women and negative for men. Further, although there was no significant correlations between companionship and the two sleep-variables, the difference in signs in front of correlation coefficients indicated gender-differences also here. For women, the coefficient was negative on the nocturnal sleep-problems and positive for the daytime sleepiness variable. For men, the coefficient was positive for the nocturnal sleep-problems variable and negative for daytime sleepiness.

The nocturnal sleep-problems model could explain between 9.2 % and 14.7 % of the variance in women, and between 4.6 % and 8.6 % in men. For women, it correctly

identified cases 82 % of the time, and 87.9 % for men. Further, being in the high category of interpersonal stress was the only predictor for both men and women. Further, the daytime sleepiness model could for women explain between 8.5 % and 14.2 % of the variance, and between 5.8 % and 11.4 % in men. For women, the model correctly identified cases 84.7 % of the time, and 88.4 % of the time in men. The strongest predictors for women were to be in the high category of interpersonal stress and instrumental support. For men, being in the high interpersonal stress category was the only predictor.

The results above clearly support findings of gender-differences in social relations with significant others. In the following chapters, gender-differences that were significant or noteworthy, will be discussed according to the theoretical framework in chapter 2, and empirical findings in chapter 3.

7.2 Men and women report equal number of friends, but may differ in who they are closest with

In accordance with Sexual Selection theory, one should expect that men and women would differ in how many friends they have, as women are thought to prefer a smaller number of close relations (Troisi, 2001). Men strive for access to a variety of female partners (Troisi, 2001), and the finding that men prefer larger networks (Kafetsios, 2007), may support this notion, as a larger network can be thought to give access to a larger number of partners. However, findings here showed that men and women reported an equal number of friends (approximately seven), and this may reflect that both women and men have a need to belong, in accordance with the Belongingness hypothesis (Baumeister & Leary, 1995). However, there was a significant difference between men and women's satisfaction with this number. Men were less satisfied, and thus, this finding supports men's preference for a large network (Kafetsios, 2007), and that the need to belong is not fully satiated, according to the Belongingness theory (Baumeister & Leary, 1995). It may in an evolutionary perspective, support the notion of men's strive for a larger availability of females (Troisi, 2001).

According to Baumeister & Leary (1995) and their Belongingness hypothesis, men and women are alike when it comes to preferences of quality versus quantity in relations, that at first may be seen as a contradiction to women's preferences for relational belongingness and men's preference for collective belongingness. However, findings that show the advantage of marriage for men and that they report their spouse as their closest (Fuhrer & Stansfeld, 2002), and women do not, suggest that men's need for quality in close relations is satisfied by their wives. Thus men and women may in fact be alike on preferences for quality above quantity, as the Belongingness hypothesis suggest, however, *who* the close persons satisfying the quality-need are, may be unlike. It can be hypothesized that the women in the current sample are very close with their friends. This reasoning can be seen further supported by women reporting a higher degree of emotional support compared to men. As most of the respondents were married, it is reasonable to assume that men's closest relation were their wives, as the finding by Fuhrer and Stansfeld (2002) showed. An explanation for the difference between men and women, of perceived closeness in marriage, may be that men due to their preference for large networks (Kafetsios, 2007) have more shallow relations were they do not talk about personal problems in the same degree as women. Further, as women according to the Sexual Selection hypothesis are more likely to have close relations and not engage in rank behaviour like men do (Troisi, 2001), women may be perceived as less harmful for men's social status, thus making them the closest relation for men. For women, it may be hypothesized that they perceive men as providing less emotional support, compared to other women, as men prefer larger networks (Kafetsios, 2007), and thus receive more emotional support from others than their husbands. The Belongingness theory's notion about women preferring mutual caring relations (Baumeister & Leary, 1995) supports this hypothesis, as men are found to receive more support than they provide (Fuhrer & Stansfeld, 2002).

7.3 Women experience more interpersonal stress and report more nocturnal sleep-problems compared to men

7.3.1 Interpersonal stress

The results showed that women reported significantly more interpersonal stress compared to men. The same finding has also been reported in other studies (Kawachi & Berkman, 2001; Chaplin et al., 2008; Kelly et al., 2008). Mittelmark and colleagues (2004), also found these results in the same age-group of participants from the HUSK-study.

The gender-differences in interpersonal stress can be explained by combining the Belongingness theory and the Sexual Selection theory. According to the Belongingness theory, both men and women have needs for significant interpersonal relations (Baumeister & Leary, 1995). However, they differ in terms of how this need is expressed. Women have a stronger need for relational belongingness, and men have a stronger need for collective belongingness (Brewer, 2004). The Sexual Selection theory says that belonging to a social network enhances female fitness (Troisi, 2001), and in the larger picture, chances to reproduce. As an adaptive response to this, women have through evolution become more interdependent than men. Research relevant to this show that women report more sadness and negative emotions following stress, compared to men, although they do not differ on physiological measures (Chaplin et al., 2008; Kelly et al., 2008). As threats to relations are social stressors for women (Troisi, 2001), with potential to reduce female fitness, women are more likely to experience and report such stressors as more severe compared to men. Also, emotions like sadness and negativity, are adaptive motivators for women in situations threatening to relations and thus to female fitness, as they give feedback on how well one does in achieving goals, and regulates the strive in the direction of strategies more likely to result in positive outcomes (Troisi, 2001). Likewise, it may seem that women report more interpersonal stress as an adaptive response to social stress and threats to maintaining social supportive networks. Having a large network enhances male fitness and likelihood of reproduction (Troisi, 2001), and men are hypothesized to be more likely to have a larger number of friends, though less close, and to be more independent than women. The

finding here, that more men than women reported having too few friends, supports this notion.

When goals of belongingness to a social network is threatened, women should according to Sexual Selection theory (Troisi, 2001) respond more greatly to this than men, as it enhances female fitness. This response is according to Sexual Selection theory (Troisi, 2001) an adaptive consequence to ensure the keeping of close relations. However, as women report more interpersonal stress than men, and interpersonal stress is significantly related to psychological distress (Bancila, 2005; Mittelmark, 1999; Mittelmark et al., 2004), subjective health complaints (Aanes et al., 2010) and objective illnesses (Tausk et al., 2008; Miller et al., 2009), women may hypothetically be either more prone to becoming ill, compared to men, or it may be a result of sensitization, as the cognitive activation theory of stress suggests (H. Ursin & Eriksen, 2004). Women may have become more able to notice physical changes, and thus report them earlier or more severe than men. As an example and support for this hypothesis, women are shown to report higher intensities in subjective health complaints (Ihlebak, Eriksen & H. Ursin, 2002), compared to men.

7.3.2 Nocturnal sleep-problems

Women in this study reported significantly more nocturnal sleep-problems (.05-level), compared to men, and other studies using self-reports as measures have reached the same conclusions (Marquié et al., 2012; Arber et al., 2009). Studies that have used polysomnography to study gender-differences in sleep, have shown the opposite, that women sleep better than men (Bixler et al., 2009; Redline et al., 2004). However, studies measuring sleep-duration and patterns may not actually reveal that women are better sleepers as they sleep more than men, but mirror women's higher needs for more sleep to restore. The study by Groeger and colleagues (2004) may also give an indication of this. Here, women reported more sleep-problems although their reports of sleep-amounts were the same as for men. Results from the self-reports of the other half of 40-44 year old participants (n=8860) in the HUSK-study (R. Ursin, Bjorvatn & Holsten, 2005), showed that women reported longer duration of sleep and a higher need

for sleep compared to men. Reports in other studies support these results (Reyner & Horne, 1995; Groeger et al., 2004), and hence, gender-differences in sleep-need may explain the higher prevalence of insomnia in women.

Physiological processes at work in gender-differences in sleep have not extensively been studied according to Paul, Tyrek and Kryger (2008). These authors report in their review of studies that reproductive hormones affect the circadian rhythm of sleep and homeostatic processes, as such, estrogen and progestins have been found to increase the amount of sleep-needs in females (Paul, Tyrek & Kryger, 2008). Hence, in accordance with the Sexual Selection theory (Troisi, 2001), it may be that women's need for more sleep than men is an adaptation as to enhance female fitness, for example to prepare for becoming a mother. A review that may favour this suggestion, found that female shift workers reporting problems with sleep also experienced problems with the menstrual cycle and changes in levels of reproductive hormones (Chung, Wolf & Shapiro, 2009).

7.4 Interpersonal stress has a larger impact on self-reported nocturnal sleep-problems in women, compared to men

The analysis revealed a significant relationship between interpersonal stress and nocturnal sleep-problems for both men and women, but the effect-size of the relation was larger for women. While the effect was small for men, the effect for women was almost medium. Although the study by Mezick and colleagues (2009) was performed with life stress as the stress-variable, it reached the same conclusion. However, Bixler and his colleagues (2009) reached the opposite conclusion, that young women sleep better than young men after exposure to a stressor. An explanation offered by Bixler and colleagues (2009), was that women may be protected from the sleep-deprivation that comes with caring for an infant or a child. Although women in the current sample were found to be poorer sleepers compared to men, the explanation given by Bixler and colleagues (2009) is consistent with the Sexual Selection theory, good sleep may enhance female fitness and enable mothers to recover faster so that they can take care of

their children. A critique to the study by Bixler and colleagues (2009), however, is that participants reporting daytime sleepiness, insomnia or other sleep-related problems were excluded, and the included participants may not correctly reflect how the general population, with and without sleep-problems, reacts to stress (Bixler et al., 2009). Also, studies where a stressor is experimentally generated, can-not necessarily be compared to what was found in this study (Cozby, 2009), as stressors here already existed and was not created in respect for use in a study. Also, the result in the study by Bixler and colleagues (2009) may be interpreted in another way, -that women become more exhausted to stress and thus sleep more.

Women reported more interpersonal stress than men, and according to CATS, an alarm is set off when experiencing stress (H. Ursin & Eriksen, 2004). According to Ihlebæk, Eriksen and H. Ursin (2002), men and women may defer in responses to stress, thresholds to complain or coping-styles to stress. A repeated exposure to a stressor can lead to habituation or sensitization, decrease or increase in response (H. Ursin & Eriksen, 2004). Sensitized individuals will according to H. Ursin & Eriksen (2004) have lower thresholds of reporting stress and complaints. So, it may be that women in this study have become more sensitized due to repeated negative experiences with close significant others. Considering that arousal is a component in sleep-problems (Hall et al., 2000), one can imagine that repeated and persistent increases in stress-hormones in women due to sensitization, may lead to sleep-problems.

Women are found to dwell and think more about sad events and feelings, while men distract themselves from it (Chaplin et al., 2008), so in accordance with CATS, one should expect that women will develop feelings of hopelessness and helplessness to a larger degree than men. Further, coping or lack of coping, expectancy of positive or negative outcomes, are roads to health or ill health (H. Ursin & Eriksen, 2004), or as in this case, having good sleep or poor sleep. Building on CATS, one can consider the onset of sleep-problems in relation to interpersonal stress, as a result of not coping. However, a feeling of mastery to cope with stress should in accordance with CATS lead to less sleep-problems. As men are more independent than women according to the Sexual Selection theory (Troisi, 2001) and also supported in empirical studies (Murphy,

1998), they are less likely to experience stress in negative social relations, and should therefore report less sleep-problems than women. The findings in the logistic regression model for nocturnal sleep-problems, support this as interpersonal stress was the only predictor in the model for nocturnal sleep-problems in women. For men, interpersonal stress was a weaker predictor of nocturnal sleep-problems than emotional support. Building on the Sexual Selection theory (Troisi, 2001), it seems as men's sleep is not as much affected by interpersonal stress compared to women. Building on a combination of the Sexual Selection theory (Troisi, 2001) and CATS (H. Ursin & Eriksen, 2004), men can be hypothesized to expect a positive outcome and mastery of situations, as they engage in less close relations, thus experience less interpersonal stress, and do not get as sensitized as women. Further, hypothesizing that they do not get sensitized, but rather develop a feeling of mastery to a larger extent than women, they will not experience as much arousal like women do in threats to social relations, and should report less sleep-problems compared to women. This train of thought are just speculations drawing on the two theories. However, the findings from logistic regression in this study, showing that the connection between interpersonal stress and sleep-problems are stronger for women, may indicate a truth to this.

7.5 Gender-differences in social support

7.5.1 Women report more emotional support than men, and are both receivers and providers of it

Men and women significantly differed on reports of emotional support. As there are distinctions between receiving and providing support (Helgeson, 2003), the emotional support statement measured perception of possibility to receive emotional support: 'I have someone I care about, with whom I can talk about my personal problems'. Also, women differed from men on the statement about performance demand in the BSRS, that says: 'there are people who make my life difficult because they expect too much care and support from me'. This statement may be interpreted as an indication of provision of support. Thus, findings here are consistent with earlier research discoveries that show that women more often than men are both providers and receivers of support

(Helgeson, 2003; Fuhrer & Stansfeld, 2002). The gender-differences can be explained with the Sexual Selection theory (Troisi, 2001). Close, supportive networks are more important for women, as it enhance their female fitness and ultimate goal of reproduction, so the result here is not surprising.

7.5.2 Instrumental support is more important for men than women in relation to nocturnal sleep-problems

For both men and women, there was found a significant correlation between emotional support and nocturnal sleep-problems, but there was no indication of gender-differences. However, for men, the bivariate analysis showed a significant, negative correlation between instrumental support and nocturnal sleep-problems, although the effect was small. Thus, this can be interpreted as perceiving a possibility to loan money if one needs to, lowers sleep-problems in men, or vice versa, enhances men's sleep-problems if they think that nobody will provide financial support if they need it. In accordance with the Sexual Selection theory, this is not a surprising finding, as men are more likely to strive to accomplish high status and acquire resources, such as financial help in this thesis, compared to women (Troisi, 2001). Hypothesizing that men perceived a low possibility of loaning money, this would result in sleep-problems, according to the negative correlation coefficient. This finding can be explained by CATS (H. Ursin & Eriksen, 2004), -men who perceive that they have nobody who can give financial help if they need it, sets off an alarm. If this perception lasts, the repeated exposure to this stressor can lead to habituation or sensitization, decrease or increase in response (H. Ursin & Eriksen, 2004). It is more likely that a sensitization happens, as this lead to increased arousal, and arousal is connected to sleep-problems (Hall et al., 2000).

7.5.3 Low emotional support is the strongest correlate of sleep-problems in men, but not in women

In the logistic regression analysis, however, emotional support was the strongest predictor of nocturnal sleep-problems for men, when controlled for interpersonal stress.

The correlation coefficient was negative, indicating either that men with a low degree of emotional support are more likely to have sleep-problems, or that men with a high degree of emotional support have less sleep-problems. For women, the only predictor of nocturnal sleep-problems was, as mentioned before, interpersonal stress. This may indicate that although men report having significantly less emotional support than women, men may be more affected by receiving, or not receiving emotional support, in relation to sleep-problems. As men according to the Sexual Selection theory (Troisi, 2001), are less likely than women to strive for close, supportive networks, they can be expected to have less providers of emotional support. Thus, if the few relations that provide men with emotional support, most often their wives as hypothesized in chapter 7.2, become troublesome and thus less supportive, it should according to CATS result in sleep-problems, as also was supported by the reported findings. Explained with CATS, a low degree of emotional support may be experienced as stress-full for men, and trigger an alarm, that further may result in sensitization or habituation. The negative correlation coefficient indicates sensitization, as arousal as mentioned, is related to sleep-problems (Hall et al., 2000). Thus, sleep-problems may be the outcome if men perceive low degree of emotional support. Further, as women according to the Sexual Selection theory (Troisi, 2001) strive for close, supportive networks, they may be thought to have a larger number of close persons compared to men, and thus, more social support, as was supported in the results here and in other studies (Kafetsios, 2007; Fuhrer & Stansfeld, 2002). As close, supportive networks are associated with increased female fitness according to the Sexual Selection theory (Troisi, 2001), one could assume that women reporting a high degree of support would be less stressed or to report few sleep-problems. However, as women report more interpersonal stress than men, it may be thought that negative dimensions in women's social relations have larger impacts than positive dimensions. Such a hypothesis may be explained by the Sexual Selection theory as it suggests that women are more affected by negative, interpersonal events than men (Troisi, 2001), as their goal is to obtain a close, supportive network, to enhance the ultimate goal of reproduction.

7.6 Ownership of a dog companion increases women's feeling of security

Both men and women tended to report a high degree of companionship across all variables, including the feeling of security variable. The protection a dog can provide one with, has been reported as one of the most important reasons for owning a dog (Wilson, 1991), so the finding is not a surprising result. Further, there were found significant gender-differences only on the security feeling variable. The Sexual Selection theory may be used to explain this gender-difference, as it argues that women are more interdependent than men, due to their strive for being part of a close, supportive network (Troisi, 2001). Thus, women can be hypothesized to depend more on a dog companion for security, compared to how much men would be hypothesized to depend on their dog, as they are more independent in accordance with the Sexual Selection theory (Troisi, 2001).

Although there were found no significant gender-differences in all but one of the variables on companionship with dog (table 5), there was found reversed signs in front of men and women's correlation coefficients, negative for male dog-owners and positive for female dog-owners, in relation to interpersonal stress (table 7). Also, there appeared to be a tendency for female dog-owners to report a negative relation between companionship and nocturnal sleep, while this relation appeared negative for male dog-owners (table 7). In addition, with logistic regression analysis, the full nocturnal sleep-problems model could explain more of the variance in sleep-problems for women (both dog-owners and non-owners) compared to men. Further, for the dog-owners, the nocturnal sleep model could explain more of the variance in sleep-problems (up to 14.7 % for women and 8.6 % for men), than the model for the non-owners could (up to 6 % for women and 3.6 % for men). These findings may suggest that there may be more to discover in companionship with dog, than this study were able to reveal. Companionship with dog may impact on sleep-problems and degree of interpersonal stress, and there may be gender-differences. However these are uncertain speculations based on non-significant results, and more evidence is needed before one can attempt to interpret findings by use of theories.

7.7 Strengths and limitations

Investigations that can expand our knowledge about the relations between social bonds and health have been requested (Mittelmark, 1999). This study stresses the importance of gender in these relations, and contributes to the existing knowledge about gender-differences, including interpersonal stress, sleep-problems and social support. It also contributes with further knowledge about gender-differences in the relation between interpersonal stress and sleep-problems, and also companionship with dogs, where gender-differences have rarely been studied, and therefore contributes with some new knowledge. However, this study has some methodological issues, that will be presented in the sub-chapters below.

7.7.1 Study-design

This study used a cross-sectional design. Such designs are useful to detect results in a quick and rather inexpensive manner, as data are collected only at one time during the data collecting period (Cozby, 2009). A cross-sectional design was appropriate in this study as it reveals status of phenomena or describes relations between phenomena at one point in time (Polit & C.T. Beck, 2008).

The study is a retrospective design (Polit & C.T. Beck, 2008), as the questions and statements asked for both present and past outcomes. Examples are respectively the interpersonal stress statements and the sleep-questions. This may according to Polit and C.T. Beck (2008) lead to unreliable responses, as events in the past may be difficult to remember in detail. However, the sleep-questions did not ask to remember how many times one had had sleep-problems during the last year, but offered alternatives, thus the responses should according to Polit and C.T. Beck (2008) be reliable.

A correlational design was used in the analysis. This means that one can only find associations in the interrelationship between the variables, and conclusions about causality can-not be drawn (Polit & C.T. Beck, 2008).

7.7.2 Sample

In this study, the sample was drawn from all men and women born between 1953-1957 (n=28.775). Sixty-three percent agreed to participate. Further, a randomized drawing of 50 % of the women and 50 % of the men were set to respond to the short version of the sleep-questions. Finally, this study included 4217 respondents, thus, it is possible that already when the remaining 37 % did not agree to participate in the HUSK-study, there were differences between the participants and the non-participants. This means that generalizability may be threatened (Polit & C.T. Beck, 2008). However, the sample size in this study sample is still large, and may be expected to give reliable results reflecting the population means (Polit & C.T. Beck, 2008).

7.7.3 Measurements

A number of studies on sleep relies on self-reports (Kim & Dimsdale, 2007), and therefore implicates causality. Nevertheless, a review by Kim & Dimsdale (2007) showed that also when studies use an objective measurement, polysomnography, the results after having experimentally induced psychosocial stressors, have been reductions in sleep efficiency and more awakenings. Thus, the use of self-reports of sleep-problems in this study may be justified.

Due to gender-differences in relational connections and health (Fuhrer & Stansfeld, 2002; Kafetsios, 2007), there may be different mechanisms at work, that may lead to erroneous conclusions due to methodology. Fuhrer and Stansfeld (2002) stress the importance of gender-fair measurements in research on social ties, with the example of the existing gender-differences in social support showing that men and women receive, perceive and report support differently. The BSRS is universal and thought not to be gender-specific. The project in the HUSK-study that studied social support, emphasized that there had been found gender-differences, and thus the variables can be thought not to be gender-specific also here. The nocturnal sleep-problems and daytime sleepiness variables are apparently not gender-specific. According to Mittelmark, Lingaas and Tell (abstract received by e-mail from Oddrun Samdal) on mental health promoting effects of canine companions in the HUSK-study, gender was not a significant factor.

The Bergen Dog Scale does not consider attachment to the dog, and the notion of attachment may be considered as more important than ownership of the dog (Smith, 2012; Peacock et al., 2012). Owning and having responsibility for the animal may become a burden, rather than an enjoyment (Peacock et al., 2012), hence it may result in ill effects on health, rather than an enhancement. Measuring attachment in addition may reveal a larger and more nuanced picture of the human-animal bond.

The difference in men and women's missing responses was somewhat surprising, and may indicate non-random missing data. By taking a nearer look at the questionnaires from the HUSK-study (Helseundersøkelsene i Hordaland, a; b), the questions and number of forms to fill out were the same, but they were presented in a different order for men and women. As an example, women had a much larger missing percent on the sleep-variables than men (on nocturnal sleep-problems, 14 % for women versus 1.8 % for men, and on daytime sleepiness, 19.9 % for women and 3.8 % for men). The sleep-questions appeared on page six in the women's questionnaires and page three in the men's. On the statements of social support and interpersonal stress, these are respectively on page four and six for women and for men, and also, men had a much larger missing percent on these questions than women (up to 2.9 % for women and 11.2 % for men on the interpersonal stress statements, and up to 2 % for women and 10.4 % for men on the social support statements). Although there is no certainty that, at least some, of the missing responses are non-random, this may represent a source of error and a threat to generalizability of the results (Tabachnick & Fidell, 2007). On how large the percentage of missing can be for a given sample size, there are no rules (Tabachnick & Fidell, 2007). As the sample size in this study is quite large (n=4217), the missing percentage may not represent a threat here. However, as an example, one may wonder if the results could have revealed an even larger gender-difference in nocturnal sleep-problems and daytime sleepiness if more women had responded to these questions.

Further, the structure of the four response alternatives on the statements about interpersonal stress and the social support-statements (see Appendix A; C) may represent a possible risk of error in responses, as they were placed side by side in two

rows (Cozby, 2009). As the alternatives goes from a high to a low degree of agreeing, the alternatives should either have been listed in a column or a row, so the meaning of the alternatives can be easily identified by the respondents (Cozby, 2009).

8 IMPLICATIONS FOR HEALTH PROMOTION AND SUGGESTIONS FOR FURTHER RESEARCH

Social ties have profound effects on people, and has been identified in the field of health promotion (Mittelmark, 1999). Working by the guidelines of health promotion, one should focus on creating supportive environments (WHO, 1986), and strengthen positive, social ties (Mittelmark, 1999), as social ties also can have adverse effects, such as social strain (Mittelmark, 1999).

Health promotion stresses the importance of building on theoretical principles and empirical findings (Mittelmark et al., 2008). Different ways of measuring the same phenomena is seen as useful as they complement each-other and may add invaluable knowledge to the greater picture, such as the use of multiple theories, quantitative versus qualitative research and cross-sectional versus longitudinal studies (Mittelmark, 1999). However, as longitudinal studies are very rare (Mittelmark, 1999), it is of great importance to stress the need for such. They may cost more, both in regards of finances and time and effort made by the respondents and the researchers (Cozby, 2009).

Based on results and discussions, the sub-chapter below presents the consequences for health promotion and suggestions for what future research should focus on.

8.1 Implications for health promotion

There are evidence for gender-differences in interpersonal stress, sleep-problems and social support, as also this study showed. These three variables and associations

between them, have all been connected to health or ill-health. Men and women seem to differ in what is important for them in a social context and within relations, thus, health promotion should take into account who their target-group are, when planning interventions. Gender-differences may as an example have impacts on who will benefit more from a certain type of intervention.

Discussions in chapter 7 concluded that although women report more interpersonal stress than men, this may be due to an inherited adaptation in women, and is not necessarily bad in itself, as long as it do not have ill effects to health. However, as women also were found to report more nocturnal sleep-problems than men, and interpersonal stress was correlated to nocturnal sleep-problems in women but not in men, this indicates an area in need for a health promotion intervention to be put into action. Further, men was found to be more affected by low emotional and instrumental support in relation to sleep-problems, and thus, interventions for improving people's sleep, should take into account that men and women differ on what affects sleep.

Women were found to be both providers and receivers of emotional support, reporting a higher degree of it than men and also reporting higher levels of interpersonal stress than men. These findings together support the notion that social support may become a burden for women. Further, men were less satisfied with the number of friends, which was discussed to be a threat to satiation in the need to belong, and thus may according to the theory result in ill health effects. These findings support health promotion's idea of creating supportive environments and strengthen positive, social ties. A supportive environment can be thought to diminish the burden of both providing and receiving support in women. It can also be hypothesized to diminish men's sleep-problems as it may bolster emotional and instrumental support. Also, it can be hypothesized that strengthening of positive, social ties may lower the interpersonal stress experienced by women.

8.2 Suggestions for further research

Women report more interpersonal stress compared to men, and this finding is supported in the literature. However, when studies have used both self-reports and physiological measures, women do not differ from men in terms of heart rate, blood pressure (Chaplin et al., 2008; Kelly et al., 2008) or cortisol-levels (Fehm-Wolfsdort et al., 1999; Stroud et al., 2002). These connections could not be investigated here, due to that the data are from self-reports only, but these findings indicate that using both self-reports and physiological measurements may enhance knowledge about gender-differences.

Past studies show that there are somewhat inconclusive evidence for who sleeps better when comparing men and women. An interesting finding is that studies using both polysomnography and self-reports show that women report worse sleep than men, although polysomnography shows that there are no differences. Hypothetically, it may be that women need more sleep than men. Thus, future studies on gender-differences in sleep-problems should use additional measurements to self-reports.

As men and women differ in reports of social support, measurements of support should take gender-differences into consideration. Also, this study asked for number of friends and did not take into account sources of support and who one is closest with. Other studies have found that men and women differ on these measures, and thus, these variables are relevant in future studies. The logistic regression analysis showed that nocturnal sleep-problems in men are best predicted by emotional support, rather than interpersonal stress as was shown for the women. As the model could only explain up to 3.6 % of the variance for male non-owners and up to 8.6 % of the variance for male dog-owners, there may be other, better predictors of nocturnal sleep-problems, for future studies to investigate.

The results for dog companionship did not reveal any significant results in relation to the other three variables in the thesis. On all companionship-variables, except for the statement about feeling secure in presence of one's dog, there were found no gender-differences. At first sight the lack of association with other variables, may appear

somewhat surprising as other studies have shown promising results in regard to companion-animal's positive advantages. Association in other studies, and lack of association here, may suggest that there are more to it, than this study could reveal, and that there is a need for additional studies on dog companionship, especially longitudinal studies. In a study by Kurdek (2009), results showed that in emotional distressing situations, dog-owners with highly positive feelings about their dog, turned to their dogs instead of family members and friends. This finding suggest that in addition to ownership, attachment with the animal may be of importance. Using attachment in addition to ownership could reveal a larger picture of the human-animal bond. Also, as companionship is a branch of social support, and dog companionship is a branch further from that, studies on companionship with dogs should in the future look for gender-differences, as studies on social support have shown that gender-differences exist.

Also, as suggested by Archer (1997), who found companion-animals to be substitutes for children and partners, argued that substitutions are often a result when people with fewer or less rewarding relations attribute human feelings and thoughts on to their pets, thus creating perceived relationships. The majority of both men and women in this thesis reported a low degree of interpersonal stress and sleep-problems, and a high degree of companionship and social support. Thus, a suggestion is that companionship with dog may have shown significant associations with the variables in the thesis if one had investigated participants with less rewarding relations, as animal companionship has had positive effects for older people, socially isolated and people with disabilities (A.M. Beck & Meyers, 1996).

As was touched upon in the introduction to chapter 8, longitudinal study designs as a complementation to cross-sectional designs, may be thought to add important knowledge, crucial for the effects of interventions. Longitudinal studies of interpersonal stress, sleep, social support and companionship with dog are rare commodities, if not to say completely absent, and therefore needed to increase the knowledge about social ties.

9 CONCLUSION

The objective of this study was to investigate gender-differences in some aspects of social ties and in the companionship between humans and dogs. The main findings are that men and women differ in reported levels of interpersonal stress, nocturnal sleep-problems and emotional support. Also, there are gender-differences in the relation between interpersonal stress, emotional and instrumental support and nocturnal sleep-problems, and which variables that best predicts sleep-problems. This finding may have implications for interventions in health promotion, as women may be thought to benefit more from interventions lowering interpersonal stress, and men from interventions increasing emotional support. Findings here also show that women are both providers and receivers of social support, compared to men, and thus support other studies. Companionship with dog was not associated with neither of the other variables, and the only significant gender-difference was that women feel more secure with their dog present. As a number of studies have shown positive results of companionship with animals, it was suggested that using attachment as a measure may reveal results in favour of dogs as companions.

Explanations for the gender-differences were discussed according to three theories, as being the result of different outcomes in the stress-process, evolutionary adaptations due to threats to belongingness, chances for reproduction and fitness of the sexes. Theories can both help to explain the gender-differences observed, and provide guidelines for health promoting interventions, tailored in accordance with the differences.

Longitudinal studies on social ties are rare, and may be a complement to what has already been found in cross-sectional studies. Such studies are more expensive and demands a larger amount of effort from both participants and the researchers. However, as social ties have such profound effects on health, conducting longitudinal studies may be profitable as better interventions may be executed, and in the long run increase the health benefits of everyone.

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11 APPENDIX

11.1 Appendix A: Interpersonal stress

Tenk på alle (barn, foreldre, søsken, ektefelle, samboer eller kjæreste, naboer, venner, kolleger eller andre du kjenner) når du besvarer følgende spørsmål:

T

Det er mennesker i livet mitt som jeg bryr meg om, men som misliker hverandre.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

Det finnes en person i livet mitt som trenger min hjelp, men jeg vet ikke hvordan jeg kan hjelpe.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

Det finnes en viktig person i livet mitt som ønsker å støtte meg, men som ofte sårer meg istedet.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

Det finnes mennesker som jeg må være sammen med nesten daglig som ofte hakker på meg.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

Det finnes personer som gjør livet mitt vanskelig fordi de ønsker for mye omsorg fra meg.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

Jeg har noen jeg bryr meg om, som forventer mer av meg enn jeg kan klare.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

11.2 Appendix B: Sleep

SØVN

Hvor ofte er du plaget av søvnløshet?

Aldri, eller noen få ganger i året.....

1 - 2 ganger i måneden.....

Omtrent en gang i uken

Mer enn en gang i uken.....

T

Har du siste året vært plaget av søvnløshet slik at
det har gått ut over arbeidsevnen?.....

JA NEI

11.3 Appendix C: Social support: emotional and instrumental

Tenk på alle (bam, foreldre, søsken, ektefelle, samboer eller kjæreste, naboer, venner, kolleger eller andre du kjenner) når du besvarer følgende spørsmål:

T

Jeg har noen jeg bryr meg om, som jeg kan snakke med om mine personlige problemer.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

Det finnes minst én person som ville kunne låne meg penger for en kortere tid.

- | | |
|--|---|
| <input type="checkbox"/> Stemmer helt | <input type="checkbox"/> Stemmer ganske bra |
| <input type="checkbox"/> Stemmer ikke særlig | <input type="checkbox"/> Stemmer slett ikke |

11.5 Appendix E: Approval from the Regional Ethics Committee (REK)

UNIVERSITETET I BERGEN

Det medisinske fakultet

REGIONAL KOMITE FOR
MEDISINSK FORSKNINGSETIKK
HELSEREGION III



UNIVERSITY OF BERGEN

Faculty of Medicine

Bergen, 10. september 1997
Jur. 311/97-64.97

Professor Grethe S. Tell
Institutt for samfunnsmedisinske fag
Seksjon for forebyggende medisin
Armauer Hansens hus
Haukeland sykehus

Ad. prosjekt: Helseundersøkelsen i Hordaland (HUSK): Paraplyprosjekt.

Det vises til ditt brev dat. 13. august 1997 med svar på komitéens synspunkter vedrørende dette prosjektet.

Den regionale komité for medisinsk forskningsetikk fikk framlagt brevet i sitt møte den 28. august 1997. Komitéens innvendinger og merknader er nå tilfredsstillende ivarettatt.

Paraplyprosjektet er endelig klart fra komitéens side. Vi ønsker lykke til med gjennomføringen av prosjektet og minner om at komitéen setter pris på en sluttrapport, eventuelt en kopi av trykt publikasjon når prosjektet er fullført.

Vennlig hilsen


Olav Dahl
leder


Kjell O. Heggstad
sekretær

11.6 Appendix F: Approval from the Norwegian Data Inspectorate

Datatilsynet



Statens Helseundersøkelser
Postboks 8155 Dep

0033 OSLO

Deres ref
370/97 AT/eh



Vår ref
97/1504-3 MWJ/-

Dato
08.09.97

KONSESJON TIL HELSEUNDERSØKELSEN I HORDALAND (HUSK-REGISTERET)

Vi viser til Deres søknad av 27.05.97.

Datatilsynet finner å kunne gi tillatelse til opprettelse av et register i forbindelse med Helseundersøkelsen i Hordaland. Konseksjonen gis med hjemmel i personregisterlovens § 9.

Nedenfor følger en nærmere redegjørelse for noen av punktene i konseksjonen. Det dreier seg i hovedsak om to forhold. For det første vilkårene for opprettelsen og bruk av HUSK-registeret. For det andre vilkårene for kobling av HUSK-registeret med personopplysninger fra andre undersøkelser eller registre.

1. HUSK-registeret:

Det er en forutsetning for konseksjonen at all deltakelse i undersøkelsen er frivillig, og at all registrering baserer seg på et informert skriftlig samtykke fra deltakerne. Datatilsynet finner det svært viktig at deltakerene får full informasjon om alle deler av prosjektet. Bare på denne måten kan deltakeren avgi et reelt samtykke.

Registeret vil inneholde til dels svært sensitive opplysninger. Opplysningene skal oppbevares i uoverskuelig fremtid og skal brukes i sammenhenger som ennå ikke er klarlagt. Dette bør deltakerne gjøres kjent med. Etter Datatilsynets oppfatning vil et samtykke basert på et grundig informasjonsskriv, som tar opp alle sidene ved prosjektet, kunne avhjelpe eventuelle betenkeligheter som knytter seg til opprettelsen av et register med dette innhold.

Det må utarbeides et informasjonsskriv inneholdende minimum de følgende punkter:

- Hvem som er ansvarlig for undersøkelsen.

Postadresse:
Postboks 8177 Dep
0034 OSLO

Konseksjons-
Tillegg 3
0122 OSLO

Telefon:
22 42 19 18

Telefax:
22 42 23 50