Perceptions of Sleep Quality While Co-Sleeping.

Morgan Clement

Allegheny College

4-1-13

Pledge:_____

First Reader:_____

Second Reader:_____

Acknowledgements:

I would like to acknowledge my family first for their unconditional love, support, and encouragement. They have been my rock when I have been lost in a sea of misery, loneliness', and new independence. I know they will always be there for me and it was great having them cheerlead for my success. Specifically, I would like to acknowledge my sister and our newfound friendship. We continuously have to search for it but when we have found it, it is a wonderful companionship different from peers and parents. Secondly I would like to thank Professor Deborah Dickey for putting up with me for a whole year. Thank you for your guidance and support even when my ideas were out there and not feasible. Even though I lost motivation when I could no longer do an experiment, it was less panic attack evoking. Last but not least, I would like to thank Professor Sarah Conklin for inspiring me and teaching me about sleep. Thank you for pushing me to do my best and keeping me on task. Without your enthusiasm and engaging classes, I would not have been as interested in sleep.

Table of Contents

Acknowledgements……2

Table of Contents……..……..3

Introduction……...……...4

Sleep……6

Quality and Quantity……..13

Factors that impact sleep quality when alone……20

Factors that impact sleep quality in couples……..25

Cohabitation versus Sleepovers…….28

Objective and Subjective Measures……...38

Relationships' impact on sleep quality during sleepovers and cohabitation…….45

Analysis and conclusion……55

References……...……...61

Introduction:

Does the type of relationship that couples have impact their sleep quality when sleeping together? Is the growing trend of co-sleeping impacting sleep quality of couples? These are the questions that have been raised by studying sleep with bed-partners. Specifically, Troxel, Robles, Hall, and Buysse's (2007) review concludes that despite the changes in individual sleep structure when co-sleeping, married couples reported poorer sleep quality without their spouse. Troxel et al.'s (2007) review suggests that most married people perceive better sleep quality when sleeping together rather than alone, even though they showed less "restorative" sleep. Women report different reasons then men for their better sleep quality. Furthermore, despite objective data suggesting otherwise, couples subjective reports are that they sleep better together than alone. The contradictory data from both test types suggests that there is an unknown element that playing into perceptions of sleep quality that neither assess. To study the factors that have made for the growing trend of co-sleeping, will hopefully divulge knowledge on these ideas.

To begin this inquiry, this study will begin with lit4rature on sleep from a variety of perspectives. Sleep, the largest common variable, and the most essential human need will briefly be discussed first. Next, the importance of and difference between sleep quality and quantity will be reviewed. Section three and four will review factors that affect sleep quality alone and factors that affect sleep in couples. Cohabitation and sleepovers will be defined, differentiated, and related to sleep quality in section five. This will be followed by the discussion of objective and subjective measures that are used to measure sleep quality. Section seven will discuss relationship type and quality since these factors are proposed to interact with sleep quality during bed-sharing. The final section will be a discussion and conclusion of all of these variables. These

will then be integrated with aspects of each used to discuss and understand the literature that is published on the questions shaping this body of research.

Section 1: Sleep

Human beings spend approximately one third of their life in an unconscious state called sleep (Siegel, 2003). Worthman and Brown (2012) report that up to forty percent of American adults sleep less than seven hours a night; they also report a decline in overall sleep time over the last decade. When someone is asleep, it is hard to name specific traits that tell us that they are sleeping, though we believe it is observable. During sleep, observers notice that there is a lack of responsiveness and alertness. Sometimes people notice a change in breathing patterns, twitching, or other similar sounds. Furthermore, some technology measures the loss of muscle tone, a steadying of the heart rate, and typically a lack of eye movement (except in rapid eye movement (REM) sleep) in a sleeping being. Sleep is also characterized by stages and spindles visible on a graph when using polysomnography or by time spent not moving measured by atigraphy, also visibly displayed.

Although there is no singular proven reason to sleep, the literature clearly shows that humans cannot properly function without it. “Diminished or disrupted sleep also has profound effects on cognitive performance, with particularly marked effects for tasks related to frontal lobe functioning, such as sustained attention, working memory, response inhibition, verbal fluency, and cognitive flexibility. These cognitive skills are critically important for problem-solving and emotion regulation” (Troxel, 2010, p.582). Small amounts of sleep loss every night cause humans to have poorer working memory, reasoning skills, decision making, and language (Thomas, Sing, Belenky, Holcomb, Mayberg, Dannals, et al., 2000). Chronic poor sleep quality also leads to impaired learning and memory abilities and compromised immune functioning (Tworoger, Davis, Vitiello, Lentz, and McTiernan, 2005). Troxel (2010) summarizes other

studies that additionally suggest a correlation of self-reported poor sleep quality with cardiometabolic outcomes.

Without adequate sleep, humans are not fully alert and have a harder time paying attention (Cheng, Shih, Lee, Hou, Chen, Chen, Yang, and Yang, 2012). People who are regularly not sleeping enough have a reduced ability to learn material, which is possibly connected to the lack of alertness and attention (Tworoger, Davis, Vitiello, Lentz, and McTiernan, 2005). Attention deficits in the sleep deprived are illustrated by a negative correlation between sleep loss and performance on attention assessments; subjects may also show a slowing of reaction time to a stimulus on vigilance tests (Ratcliff & Van Dongen, 2011). These are only a few consequences of inadequate amounts of sleep even which illustrate its importance.

Declining physical and mental performance are associated consequences of insufficient sleep. Human happiness as an overall category under mental performance is also correlated to proper sleep (Hicks & Diamod, 2011 and Troxel, Buysse, Hall, & Matthews, 2008). There are many explanations associated with the correlations between proper sleep and happiness. Some scientists hypothesize that sleep helps regulate emotions by giving synapses time to check sensitivity and balance neurotransmitters because sleep requires less activity in these systems (Siegel, 2003). Neurotransmitters are a regulator of emotions and can influence feelings of self-esteem through mood which is a closely correlated factor in feelings of happiness. The correlation can be seen by having high self-esteem leading to greater happiness and low self-esteem sometimes leading to depression (Baumeister, Campbell, Krueger, and Vohs, 2003).

Two emotional ramifications of sleep deprivation are seen by increased feelings of irritability or moodiness, both of which would hinder feelings of happiness (Pilcher & Huffcutt, 1996). Serotonin's impact on emotional states can be observed in the success of serotonin reuptake inhibitors when used as medication for depression. A hypothesis is that the monoamine circuits, for example norepinephrine and serotonin which both have a role in emotions, turn off during REM sleep "reset" themselves (Siegel, 2003). Lastly, Kahn-Greene, Lipizzi, Conrad, Kamimori, & Killgore's (2005) study conveys that sleep deprivation negatively impacts one's ability to control aggression, and those who are sleep deprived become frustrated more easily.

The different stages of sleep that compose one's sleep architecture are identifiable in the output of polysomnography, a machine that measures brain waves (Adnane, Jiang, & Yan, 2012). Sleep architecture is composed of four different states of sleep that are cycles through, each classified by their wave type, like alpha, delta, and theta. Stages three and four characterize deep sleep and stages one and two that of light sleep (Krystal and Edinger, 2008). One of the stages is rapid eye movement (REM) sleep, which is a particular state of sleep that is deeper than the others and where dreams are reported to happen. It is crucial for living, as illustrated by the way that humans spend more time in REM after inadequate sleep to make up for it. Additionally, not enough sleep breaks up the cycle through stages, which decreases time spent in REM or interrupts it (Siegel, 2003). Siegel (2003) develops the idea that REM sleep works to develop synaptic connections that are the source of instinctive reactions. Additionally, it is believed that non-REM sleep gives neurons a chance to recharge and repair damage caused by daily use (Siegel, 2003).

Sleep, for reasons like happiness, top performance and more, is crucial for optimal functioning. But, there are many reasons that humans do not sleep well, all of which are

detrimental to wake-time performance. Reasons can range from physical, to psychological, to social. Sleep disorders are a specific example of physiological factors that degrade sleep quality; they include somnambulism, insomnia, night terrors, narcolepsy, and sleep apnea (Klob & Whishaw, 2009). Other reasons that people do not experience adequate quality sleep are physical, like body mass index and breathing difficulties; other reasons are specific to each person's temperament, like stress, comfort, extraneous sounds, setting, and familiarity (Rosenblatt, 2006 and Tworoger et al., 2005). Other factors that Cheng et al. (2012) identified as related to poor sleep quality, besides stress, are lack of time management skills, consumption of tea, lesser social support, skipping breakfast, neurotic tendencies, and internet addiction.

A main sleep disturbance listed is body mass index; the reason that sleep is correlated with body mass index (BMI) is because weight can cause discomfort and obstruction or pressure on airways. This connection can be seen in obese patients who are more likely to report poorer sleep quality due to their obesity being a sleep disruption. Additionally, those with higher BMI's are also at higher risk for sleep apnea and other related sleep diseases (Tworoger et al., 2005). Sleep apnea is a physical impairment to sleep because it involves patients being awoken from slumber by inability to breathe. By awakening, the sleep architecture is broken up and therefore so is overall sleep. This disorder is also thought of as a "disease of listeners" since bed-partners are often woken up by it as well (Troxel, 2010).

Stress, another factor that impacts sleep, can prevent restful and deep wave sleep. Deep wave sleep includes stages three and four; they characterize sleep that is that hardest to wake someone up from. Worry and repetitive thinking can prevent the onset of sleep be activating the autonomic nervous system and emotional distress, both of which trigger a cascade of subsequent hormones (Takano, Iijima, Tanno, 2012). Other causes for disturbed sleep are common place in

college students, like stress, internet addiction, increase of tea consumption, and poor time management skills (Cheng et al. 2012). For example, at one Canadian University about half of the first year students experienced poor sleep (Galambos, Dalton, and Maggs, 2009), of which Cheng et al. (2012) defined as having a Pittsburgh Sleep Quality Index, a subjective measurement of sleep quality, score lesser than or equal to six.

First semester of college is a "difficult" experience for most students because of all of the adjustments that they have to make. The first semester is when college students struggle the most adjusting their sleep patterns. There are new factors that are related to sleep like "…new academic demands, financial stress, and experimentation with risk behaviors such as drinking. Students may experience mental health problems including sleep disturbances and inadequate amounts of sleep" depending on their coping abilities (Galambos, Dalton, and Maggs, 2009, p.741). The connection between college and the development of mental health problems sheds light on how college and sleep can specifically affect students psychologically.

The first semester of college is for many, their first time living on their own and away from hometown friends for an extended amount of time. During the first semester students must work to make new friends and find a social niche in the community. Another factor that may contribute to sleep difficulties are social experiences. Socially involved and connected students are better sleepers than their peers who are less socially active (Galambos, Dalton, and Maggs, 2009). Since sleep has a connection to social interaction, this too draws attention to a psychological aspect of sleep.

It has become common knowledge that humans are social animals (Myers, 2013) but it is not as commonly known that sleep can be a social function for couples (Rosenblatt, 2006).

Troxel (2010) states that sleep is a part of a social context because “for many, this critical health behavior [sleep] is shared with a partner” (Troxel, 2010, p.583). Oxytocin, a neuropeptide that is released to induce contractions and milk letdown in nursing mothers, plays an important role in sleep and rest-wake patterns as well as in bonding and attachment behaviors (Troxel, 2010). This neuropeptide is also released during non-sexual touching between two humans, encouraging attachment.

Troxel (2010) draws the conclusion that sleep is a social behavior through other research that considers sleep to be a fundamental attachment behavior since it requires less vigilance and awareness. Therefore, as social animals, there appears to be a connection between sleep, a biological need for mammals, and social interactions. The raising trend of co-sleeping could therefore be related to social interactions, considering the connection between sleep and social interactions. Co-sleeping could then possibly help college students obtain better sleep quality by fulfilling social needs.

Rosenblatt (2006) claims there must be a reduction of vigilance and awareness for sleep to occur; the reduction of these two factors is influenced by the presence of others and if the other helps create a sense of security and trust that allows for the down regulation to happen (Troxel, 2010). Historically, humans have found these feelings of safety and security through their social groups and connections. Women, needing more emotional and physical security due to the history of reliance on men as protectors from predators, may benefit more from a significant other and co-sleeping because of increased comfort and “protection” (Troxel, 2010 and Rosenblatt, 2006). In most human societies and cultures, women have typically relied on men for security and protection, therefore, the presence of a man helps a woman down regulate her monitoring because of a better sense of safety and security both physically and mentally.

"Sleep is constructed as a form of social behavior in many societies" an example of which is Egypt (Worthman and Brown, 2007, p.124). In these societies co-sleeping is respected and expected because it is looked upon as important to the basis of relationships and emotional connections; in the cases of regular co-sleeping there is also a higher prevalence of napping (Worthman and Brown, 2007). In Worthman and Brown's (2007) literature review, they state that social life quality directly influences sleep quality. The specific factors they listed in their review that are associated with sleep disturbances are attachment anxiety, marital conflict, family stress, stress levels in adolescence, and loneliness among adults. Lastly, the psychological impact of poor social relationships may disrupt arousal-regulating mechanisms that also control sleep wake patterns and thereby cause sleep disturbances (Worthman and Brown, 2007). Additionally, Troxel, Robles, Hall, and Buysse (2007) reviewed research that found social isolation to cause sleep disturbances. Marriage protects adults from these feelings of social isolation, which could help lead to better sleep quality.

This basic introduction to sleep architecture and contributing factors to the quality of sleep forms building block for all the following sections. Though there might be some questions about details and specifics from this, many of these topics come up again in other sections and will hopefully answer what this section did not. This short review of literature prominent in my conclusions and research illustrates the essential functions that sleep plays in people's lives. It also alludes to a strong correlation between the biological need for sleep and the social functioning as well as emotional well-being of the sleeper. Sleep quality and quantity are two different ways that sleep is assessed and will be covered in the next section.

Section 2: Quality vs. Quantity

Quality and quantity not only mean different things for perceptions of sleep but they are also measured differently. For the purpose of this inquiry, it is important that the relationship between the two is distinguished. Quality, the value of sleep being obtained, can be measured in a variety of ways using subjective or objective measures. It may be measured by either the sleepers point of view or by analyzing data on variables associated with such. Quantity, how much of said variable, is typically measured in terms of time spent asleep and therefore is much simpler to measure. Quantity can also be measured by both the sleeper who self-reports time or through analysis of mechanically gathered data.

Quality and quantity are related in the way that they both are important to seep and are two ways that sleep is standardized. Time asleep and how "good" that time was both have to be considered to assess overall satisfaction of sleep. It is significant to note that even though they are related, one does not cause the other. For example, a lot of sleep, quantity, does not mean that it was "good" sleep, quality. Pilcher, Ginter, and Sadowsky (1996) researched the difference between quality and quantity and found that each is correlated with different health standards.

Sleep quality has a variety of definitions and standards by which is can be measured. Three different studies define sleep quality in different ways which then impacts the methods used to assess the quality. In their study, Krystal and Edinger define it as the "collection of sleep measures including total sleep time, sleep onset latency, degree of fragmentation, total wake time, sleep efficiency, and sometimes sleep disruptive events such as spontaneous arousals or apnea" (2008, p.S10). Souders, Mason, Otto Valladare, Bucan, Levy, Mandell, Weaver & Pinto-Martin (2009) used fewer measures and defined sleep quality by how many times the participant

woke up, how long it took them to fall asleep, how efficient they were at sleeping, how much they moved, and how long they slept. By defining sleep quality by how rested the sleeper reported to feeling Dittami, Keckeis, Machatschke, Katina, Zeitlhofer, and Kloesch (2007) were able to use sleep diaries to measure such.

Definitions of sleep quality are important because they set up guidelines that are used to assess the data with. In many studies the assessment of quality includes measures of quantity. In addition to all of the definitions mentioned above are certain variables that can be studied by specific tests. Meadows, Arber, Venn, Hislop, and Stanley (2009) used the following variables to assess sleep quality: preferred bed time, actual bed time, wake up time, and the difference between the preferred and actual bed time. In this study by Meadows et al. (2009, abstract), the actigraph enabled the use of objective measures of "sleep latency, actual sleep time, sleep efficiency, wake bouts, and light/dark ratio" (the difference between amount of daytime movement and nighttime movement). "Actigraphy is best thought of as a measure of sleep quantity or timing rather than as a measure of the quality or depth of sleep" in this study depth of sleep refers to sleep quality (Krystal and Edinger, 2008, pg. S13). The overlap of variables between objective and subjective measures is logical considering their correlation with sleep quality.

Objective measures analyze data about sleep and therefore must look at the variables that are correlated with sleep quality instead of personal reports. In this way, these measures can be more scientifically accurate. With the advancement in technology, different variables are now being used than before. Some objective measures define sleep quality by "sleep onset latency, total sleep time, wake time after sleep onset, sleep efficiency, and number of awakenings" all of which correspond with subjective measures (Krystal and Edinger, 2008, p. S10). One way to

gather objective data is through the use of polysomnography which assesses the length of specific stages of sleep that have also been associated with sleep quality. Stages of sleep include one, two, three, and four which includes REM where dreams (Krystal and Edinger, 2008).

One distinction between sleep quality and quantity lies in people's perceptions of their sleep. For example, those suffering from insomnia often underestimate the amount of time they spend sleeping, although this is not a specific characteristic that separates insomniacs from normal sleepers. By believing that they are getting less sleep, patients often feel like they are suffering more from this sleep disturbance (Means, Edinger, Glenn, and Fins, 2002). In non-diagnosed and non-complaining sleepers, a similar disjunction between actual sleep and perceived sleep time can be seen. Some people complain more about their sleep onset latencies, wakefulness throughout the night, total amount of time spent asleep, and times disturbed even when all of these factors are favorably comparable to those who do not complain. The most common hypothesis for this is that ""sleep quality" may reflect different aspects of sleep among people" (Krystal and Edinger, 2008, pg. S13). The difference between people's perceptions of their sleep must lie in variables that are not tested or looked at or individual differences in temperament.

Sleep studies have found many different relationships between quality of sleep and reported health, between little sleep and increased sleepiness, and between poor sleep quality and increased sleepiness. Poor sleep has been associated with higher risk for gastrointestinal and cartiovascular diseases and problems. Poor sleep quality has been connected to higher rates of complaints among the sleep disordered, the clinically disordered, and shift work groups (Pilcher, Ginter, and Sadowsky, 1996). Hicks and Diamond (2011) describe how cortisol, a stress hormone, also serves for the "cortisol awakening response" by being at the highest levels thirty

minutes after waking up. Therefore, there are a variety of ways that sleep is related to health just like there are a variety of ways that sleep can be adversely impacted.

Sleep quality is affected by many things including day time habits/patterns, bed-time routines, social interactions, stress level, and comfort (Rosenblatt, 2006). Habits and routines are important when it comes to sleep because they help people coordinate their internal clocks with day time activities. Through the intentional development of helpful habits and certain practices, people can train themselves to sleep better by attending and responding to environmental cues that signal sleep and wake cycles, also known as zeitgebers (Seigel, 2008). Due to the association between sleep habits and sleep quality, this is a variable that distinguishes subjective from objective measures. This is because objective measures cannot accurately assess bed-time habits.

The wide range of variables that impact sleep quality and quantity in young adults can be seen in Cheng, Shih, Lee, Hou, Chen, Chen, Yang, and Yang's (2012) study. They found that "poor sleep quality was significantly associated with undergraduate students, female gender, skipping breakfast, tea drinking, a higher tendency toward internet addition, poor social support, [and] higher neuroticism" (2012, p.270). Their study adds that the amount of sleep may also be affected by feelings of social inclusion and support (2012). Undergraduates, the demographic this study is representing, report the most amounts of sleep disturbances, ranging from nineteen percent to fifty-seven percent. This study by Cheng et al. (2012) also found evidence that associated poor sleep quality to poor academics. Another example is from Galambos, Dalton, and Maggs' (2009) who found that poorer sleep quality the night before leads to more social interactions and decreased schoolwork time. They too found that better sleep quality also leads to less perceived stress and more positive affect or emotions (2009). As these two examples illustrate, sleep quality in the undergraduate population is correlated with a variety of factors.

Some of these factors allude to possible causes for the increase of c-sleeping but they may also be affected by this populations' culture

Attachment theory illustrates another factor that can affect sleep quality. There are "associations between measures of attachment insecurity (particularly attachment anxiety) and various dimensions of subjective sleep quality" state Troxel, Robles, Hall, and Buysse (2007, p.394). In summary, attachment theory proposes that our ability to trust other people starts developing in early interactions with caregivers. These interactions help children form cognitive models of relationships. This cognitive relationship model impacts one's self image, self-confidence, and stress coping abilities. Recently this theory has been applied to adults in romantic relationships. The different types of attachment lead to different types of romantic relationships: secure, anxious, preoccupied, dismissive-avoidant, and fearful-avoidant. One's attachment anxiety can have similar impact on sleep quality, either fostering and supporting sleep quality or hindering such. In particular, those who are attachment insecure suffer from poorer sleep quality due to lessened abilities to down-regulate vigilance and awareness. Lower measures of subjective sleep quality are shown in those who show attachment anxiety but not attachment avoidance (Troxel, Robles, Hall, and Buysse, 2007).

Attachment can influence how comfortable a sleeper feels when sleeping with others. A number of different studies show that comfort while sleeping is an important factor in the quality of sleep obtained (Rosenblatt, 2006). Being comfortable, defined by personal preferences, helps people sleep well and feel more rested. Young adults who have sleepovers with their significant others report that it is comforting and that increased comfort improves the quality of sleep they experience (Lonardo, Manning, Giordano, Longmore, 2010). For example, results from Dittam, Keckeis, Machatschke, Katina, Zeitlhofer, & Kloesch's (2007) study illustrated that subjective

sleep quality assessments were lower in men when sleeping alone. Comfort has been reported from the enjoyment of warmth and snuggling, to sexual intimacy and safety and security (Jamison & Ganong, 2011). This seems to indicate that bed-sharing may be an influential factor improving perceived sleep quality for men.

Adult touching can increase comfort according to reports from sleep diaries and personal testimonies (Rosenblatt, 2006). Rosenblatt (2006) states that intimacy gained from touching increase the feeling of comfort. Comfort when sleeping together has been shown to positively impact partner's sleep quality in a variety of studies (Rhodes, Stanley, & Markman., 2008; Stritof & Stritof, 2011; Troxel et al, 2008; Diamond, Hicks, & Otter-Henderson, 2008; Hale, 2010; and Hicks & Diamond, 2011). Comfort can by either physical or psychological.

Rosenblatt (2006) iterates that there must be a reduction of vigilance and awareness for sleep to occur, the reduction of these two factors is influenced by the presence others who are able to help create a sense of security and trust that allow for down regulation (Troxel, 2010). In the past, humans have found feelings of belonging in their social groups. The difference between the genders is that women may be benefited more from a significant other (Troxel, 2010). From an evolutionary perspective, women have had to rely on men for protection and could therefore sleep better with a male bed-partner. Gender can also be an influencing factor on sleep quality in more modern ways, as Cheng, Shih, Lee, Hou, Chen, Chen, Yang, and Yang's (2012) review suggests. Women have been found to report needing more sleep than males and reporting more daytime sleepiness. They have also been suggested to have more trouble falling asleep and staying asleep than males (Cheng, Shih, Lee, Hou, Chen, Chen, Yang, and Yang, 2012).

When asked about overall sleep quality, people do not think of the individual factors that play into their perception of sleep quality. What most likely comes to mind are the most memorable and recent experiences, either positive or negative (Myers, 2011). Comfort is correlated with temperature, physical support, stress and anxiety levels, regularity, habits/routine, and familiarity (Rosenblatt, 2006 and Troxel, 2010). Unless a person is extremely sleep deprived, it is difficult to fall asleep in certain situations or places like during dinner or a conversation, at an unfamiliar place with nothing comforting, or in a position that is unnatural or not relaxed. Comfort is assessed in the Pittsburgh Sleep Quality Index with questions about temperature, time spent in bed, bed-partners and more. Because people do not typically think of comfort as an individual factor in their overall assessment of sleep quality can differ from the specific assessments of comfort, a significant aspect of sleep quality.

Some aspects of sleep are able to be quantified, like number of awakenings at night, how long it took to fall asleep, and how long sleep lasted. These are able to be quantified because a number can be estimated from how rested a person feels and how long they believe they slept for according to their bed and wake times. Sleep quality is measured with personal views on sleep by looking at depth of sleep, effectiveness/restfulness of sleep, general satisfaction with sleep. An aspect that quantifiable measures miss is psychological distress or satisfaction with sleep which is an important aspect of sleep quality since quality is related to personal views on sleep (Pilcher, Ginter, and Sadowsky, 1996).

Accordingly, Pilcher, Ginter, and Sadowsky (1996) conducted a study on the differences between sleep quality and sleep quantity. One significant finding was that quality of sleep was more highly correlated than with reported health and well-being than quantity; for example, poor sleep quality as measured by the Pittsburgh Sleep Quality Index was associated with more health

complaints. They also found that sleep quality and quantity were not related to increases of sleepiness as measured by the Epworth Sleepiness Scale but that increased reports of sleepiness on the Stanford Sleepiness Scale were correlated equally with sleep quality and quantity. Sleep quantity did not correlate with bed times or measures of health. Sleep quality might account for health reports but sleep quantity and quality are relatively equal when it comes to reports of sleepiness. “Thus, the components of sleep quality other than simply quantity (e.g. the number of awakenings at night, general satisfaction with sleep) appear to be largely responsible for the relationships between sleep quality and measures of health, well-being, and sleepiness” (Pilcher, Ginter, Sadowsky, 1996, p.592).

This sections purpose was to distinguish between quality and quantity of sleep. The research illustrates that quality can be more important than quantity, though it is not always focused on in such a manner. But, quality of sleep is only one factor among many that impact sleep quality. The impact that comfort can have is typically overlooked and may be significant to the sleeper being able to get enough sleep as well as quality. With the development of technology and advances in the studies on sleep, better measures will be developed. These measurements will help researchers have more tools to gather data and understanding the factors important to sleep quality. As sleep studies continue to identify new factors related to quality of sleep it may be that our understanding of the role that length of sleep (quantity) plays in overall wellbeing will be redefined.

Section 3: Factors that impact sleep quality when alone

People can either sleep alone or with one or more partners. In this section, the factors that impact sleep alone are outlined. Some of these factors may also impact sleep when not alone, either in the partner or sleeper. Factors range from physical, to psychological, to societal.

A specific physical factor that impacts sleep quality when alone is body mass index (BMI). Those who have higher BMI's are at more risk for obstructive sleep apenea (Mortimore, Marshal, Wraith, Sellar, Douglas, 1998) snoring, and more awakenings due to breathing difficulties (Troxel, 2010). BMI is a measurement used to identify obesity. A high BMI usually indicates a person is obese and the extra fat puts more weight on the chest (Mortimore et al., 1998). The extra weight restricts the ability of the rib cage to expand and the diaphragm to drop and pull air in the lungs. Even those who are not over weight but have excess fat in their soft palate also suffer from snoring and/or obstructive sleep apnea (Mortimore et al., 1998).

High stress levels prevent sleep onset and continuation difficult. Stress is correlated with cortisol levels and the hypothalamic adrenal pituitary axis (HPA). The HPA axis refers to a series of events in which cortisol, a chemical, is released and causes sympathetic nervous system activation. The first step in the axis is indicated by levels of corticotropin-releasing hormone. This hormone has been shown to affect the brainstem and hypothalamic arousal systems to promote wakefulness. Other studies conclude that sleep inhibits the HPA axis, and that insomnia increases activity in the axis (Troxel, Robles, Hall, and Buysse, 2007).

Comfort and setting both contribute to down regulation of vigilance, a prerequisite to sleep. As mentioned before, comfort is correlated with temperature, physical support, stress and anxiety levels, regularity, habits/routine, and familiarity (Rosenblatt, 2006 and Troxel, 2007, 2008, 2010). Temperature has recently been noticed by the media as an important factor for

amount of sleep obtained. This can be seen in the recent publications in *Cosmopolitan* and *The New Yorker*. Both published articles this year related to sleep and mentioning the importance of sleeping in a cooler environment. They claim that with the new habits of wearing heavy pajamas and newer mattresses keep the body too warm while people sleep (Kolber, 2013). *Cosmopolitan* particularly claims that keeping the body too warm makes for poorer sleep quality, looking less rested and older (1-18-2013, 6 Reasons You Should Sleep Naked).

These personal factors can prevent or disturb sleep in a variety of ways. Each person has their own preferences for setting, temperature, and habits. Also, BMI and sleep apnea can be genetic and therefore out of an individual's control. In addition to personal preferences and practices, the society in which American's live also contributes to sleep disturbances. Americans are continuously busy and have lots of distractions.

In today's fast paced society sleep is becoming a less desirable human need. With the integration of technology into our lives, sleep quality and quantity are impacted. Many people can now avoid going to sleep with use of technologies that create artificial light. Historically, when these technologies did not exist, people were forced to sleep in the hours of no daylight. Another aspect of current day society is technology which is always interfering with attention. Computers and internet especially prevent sleep onset. Cheng et al. (2012) demonstrated how the internet and addiction to, can hinder sleep in their study on college students. Even those who are not American, and therefore are not as attuned to technology, show a delay in sleep onset when there is an increase of television time or use of computer and internet surfing (Worthman and Brown, 2007).

Technology developments have lead to specialists' abilities to identify and treat sleep disorders. Sleep disorders are naturally occurring and hinder sleep quality. These disorders include insomnia, somnambulism, narcolepsy, sleep apnea, restless leg syndrome, and more (www.helpguide.org). Some of these sleep disturbances are genetic others are not. All sleep disorders prevent sleep, each in their own way. One of the most costing sleep disorders societally is insomnia due to its long term effects on people and their productivity (Troxel, 2010).

Two contributing factors to insomnia are repetitive thought and worry which work to maintain the sleeping disorder. These two contribute to inabilities to sleep because they keep the mind from reducing vigilance and attention. "Excessive worry and rumination regarding getting enough sleep and the impact of the sleep disturbance trigger autonomic arousal and emotional distress…" (Takano, Iijima, Tanno, 2012, p.779). Takano, Iijma, and Tanno (2012) found that those who reported more repetitive thoughts and worry during night time reported worse subjective sleep quality. They also stress the difference between rumination and worry since the two may possibly use different cognitive pathways. Rumination often is in the past and worry in the future of what is to come, though they both share the characteristics of persistence and uncontrollability. Even when anxiety levels and depressive symptoms were controlled for, poor sleep quality and rumination were correlated (Takano, Iijma, and Tanno, 2012). Takano et al. (2012) also report that rumination and worry lead to misinterpretation of daytime functioning and sleep which contributes to biases in reported sleep. Rumination and worry therefore have a direct impact on sleep quality and perceptions of.

During young childhood, attachment anxiety is built around mothers and children's trust and reassurance in. Depending on previous experiences children, they can either develop into securely attached or insecurely attached. These experiences as a young child continue on into

adulthood to affect sleep. Sleep quality is impacted by attachment anxiety, which the presence of is correlated with worse reports of subjective sleep quality (Troxel, 2010). This implies that those who suffer from attachment anxiety also perceive their sleep quality to be worse. When uncomfortable or anxious, the autonomic nervous system is activated, increasing awareness and preventing sleep (Troxel, 2010).

Researchers offer a variety of sleep care habits that can help improve sleep quality for individual sleepers. These include a nightly schedule and ritual, set bed time and wake times, quiet, dark, cool, and comfortable sleep place, and no distractions with technology or other games. Additionally, medicine, surgery and breathing machinery have all been developed to treat some of the known sleep disorders, lessening sleep disturbance. Medicine can also help to control psychological or mental health symptoms that interfere with sleep quality. Along with medicine, counseling and personal reflection and development may better sleep quality. However, the specifics to a good night's sleep are becoming more and more elusive.

Section 4: Factors in couples

While the list of factors that impact sleep quality in individuals can be long couples are affected by additional factors that impact sleep. Having a bed-partner can add to stress or comfort in addition to helping maintain healthy sleeping habits or disrupting them. The main category of sleep disturbances for people alone are sleep disorders. When sleeping with a partner these personal sleep disorders can affect bed partners' sleep as well since so much time is spent sleeping with another. Furthermore, one's bed partner's sleep disorders can negatively impact one's sleep as well. For example, one fourth of cohabitating adults are involuntarily deprived of sleep by being disturbed or awakened by their significant other's sleep disordered breathing, snoring, or sleep apnea (Troxel, Robles, Hall, & Buysse, 2007). Snoring and increased arousals, symptoms of obstructive sleep apnea, often adversely impact both bed-partners sleep (Troxel, 2010). This disruption can be so severe that the bed partner can many times report and describe the patient's symptoms better than the sleep disordered (Rosenblatt, 2006).

Adult touching is an important factor that adds to comfort which can be deduced from reports of where comfort comes from for adults (Rosenblatt, 2006). Rosenblatt (2006) states that intimacy gained from touching increases the feeling of comfort. Comfort when sleeping together has been shown to impact partner's sleep quality according to a variety of studies (Rhodes, Stanley, & Markman., 2008; Stritof & Stritof, 2011; Troxel et al, 2008; Diamond, Hicks, & Otter-Henderson, 2008; Hale, 2010; and Hicks & Diamond, 2011). Touching with a bed partner can increase feelings of security and help to reduce anxiety. Cuddling, a form of touching, has been one of the most commonly reported benefits of a bed-partner (Rosenblatt, 2006).

In infants touching plays an important role in the development of the brain, bonding with parents, and trust. Oxytocin may be the chemical that connects health and social relationships,

speculates Troxel et al. (2007). Through touch, a neuropeptide called oxytocin that is released during labor and breast feeding promotes bonding between mother and infant. Co-bedding does not have any detrimental clinical or developmental impacts, despite advice to not sleep with infants (Polizzi, Byrs, Kiehl, 2011). Touch also is known to play an important role in development of social skills and intelligence (Lebel and Beaulieu, 2011). Touching can also disrupt sleep for adults by hindering abilities to fall asleep because of discomfort or distraction.

Couples can be disturbed by their partners because while co-sleeping they are sharing one space. Movement can therefore be detected and awaken a bed partner. Sharing a space to sleep can result in bed hogging or blanket stealing, according to a news author for BBC, which can also be sources of sleep disturbances (2009). The movements of a bed partner additionally trigger the other partner to move. Movements were mirrored by the bed partner in Aaronson et al.'s (1982) study. They (1982) found that sixty percent of men's movements were matched by the women and seventy percent of the woman's movements were matched by the man. The match up of movements, a characteristic used to identify poor sleep or sleep disturbance, implies that couples movements arouse each other.

Another sleep disturbance in couples can be employment and work hours. Not sharing the same work schedule makes partners have different routines that can possibly disturb the other. Shift work can impair sleep quality in couples because of the different sleep/wake schedules and day layouts. Shifts are a consequence of occupational work that can many times not be changed or controlled. Couples that worked different shifts than each other suffered more sleep problems due to different bed times and sleep habits; additionally, the one with an unusual shift, for example third, was more times than not also suffering from sleep deprivation (Troxel, Robles, Hall, and Buysse, 2007).

In the relationship of marriage or committed partnership, adults can feel more safe and secure; as well have fewer feelings of loneliness and negative emotions which are shown to impact sleep quality. Having a partner may lead to the development and practice of sharing rituals that calm and relax the couple and the relationship provides space for them to unwind and digest their day as well as de-stress. With a supportive partner, this can encourage better sleeping (Troxel, Robles, Hall and Buysse, 2007). But, supportive partners are not limited to marriage and/or living together.

Section 5: Cohabitation and Sleepover

Thus far, sleep, factors that affect sleep, and objective versus subjective measures have been reviewed. As previously mentioned, bed partners could have a positive impact on perceptions of sleep quality for some. The increase in perceptions of sleep quality are typically among married couples, but co-bedding is not specific to such relationship. The growing trend of co-habitation before marriage illustrates this. Also, couples in college spend the night with each other without moving any of their personal items. Therefore, there are more than one type of relationship that fosters co-bedding, and depending on the relationship, couples may or may not live together when co-sleeping.

Sleeping together casually is a social phenomenon characterized by unfound reasons to share beds in many different cultures (Worthman, 2004 and Huang, 2010). According to the National Sleep Foundation poll sixty one percent of American adults slept with a significant other in 2005 (Troxel, Robles, Hall, & Buysse, 2007). The number of these who also lived together is not specified and there is a clear distinction between living together and sharing a bed (cohabitation) and just sharing a bed occasionally (sleepover). Cohabitation is living together and implies intimate emotional attachments and commitments, while sleepovers and bed sharing are seen as more casual.

The National Sleep Foundation poll draws attention to a growing trend towards co-sleeping in non-committed pairs. A “recent development has been the habit of couples to share a single bed to sleep in” (Dittami, Keckeis, Machatschke, Katina, Zeitlofer, and Kloesch, 2007, p.272). Sharing a bed can be classified as a sleepover unless the couple is also living together, then it would be classified as cohabitation. “Sleeping arrangements are related to sleep pattern, quantity, and quality” (Worthman and Brown, 2007, p.132). Cohabitation and sleepovers may

have a different impact on sleep quality for each partner. The difference could be anything from the lack of personal space to the strength of the couple's relationship. Cohabitation is not limited to married couples, as seen by young adults living together before marriage or instead of marriage. Cohabitation also implies regular bed-sharing while sleepovers can happen occasionally (Jamison, 2011).

Depending on the culture and society, sleepovers, bed-sharing, and cohabitation may all occur at different rates. For Egyptian families co-sleeping is normal since most of the time families share beds or bedrooms. Children typically sleep with their parents from infancy to adolescence. The regularity and the societal acceptance influences families to continue these practices which have been shown by Worthman and Brown (2007) to be beneficial. One of the conclusions that Worthman and Brown (2007) make is that regular and habitual co-sleeping may help in modulating arousal and stabilizing sleep. They drew this conclusion from studies of Egyptians who slept together who reported fewer nighttime arousals, shorter and less variable sleep during the night, and spent less over-all time sleeping. Their study of Egyptian families found significant results indicating that when co-sleepers slept alone they woke up more often and slept longer (Worthman and Brown, 2007).

The study *Companionable Sleep: Regulations of Sleep and Co-Sleeping in Egyptian Families* (Worthman and Brown, 2007) had seventy-eight participants from sixteen different families in two different towns in Egypt. Co-sleeping made up sixty-seven percent of the total sleep events, twenty-four percent were with one other sleeper, and only twenty-one percent were alone. The prevalence of co-sleeping in Egypt plays an important role in the results that Worthman and Brown (2007) calculated. Since Egyptains regularly practice co-sleeping their sleep quality with a bed-partner is most likely higher than persons in other cultures or

communities where co-sleeping is not normative, especially in a society that does not accept is as a normal form of interaction. It is important to note that co-sleeping was occurring within families in Egypt, which sets it apart from other instances of bed-sharing that are not within family.

In Egypt, co-sleeping was prevalent and resulted in shorter lengths of time and higher efficiency of night time and total sleep, as well as earlier, more regular, and less disrupted sleep (Worthman and Brown, 2012). Sleeping together can be one of the most intimate behaviors for couples of all ages and sexes. Sharing the close space and time together while in a state that is evolutionarily dangerous creates a sense of trust and connection. Co-sleepers are "in close body contact share space, air, warmth, and time (one third of the day) during a critical chronobiological period" (Worthman and Brown, 2007, p.125). Therefore, co-sleeping requires some level of trust and affection.

Egyptian co-sleepers did not perceive themselvesto wake up as many times during the night as those who slept alone. Those who co-slept also went to bed earlier than those who did not. Significantly, when the Egyptian participants were in their thirties, there was no difference in nighttime arousals between individual and co-sleeper(Worthman and Brown, 2007). Logically, the Egyptian sleepers who slept alone when they were accustomed to sleeping with another reported worse quality sleep. This can likely be attributed to the fact that it was unusual as they were not used to solitary sleeping. Where co-sleeping is a normal and a socially accepted activity, it appears that there is a higher likelihood of better sleep quality for co-sleepers (Worthman and Brown, 2007). This explains why the data reported by Worthman and Brown (2007) illustrated that both genders suffered from poorer quality of sleep when they did not sleep in the manner that they were used to sleeping.

Americans do not practice co-sleeping as regularly as people from other countries, possibility due to our emphasis on individualism. Co-sleeping and napping are regularly practiced from Egypt to Brazil, from urban China to Japan (Worthman and Brown, 2007). The social construction of individualism leads Americans to subconsciously strive for individuality that infiltrates sleep practices and has even lead to the beliefs that bed-sharing with infants is dangerous. Despite the volume of recommendations for mothers top sleep separately from their children to prevent too much attachment and foster independence, a long-term study of American families that practice co-sleeping with their infants found that there were no long-term negative psychobehavioral consequences of this practice (Worthman and Brown, 2007).

Prior to the emergence of this new trend, the most common place where bed-sharing (co-sleeping) occurred was between mothers and infants (Dittam, Kecheis, Machatschke, Katina, Zeitlofer, Kloessch, 2007). Originally, mothers and infants shared a bed to promote bonding and increase breast-feeding. But the practice of bed-sharing with infants has also been discouraged due the fact that some authorities are worried that co-sleeping with infants can cause Sudden Infant Death Syndrome (SIDS). In one study, maternal moods were correlated with bed-sharing with the infant; in particular bed-sharing did or did not occur depending on the mothers' mood (Galler Harrision, and Ramsey, 2006). Galler, Harrision, and Ramsey (2006) suggested that mother's with high anxiety and more post-partum despair slept with their infants more often. As noted earlier, high attachment anxiety is a possible factor in reducing sleep quality. A positive finding was that Barbados mothers who breastfeed had children of a lower weight and increased heath quality and physical growth who also had a reduced risk of obesity (Galler, Harrision, and Ramsey, 2006). Therefore, despite the debate about bed-sharing with infants, there are still important findings that support the practice.

Infants and mothers are not the only two to co-sleep; since the single marriage bed became a place that couples now share, co-sleeping rates between spouses have increased (Rosenblatt, 2006). Recently the media has circulated articles like a BBC article (2009), discouraging married couples from co-bedding, claiming that it is bad for their health and sleep quality. One of the tips given for couples is to snuggle and talk until sleepy, then one partner move to their own bed. Though, it is hard to believe that people will follow this suggestion considering the hassle of leaving one bed for another before sleep onset. One major study by Monroe in 1969 implied that co-sleeping was detrimental to sleep quality because of the changes found in sleep architecture in couples sleeping together instead of alone. Since then, new studies have been published refuting Monroe's conclusion.

In 2007, Troxel, Robles, Hall, and Buysse found only five studies that investigated how sleeping with or without a partner could affect the parameters by which we assess sleep quality. Worthman and Brown (2007) reviewed a longitudinal study of American families and co-sleeping that showed no long term negative effects and few positive effects of such bed-sharing. A similar study to Worthman and Brown's (2007) study is by Dittami, Keckeis, Machatschke, Katina and Zeitlhofer (2007) who used an actigraph to measure sleep quality of active co-sleepers. Dittami et al. (2007) found that the difference between normal synchronization deviation and the synchronized deviation during co-sleeping was not significant. This finding suggests that co-sleeping did not create negative deviations from individual sleep.

Conservative activists discourage sleepovers and bed-sharing before marriage because they believe that cohabitation is replacing marriage. They support this claim with the statistics of increasing numbers of divorce and cohabitation. One such statistic is reported by Lichter, Turner, & Sassler, (2010) who note the increase in cohabitation between adults from 1995 to 2002. In

1995 only about forty-eight percent of young to middle aged women had cohabitated (Lichter, Turner, & Sassler, 2010). In 1992, of those not living together, forty-one percent of men and twenty-eight percent of women reported that they would like to live with someone before they are married (Huang, Smock, Manning, Bergstrom-Lynch, 2011). Ten years later in 2002, more than sixty percent of women had cohabitated (Huang, Smock, Manning, Bergstrom-Lynch, 2011). Rates of cohabitation have increased by forty percent two decades ago particularly among young adults (Servaty and Weber, 2011). Even though cohabitation rates have increased, marriage continues to be an important part of today's society. For example, only thirty-nine percent of American's agree that marriage is not important (Servaty and Weber, 2011). Changing attitudes about marriage and cohabitation are related to the increase in divorce rates and changing family structures. All of this impacts the willingness of young adults to co-sleep in order to meet needs that may have never been met before through traditional marriage.

Some researchers believe that the decreasing rate of marriages comes from poor family models and increase of cohabitation. Servaty and Weber (2011) found many studies that concluded that parental marriage influenced children's own relationships. The mass media in particular sends many messages promoting causal relationship with no more commitment than living together (Servaty and Weber, 2011). Servaty and Weber (2011) also found that beliefs about cohabitation have also changed from it being a sin to it being something that all couples practice to test out their marriage potential. In addition to Abowitz (2009), Servaty and Weber also found out that men are more likely than women to believe that living together before marriage will improve the marriage.

Today, it appears as though cohabitation is the prerequisite to marriage (Huang, Smock, Manning, and Bergstrom-Lynch, 2011). The factors that encourage couples to cohabitate before

marriage include testing compatibility, spending more time together, sharing financial responsibilities and expenses. The difference between men and women are the loss of freedom and delay in marriage (Huang, Smock, Manning, and Bergstrom-Lynch, 2011).

Cohabitation seems to be more likely in those who prefer a more egalitarian and nontraditional family structure. This is an interesting claim because interviews of couples illustrate that men in cohabiting relationships still have control as to whether they get married or not. Furthermore, women in cohabitating couples still feel like they have to wait for their partner to propose and must wait for the wedding (Huang, Smock, Manning, Bergstrom-Lynch, 2011). These two aspects illustrate that parts of the institution of marriage are still alive and well.

Another form of cohabitation is serial cohabitation which refers to multiple occasions of living with a partner before marriage. The national estimates of this form of cohabitation have increased in the last two decades. The implications of such threaten the institution of marriage, still highly valued in our culture. Even older women who have possibly suffered a divorce are resorting to cohabiting with partners instead or re-marrying. Some people even consider cohabitation to be a part of the courting process now and therefore believe it is normal and regular to live with a partner in a serious relationship (Litcher, Turner, Sassler, 2010).

Sleepovers and cohabitation both require adjustments of sleep patterns and habits on both parties. But since sleepovers differ from cohabitation, sleep patterns and habits may or may not change. According to Rosenblatt (2006) in reference to cohabiting couples, sleeping together is a learned ability that changes with each different partner; since this is so it makes sleeping together a more intimate and relationship fostering activity. This association is because bed time is an opportunity and space for couples to talk and snuggle in a safe, relaxed, and comfortable space

(Rosenblatt, 2006). Snuggling is a period to talk for romantic couples and socializing predicts more sleep particularly in young adults (Galambos et al., 2009). Bed-sharing has the potential to have a positive impact on coping and stress modulation (Dittami, Keckeis, Machatschke, Katina, Zeitlhofer, and Kloesch, 2007). Young adults who have sleepovers with their significant others report that it is comforting and that influences the quality of sleep they experience or report (Jamison and Ganong, 2011).

Sleep quality amongst adults co-sleeping is a variable of concern. Monroe, Pankhurst and Horne (1994), and Diamond et al. (2008) all assess sleeping alone versus sleeping with a partner; they all found that participants subjectively report better sleep quality with their partner than sleeping alone. For example, Dittami et al.'s (2007) results that sleep quality assessments were lower in men when sleeping alone. Subjective measures show this trend despite data conclusions that show they are spending less time in stage four and REM sleep.

An important study that illustrates the impact of a bed partner on sleep quality is a study by Rigg and Cosgrove (1994) on aircrew wives when their husbands are traveling. They compared ground crew with aircrew wives and found multiple results. For aircrew wives, the night before the husband left, the women reported worse sleep quality. This temporary separation did impact the wives sleep quality immediately. Simply knowing that the husband was leaving the next day worsened the wives sleep quality reasons including stress over the husband's job, frequent separations, and unexpected schedule changes. Aircrew wives showed worse sleep quality than ground crew wives, but interestingly the aircrew wives did not suffer worse sleep the rest of the separation time.

Aircrew families are appropriate to study for sleep partner separation since frequent trips are out of town. Aircrew couples were compared to ground-crew couples, both suffer from unexpected schedule changes and sometimes difficult hours. The wives of aircrew workers reported worse sleep the night before the administration of the questionnaire. During the rest of the week, these same aircrew wives did not show any more difficulties sleeping. The aircrew wives did report having a lower sense of well being and mood than the ground-crew wives though. The effects of husband absence on mood and one night of sleep can be avoided when management uses for advanced planning, not changing schedules last minute, and encouraging closer families be including family member in the husband's work (Rigg and Cosgrove, 1994).

Another study of couples sleep was by Dittami, Keckeis, Machatschke, Katina, Zeitlhofer, and Kloesch (2007) who conducted an important study on sleep quality either alone or in pairs. The goal of the study "was to examine how sleep patterns in individuals varied between sleeping alone and pairsleeping by comparing whole night sleep parameters with objective and subjective techniques" (Dittami et al, 2007, p.272). To do this, they asked ten healthy couples who were in steady relationships and either regularly slept together or apart to participate. Ages ranged from twenty-one to thirty-one years of age and all relationships were over two months, the median being five months. The couples were asked to spend at least ten nights alone and ten nights with their partner. Over twenty-eight days, each couple member was monitored by an actigraph and kept a sleep diary. Couple members also took a subjective sleep quality test (The Pittsburgh Sleep Quality Index) and a moving evening questionnaire.

The results that Dittami et al (2007) found included men reported lower subjective sleep quality when sleeping alone compared to the women. The same level of sleep quality between genders equaled out when sleeping in pairs with or without sexual contact. Men's sleep quality

was not reduced by their partner except for in some cases including sexual contact. To test if the partner's movements were disruptive to the other, they used the sleep fragmentation index because fragmentation is correlated with sleep quality. Lastly, when analyzing sleep fragmentation, "there was no synchronization of deviation from the norm levels between the partners on individual nights either when they slept alone or in couples" (Dittami et al, 2007, p.271). Therefore, sleep was not disturbed more than the normal.

Despite possible sleep disruptions from bed partners, that does not stop adults from sleeping together. A bed-partner or spouse can promote healthy sleep habits and patterns or encourage seeing treatment for sleep disorders (Troxel, 2010). Contradictorily, Dittami et al.'s (2007) study found that the time spent in bed did not predict worse or better sleep. An interesting correlation that Worthman and Brown (2007) found was that as the amount of co-sleeping went up, the less amount of sleep participants had and needed. Comfort has been reported from the enjoyment of warmth and snuggling, sexual intimacy, and safety and security (Jamison & Ganong, 2011). Therefore, bed-sharing may be an influential factor improving sleep quality for men because of the increased comfort of snuggling.

The change that society has on cohabitation and bed-sharing possibly grew from the changes in family structures. Since children model their parent's relationships, the increase of divorce and other forms of families have influenced the younger generation to begin co-sleeping to meet needs not fulfilled before. With the change of social opinion of co-sleeping outside of marriage, the willingness and appreciation for such will change possibly helping couples sleep better. These changes can furthermore better young adult's sleep quality by providing a social aspect. This can be seen in other cultures, like Egypt where they report sleeping better together than apart and it is the cultural norm is to co-sleep.

Section 6: Objective vs Subjective

Thus far sleep quality and quantity have been distinguished, cohabitation and sleepovers have been discussed, and factors that impact sleep quality in couples and alone have been listed. All of these topics are linked together by way of being assessed. The measurements for sleep are numerous and vary, like the variables that affect sleep and the different situations it occurs in. In regards to sleep quality, the difference between objective and subjective measures is significant because they are contradictory to each other.

There are two different categories of tests to measure sleep quality: subjective and objective. Subjective means a subject's perceptions and views in contrast to objective which uses machines to measure a subject's views. Subjective measures include questionnaires, surveys, scales, sleep logs, interviews, and more; Objective measures are machinery, like the actigraph or polysomnography that collect data on variables. Some popular measurements include Polysomnography, actigraphy, Epsworth Sleepiness, Stanford Sleepiness Scale, Sleep-Wake Activity Inventory.

There are a variety of ways that sleep quality has been measured in previous studies, one of which is the *Pittsburgh Sleep Quality Index* (PSQI) (Dashti-Khavidaki, Chamani, Khalili, Hajhossein, Ahmadi, Lessan-Pezeshki, Ghaeli, Dalili, & Alimadadi, 2011). The PSQI has been studied for its validity and is highly regarded as an accurate representation by Escobar-Córdoba & Eslava-Schmalbach (2005), Beaudreau, Spira, Stewart, Kezirian, Lui, Ensrud, et al (2012), and Wade (2011). The PSQI measures people's perceptions of their sleep quality by asking questions likehow long it took to fall asleep, how often they woke up, and how long they slept for. It asks for overall ratings from the last thirty days which are the most memorable and therefore thought

to be the most representative of overall sleep. Tworoger, Davis, Vitiello, Lentz, and McTiernan's (2012) study illustrated that a third of the women that participated reported a PSQI score below five, indicating poor sleep quality. A few other subjective measures similar to the PSQI are the Stanford Sleepiness Scale, the Sleep-Wake Activity Inventory, and the Epsworth Sleepiness Scale.

One subjective measure of sleepiness, the Standford Sleepiness Scale (SSS), has been used to assess sleep quality by how tired a person is. The SSS has been tested for reliability for quantification of levels of sleepiness. Another test of self-reported sleepiness is the Sleep-Wake Activity Inventory (SWAI) which is a multidimensional inventory that uses a Likert-type scale. This test asks about self-reports of the variables sleep, psychiatric distress, ability to relax, social desirability, and energy levels perceived within the last seven days (Rosenthal, Roehrs, and Roth, 1993). Another test that is used to measure patients perceptions of sleepiness is the Epsworth Sleepiness Scale (ESP) which has people imagine themselves in specific situations and rate how likely they would be to fall asleep (Pilcher, Ginter, and Sadowsky, 1996). This test also assesses sleep efficiency by assuming that less activity means more sleepiness from poor sleep quality. The Multiple Sleep Latency Test (MSLT) is a objective measure of sleep quality by determining sleep latency measured by polysomnography. It has become an accepted measure to quantify sleepiness since it assumes that sleep is a psychological need and those who have shorter sleep latencies are less sleepy (Rosenthal, Roehrs, and Roth, 1993). Studies attempting to assess perceived sleep quality are still trying to be made, as Fortunato, LeBourgeois, and Harsh (2008) show in their study attempting to make a new test for adult sleep quality. In their test they investigate bed time, falling asleep time, ability to maintain sleep, ability to fall back to sleep, and waking up (Fortunato, LeBourgeois, and Harsh, 2008).

There are many other tests or questionnaires on sleepiness and sleep quality, the use of which depends on the research and the sample. Other measures for sleep quality, like the actigraph and the polysomnography, both use different variables than subjective assessments related to sleep to assess overall quality.

Actigraphy has also been shown to be a valid test in a study conducted by Grutsch et al. (2011). It is a very specific and detailed measurement as Avi Sadeh (2010, p.259) illustrates: the "actigraphy is sensitive in detecting unique sleep patterns associated with specific sleep disorders as well as with other medical or neurobehavioral disorders. Furthermore, actigraphy is sensitive in detecting sleep changes associated with drug treatments and non-pharmacologic interventions. Recent developments include the invention of devices specially tailored to detect periodic limb movement in sleep and the introduction of new devices and algorithms" (p.259). Therefore, actigraphy is a significant tool to use to examine physical sleep quality because it can collect a variety of data associated to sleep quality and it has been shown to be valid.

There is an important difference between perceptions of sleep quality versus variables of sleep indicating quality. The difference between variables and perceptions can be seen in studies of couple's sleep quality. In the studies by Aaronson, Rashed, Biber, & Hobson (1980) and Pankhurst & Horne (1994) people reported perceiving better sleep quality with a bed-partner rather than alone. These reports were surprising because the variables assessing sleep quality place people's sleep quality as worse with a bed-partner rather than better.

Objective measures of sleep quality all relate to physical manifestations that have been correlated to sleep quality, concentrating on non-bias, non-controllable and measureable aspects of sleep. Subjective measures of sleep quality ask a person specific questions about similar

aspects used to determine sleep quality and therefore look at their perceptions. Both types of assessments, subjective and objective, are only moderately correlated suggesting that they each measure a different aspect of a person's sleep quality (Tworoger, Davis, Vitiello, Lentz, and McTiernan, 2012). Tworoger, Davis, Vitiello, Lentz, and McTiernan (2012) reported how subjective sleep quality was correlated with perceived stress levels, employment, and age. Again, choosing a type of measurement, objective or subjective, depends on the purpose of the research.

There is an important difference between perceptions of sleep quality versus variables of sleep indicating quality. The difference between variables and perceptions can be seen in studies of couple's sleep quality. The discrepancy in people and their perceptions is what often leads a researcher to use objective measures of sleep quality because then people differ less through data which is more controlled. This is not to say that objective measures are more reliable because, in the case of insomniacs, there is no way to determine time spent quiet and not moving with objective measures, which is a symptom of the disease. Krystal and Edinger (2008) have noticed how objective and subjective measures do not match and believe this is because there are variables of sleep quality that have yet to be identified or are not known how to assess yet. Therefore, to analyze sleep quality the most accurately there must be a use of a combination of objective and subjective sleep measures. Using both types of measures for one variable helps to determine the gap between the two. It is logical that these measures miss some aspects of sleep quality because sleep quality is influenced by and associated with many different variables.

The first example of the difference between objective (variables) and subjective (like the PSQI) measures and their assessment of sleep quality is a study by Monroe (1969). Monroe was the pioneering researcher to report that bed-partners have a detrimental consequence on objective sleep measures. His study found less stage four sleep when sleeping with another and that

participants generally sleep better alone than with someone, according to objective measures. The study also reported more rapid eye movement (REM) sleep when sleeping with a partner than when alone. He concluded that couples do not sleep as well together due to these sleep structure differences. Interestingly, even though sleep structure is changed by a bed-partner, subjects personally reported worse sleep quality alone than with a bed-partner (Troxel, 2010).

The second example of the difference between perceptions and variable assessment is in a study by Pankurst and Horne (1994) who used actigraphy to qualify couple's sleep quality. They found the actigraph recorded more movements when sleeping with a partner than when alone. Here is where participants reported better subjective sleep quality when bed-sharing than sleeping alone (Pankurst and Horne, 1994). This is a surprising result since movement is a variable that is thought as a characteristic of poor sleep quality. It is easy to believe that the more a person moves around during sleep, the less peaceful and restful their sleep is. Furthermore, the less peaceful and restful their sleep is leads to worse sleep quality. Pankurst and Horne (1994) found that despite the contradictory preconception, the impact of bed-sharing is greater than the impact of movement during the night.

A more recent study, by Diamond, Hicks, Otter-Henderson, and Kimberly (2008) conveys similar results when they studied couples temporarily separated. For example, those with partners who went on a business trip reported more sleep problems in their sleep log then when they were together. When the couples were first reunited, the diaries showed significantly less reports of sleep disturbances. Fewer reports of disturbances assumes that people are sleeping better since they are not noticing or reporting such. Diamond et al.'s (2008) study describes that couples are more still, a standard of "good sleep", when sleeping with their partner than when they were alone, therefore further supporting that couples sleep better together.

To conclude the meanings of these three studies, Troxel (2010) writes "the effects of co-sleeping on sleep based on subjective versus objective sleep parameters suggest that the psychological need for closeness and security, particularly at night, trumps the equally important need for good quality sleep" (p.580). From her research, Troxel (2010) constructs a model that describes the interplay between a close relationship and sleep due to the use of similar physiological pathways, and therefore linking both with the physical health problems that were previously mentioned. Reasons that she analyzes to explain the model include habit, which could serve as an external cue to sleep and to recover from day stress. A bed-partner could then cue a reduction of arousal before sleep onset and a sense of better sleep (Troxel, 2010).

Objective measures are many times correlated with different variables than subjective measures because of the variety of sleep quality variables. The conclusion of *Factors Associated With Objective (actigraphic) and Subjective Sleep Quality in Young Adult Women* demonstrates the variety of factors that impact sleep quality, one of which was menstrual cycle (Tworoger, Davis, Vitiello, Lentz, and McTiernan, 2012). In particular, Tworoger et al. (2012) found that a longer menstruation cycle was slightly associated with poorer sleep quality. This study reported that there were different variables associated with subjective (PSQI) and objective (actigraphic) measures of sleep quality. "For example, perceived stress was not associated with actigraphic sleep measures, but was positively associated with poor subjective sleep" (Tworoger, Davis, Vitiello, Lentz, and McTiernan, 2012, p.17). In addition to this, subjective sleep quality measures differed from objective sleep measures in association with employment, age, and stress (Tworoger, Davis, Vitiello, Lentz, and McTiernan, 2012). The most important aspect of this conclusion is that this study depicts the difference between the measures of sleep quality and how they may test different parts of the experience of sleep.

Changes in the research of sleep have impacted subjective measures for sleep and the physiology of such. The growth and development of subjective measures of sleep quality have raised awareness of the importance of sleep time and environment (Dittami, Keckeis, Machatschke, Katina, Zeitlhofer, and Kloesch, 2007). Another possible measurement could be of the relationship and frequency of bed-sharing. The advances in technology have lead to better computers, electrodes, specificity, and equipment for the machinery that measures sleep quality. These advances have added massive amounts of knowledge about sleep to our databases.

The differences in subjective and objective measures are clear when it comes to sleep quality. People's perceptions and physical measurements of sleep differ enough to impact how rested they feel. It is interesting that those who sleep together regularly believe that they sleep better together than apart despite the changes in sleep architecture. These same people also happened to be couples who had a relationship with each other. The possibility of the relationship type having an effect on sleep quality is logical. If people like each other and co-sleep often, then it is easier to fall asleep with this trusted person who there are feelings of comfort and security with. The possible effect of relationship type is discussed in the following section.

Section 7: Relationships and Sleepovers/Cohabitation

From an early age on, humans find their bed as a safe and comforting place, partially because it is associated with sleep and rest. Even into adulthood, people view their beds as a safe space that is calm, nest-like, comforting, securing, and trustworthy (Rosenblatt, 2006). "The lifetime of most adults will include thousands of nights of shared sleeping with another adult, and often challenges of sleeping are very much about the couple relationship" (Rosenblatt, 2006, pgs. 9-10). Furthermore, the practice of casual co-sleeping and bed sharing without living together or being in a serious relationship (sleepover) illustrates a generation giving more trust out to other people by letting them into their bed (Smock 2000; Smock & Manning, 2004; and Jamison & Ganong, 2010). Bed sharing can only be so "casual" since humans find their beds as a safe place and sharing such puts the safeness at risk.

It seems that depending on the type of relationship a couple is in, sleepovers or cohabitation can either be detrimental or beneficial to sleep quality. The more serious and long-term the relationship, the better sleep quality reported after bed-sharing, no matter if that couple is living together or not. This correlation appears in a few studies on sleep quality during bed-sharing of couples in relationships. But most studies of sleep quality between bed partners are of married or long-term couples. There are no studies performed on sleep quality after a sleepover with a partner who was unknown. The type of relationship like new and unsecure, may be detrimental to sleep quality.

Serious relationships for extended amounts of time with one other adult impacts sleep quality. Rosenblatt (2006) dedicates a chapter to discussing how couples learn to sleep together over time and how learning betters sleep quality by changing sleep habits. Two specific measurements of actigraph activity include measurements of movement after sleep onset and

time lengths of sleep. A study that used actigraph and looked at sleep quality found that the women who had a partner for eight years showed less actigraph activity after they went to bed than women who slept alone (Pankhurst and Horne, 1994). Another study using actigraphy found that men had more small movements than women during sleep, but that one third of these movements were synchronized with their partner. Females reported being disrupted by their male bed partners more, but overall most couples reported sleeping better together than not (Pankhurst and Horne, 1994). The sleep qualities of both sexes were the same when sleeping together with or without sexual contact (Dittami et al., 2007).

A pioneer researcher of couples sleeping together was Monroe (1969) who used the electroencephalogram (EEG) to assess twenty-eight married couples. For three nights they were monitored in a lab, the first night to get used to the new setting and the other two nights randomized with or without partner. When partners slept separately they averaged more sleep by about twenty minutes. This particular sleep was spent in stage four, a deep sleep without rapid eye movements. Time spent in REM sleep, a deep stage of sleep including rapid eye movements and dreams, actually decreased by an average of sixteen minutes. Lastly, each person woke up less when sleeping alone than when they were sleeping with their partner. From these data based conclusions, Monroe (1969) claimed that sleeping alone lead to better quality sleep, but he neglected the couple's perceptions of their sleep in each condition. Despite how exciting this research was conclusions cannot be drawn about the potential alterations in sleep quality (Dittami, Keckeis, Machatschke, Katina, Zeitlofer, and Kloesch, 2007).

Aaronson et al. (1980) conducted research that was more specific in couples and measured the amounts of bed partner movement and their synchrony. To do this, a time-lapsed photography monitor recorded a single couple for seven days in a row. In this one couple, sixty

percent of the male's movements were matched by the female. About seventy percent of the female's movements were matched by the male (Pankhurst and Horne, 1994). Researchers consider movement during sleep to be disruptive and an indication of poor sleep quality. The amount of synchrony in the movements during sleep indicates a new variable to assess sleep quality with a partner.

A study that brought together Monroe's (1969) work and Aaronson et al. (1980) was *The Influence of Bed Partners on Movement During Sleep* by Pankhurst and Horne (1994). They conducted two studies at once; one addressed couple's body movements and the other the presence or absence of their habitual partner. Both used actimetry and sleep logs to gather data. Pankhurst and Horne (1994) found interesting results indicating that over all the males moved more throughout the night compared to their female counterparts who spent more total time sleeping. The male's more frequent movements seem to have impacted their bed partner's sleep illustrated by the women reporting more night time disturbances. It also appears that the same people, who were sleeping in couples, move less when sleeping alone. Surprisingly, none of this impacted the participant's perceptions of their sleep quality, as most of them reported better sleep together than apart (Pankhurst and Horne, 1994).

An interesting conclusion from *The Influence of Bed Partners on Movement During Sleep* (Pankhurst and Horne, 1994) is that couples echo each others' movements. One third of the measured movements were common to both bed partners even though the couples were unaware and continued to report better sleep with their partner than alone. Their data also illustrated that younger couples move more frequently in concordance with each other than older couples. The majority of these movements were within thirty seconds of each other. Age thereby became a significant factor because the older, more established couples moved less together than the

younger couples. The two explanations that Pankhurst and Horne (1994) had were that older couples were more accustomed to the other and their movement since they had longer to adjust to it. The other explanation they offered was that as couples age their sensitivity to movements around them declines. It would be falsely assumed to conclude that the partners prompted each other's movements since there was no way their data could indicate such. But, it is interesting that within thirty seconds are the most number of concordant movement.

Pankhurst and Horne (1994) used both actigraphy and sleep logs which covered both subjective and objective measures of sleep quality. Sleep logs indicated that when couples were temporarily separated, partners reported worse sleep and went to bed later than they did when their partner was there. Reasons reported for why couples slept together were that they felt more secure and safe by sleeping with their partner or it was just out of habit. The gender difference found in these two reasons were women more often thought that it was their heightened sense of security and safety that made them sleep with their partner; men more often claimed that sleeping together was simply out of habit. The reasons that couples did not like sleeping together were mainly bed-hogging, snoring, or a restless partner. The sleep logs also indicated that the couples were not aware of the other's movements or the concordance to their own. There were very few reported awakenings that could be matched to a bed-partner from the sleep logs (Pankhurst and Horne, 1994).

All of these previous studies are of established couples in a romantic relationship but the phenomenon of sleeping together is not restricted to types of couples. For example, in many other cultures families or siblings share beds relating to the cohabiting romantic couples just through the commonality of sharing a bed. In Egypt, young adults that regularly took naps together or slept at night together slept better than alone. Wothman and Brown (2007) describe

this and more in their study of companionable sleep in Egyptian families. Egyptians who slept with another woke up less for shorter periods during the night and slept less overall. When the same people slept alone, their sleep quality was associated with more sleep dysregulation, and a more obvious transition into different sleep stages in males including and more times waking up during the night for females (Worthman & Brown, 2007). Increased sleep solidarity is a variant of bed sharing habits, and sleep dysregulation signifies abnormal sleep patterns.

Worthman and Brown's (2007) study found that females sleeping alone after having a bed partner increased how many times the young women woke up over the night. This finding implies that the females had become accustomed to bed sharing and did not sleep as well without a bed partner documented by the amount of times the women woke up. The most interesting conclusion to Worthman and Brown's (2007) study was that where co-sleeping is normative in a culture, psychosensory stimuli provided could help to moderate arousal thereby stabilizing sleep. The aspects that potentially moderate arousal may stimulate self-regulating development during preteen years. This conclusion is interesting because such a simple thing as sleeping with a bed partner can impact sleep quality by increasing sleep stability. Although, Worthman and Brown (2007) specifically state these results occur where bed sharing is normative, which is different from the United States.

Unmarried couples, particularly young adults between the ages eighteen and twenty-nine, are engaging in similar activities of bed-sharing by having sleepovers and cohabitating. In one study there are findings that almost half of American women who are of reproductive ages are currently or have cohabited before (Litchter, Turner, & Sassler, 2009). This figure refers to living together, contrary to bed-sharing or co-sleeping. Also women, who were under twenty-five and never married had increased experiences with cohabitation by sixty-three percent between the

years 1995 – 2002 than in time periods before (Lichter, Turner, & Sassler, 2010). College or graduate students who live and therefore spend most nights together could be included in this statistic. As defined by Jamison and Ganong (2010), spending the night together three to four times a week but not living together illustrates the beginnings of a different type of behavior than previous generations, sleepovers.

The growing number of young adults engaging in sleepovers is attributed to comfort, convenience, physical and emotional closeness, safety and security, and exclusivity. Students are increasing sleepover practices because they feel like it is less of a commitment and less disturbing to the other than living together. It also allows them to maintain control of personal space, sleepover frequency, and emotional boundaries. All of these findings were reported from personal interviews and surveys of undergraduates (Jamison & Ganong, 2011). Furthermore, this group is reporting more confidence and dedication in their relationships specifically from frequent sleepovers and the increase in time spent together (Rhoades, Stanley, & Markmen, 2008). One of the main factors attributing to the growing numbers of sleepovers is comfort, which has a direct impact on sleep quality.

Sleep quality is impacted by physical contact that occurs during sleepovers. Contact like snuggling and touching are becoming more important for couples today in our fast paced society (Rosenbaltt, 2006). Bed time is the first time all day for many couples to talk, touch, or kiss. Touching each other and snuggling in bed could be the most important aspect of the relationship to foster intimacy, trust, and meet emotional or psychological needs not found elsewhere (Rosenbaltt, 2006). Despite such conclusions, there is very little to no research specific to adults on general needs for touching and its importance even though we know its importance for infants (Rosenbaltt, 2006). The specific feelings that snuggling can create are feelings of worth, security,

emotional connectedness, being understood, reassurance, and sometimes romance. Additionally, intimacy is what affirms a couple's feelings, beliefs, and trust in or about the relationship (Rosenbaltt, 2006).

Another possible reason for reports of better quality of sleep from co-sleeping could be happiness since bed sharing could make people happy. Diamond et al. (2008) support the hypothesis that couples are happier sleeping together than apart. Happiness co-sleeping may arise from better or more regular sleeping habits, feeling a sense of safety and comfort, emotional intimacy, regular sexual activities, and social support (Hale, 2010). Additionally, during sexual activity women release a neuropeptide, oxytocin, that plays a role in bonding and sleep (Troxel et al., 2010). Better sleep can formulate happier couples which is important because relationships have direct impacts on mental and physical performance (Hicks et al., 2011). Sleep and bed time may now form a new place for couples to connect with each other as well as relax and feel emotionally fulfilled.

Troxel, Robles, Hall, and Buysse's (2007) review suggests that measures of close relationship quality are correlated with sleep quality. Troxel et al. (2007) give the implication that close relationships and sleep quality have a bidirectional association. Sleep problems often co-occur with relationship problems (Troxel, 2010). Hicks and Diamond (2011) found that couple that live together and had a fight did not sleep as well. They had more negative emotions, increased disruptions of sleep, and higher levels of the stress hormone cortisol. The worse the fight was, the more each person's sleep quality suffered (Hicks and Diamond, 2011). The social implications of this study are to resolve conflicts before going to bed with your partner so that both are more satisfied by their sleep.

Co-sleeping and relationships can act as a buffer that encourages better sleep quality and lessen feelings of loneliness and social isolation (Worthman and Brown, 2007). The most common place for co-sleeping and relationships is the institution of marriage. Marital status is related to sleep outcomes, for example divorced adults report more sleep disturbances than married or single counterparts. There is a significant reduction of Delta wave sleep, which is known for its restorative properties, during a divorce than after (Troxel, Robles, Hall, and Buysse, 2007). This implies that sleep is closely correlated with marriage.

Some studies imply that women are more sensitive to marriage and relationship quality than males due to their traditional roles in the household and their increased investment in the quality and health of their family. These same studies also insinuate that women are more apt to sleep disturbances due to their greater concern and care of their families (Troxel, Robles, Hall, and Buysse, 2007). Such traditional views are up to debate considering progress women have made towards equality and the lesser social demand for woman to remain in the household as cleaner, organizer, and child-raiser. Marriages in which males unconsciously expect traditional roles for women and women do not can be unhealthy, mentally detrimental, and undermining for women.

Healthy relationships are often those that are supportive and encouraging with fewer arguments and aggression markers. Worthman and Brown (2007) reported that a positive or an affectionate relationship can be conducive to more positive outcomes of co-sleeping than negative and aggressive relationships which may worsen sleeping problems. Specific variables that determine a couple's relationship quality are satisfaction, happiness, amount of conflict, and intimacy (Troxel, 2010). Troxel (2010) also observes that people who are socially connected live

longer, healthier, and happier lives that their socially isolated counterparts. Along with this, there are many mental and other health benefits to a "good" marriage.

Strong relationships make people feel secure and like they belong which is important for social fulfillment. Relationships can also promote good health due to reductions in stress and promotion of sleep and bed-time habits (Troxel, Robles, Hall, and Buysse, 2007). Since it takes decreased awareness and vigilance to fall asleep, a relationship full of fights will increase vigilance and awareness therebydecreasing sleeping abilities (Troxel, Robles, Hall, and Buysse, 2007). Unhealthy relationships can disrupt regular couple routines, decrease the feelings of social support, lead to increased drug use, and change bed time habits, all of which can impair sleep. Unhealthy marriages can potentially change the ritual of sleeping together which is a motivational factor to have a regular bed time (Troxel, Robles, Hall, and Buysse, 2007). Therefore relationship quality is an important factor that plays into sleep quality perceptions.

In 2005, about sixty-one percent of adults slept with a significant other, which is significant when it comes to the contribution of sleep disorders to marital problems (Troxel, Robles, Hall, and Buysse, 2007). Although some sleep disorders have negative impacts on a bed-partner's sleep quality, other studies report that sometimes they do not. For example, in one study in Troxel, Robles, Hall, and Buysse (2007) review, there was no reported difference in marital satisfaction between snoring groups and non-snoring groups. Moreover, wives of severely apneic men had the same levels of marital satisfaction as the wives who did not. This was found a study on marital satisfaction that was conducted before and after treatment of non-apneic snoring to obstructive sleep apnea with a mandibular repositioning splint. The study found no improvements in marital satisfaction after treatment other than an increase in reported

cuddling (Troxel, Robles, Hall, and Buysse, 2007). There is the possibility that the marriage and relationship were more influential on sleep quality than the sleep disorders were disruptive.

Types of relationships appear to significantly impact sleep quality. Most of the studies mentioned report that couples report better sleep quality together than apart. This is contradictory to the analytical data from actigraphy and polysomnography that shows more movement and less deep sleep. As Troxel believes (2010) it is possible that there is a bidirectional influence between sleep and relationships. The bidirectional influence is that sleep affects relationships and relationships affect sleep. This is logical considering the reduced abilities to control emotions in those who are sleep deprived.

Relationship type, sleep quality, and perceptions of all interconnect by an unknown variable. Assumptions can be made about what this variable is but considering all of the factors that play into sleep and quality of, they are not established. Relationships, sleep, quality, and perceptions of all interconnect since relationship type influences perceptions of sleep quality. The next section will weave together the information listed thus far, drawing one main conclusion.

Section 8: Conclusion

In the beginning, sleep, its importance, and the detrimental effects of chronic inadequate sleep were discussed. From there, the differences between quality and quantity were reviewed followed by factors that impact sleep quality alone and factors that impact sleep quality in couples. Next was the discussion of objective and subjective measures of sleep quality and then the differences between cohabitation and sleepovers. Finally, relationships and their impact on sleep quality or vise versa were reviewed on the basis of all the previous sections. To come full circle, here are the questions that this review is based on: does the type of relationship that couples have impact their sleep quality when sleeping together? Is the growing trend of co-sleeping impacting sleep qualities of couples?

Surprisingly, there are few studies on co-sleeping, sleep quality, and relationships. Rosenblatt conducted an expansive review of published and reviewed studies from *PsychInfo, Sociological Abstracts* and *Medline* on this topic. He found that in 2005 of 9,198 studies on couple's sleep in *PsychInfo*, only nine of them dealt with couple sleep quality. Rosenblatt also counted fifteen studies dealing with couple sleep quality in Medline from a total of 34,295 studies dealing with sleep. Finally, *Sociological Abstracts* had 17,659 studies on marriage or couples and 514 on sleep, one of which overlapped both categories (Rosenblatt, 2006). It is remarkable how little these numbers have changed in six to seven years.

The little amount of research appears to conclude that relationship types do impact sleep quality and that sleep quality also impacts relationships (Troxel, 2010). The type of relationship that married couples have mostly resulted in better perceptions of sleep quality. Sleep quality also predicted how satisfied a couple was with their sleep quality (Hicks and Diamond, 2011). Disruptions in objective variables that assess sleep quality resulted in poor objective measures.

Objective measures did not affect personal perceptions that couples had about their sleep quality together; they were convinced that they slept better together than alone illustrated by higher reports of sleep quality when co-sleeping than alone. The interaction of sleep quality and relationships should be considered in marriage counseling as another way to satisfy couples.

The growing trend of cohabitation before marriage does not appear to be overshadowing marriage. Couples still strive to get married and look at cohabitation as a test period to see if marriage would work. Most young couples that cohabitate still report that they want to get married and see living together as a step towards such (Sassler, 2010 and Servaty & Weber, 2011). But, sleep quality is being impacted by sleepovers due to the multitude of variables associated with sleep quality. Simply by changing sleeping habits sleep quality is reduced, therefore beginning to cohabitate, is correlated with an adjustment period where the couple learns how to sleep together (Rosenblatt, 2006).

One of the variables associated with sleep quality are perceptions of sleepiness, restfulness, and satisfaction. These perceptions can change due to personal temperament, which is a reason that objective measures are still used. Personal opinions on sleepovers and cohabitation can alter perceptions of sleep quality too. For example, if one couple member feels uncomfortable, judged, and not supported in their decision to have sleepovers or cohabitate with their significant other, than they likely not report good quality sleep because of the other factors on their mind.

It is important to break down and examine each variable in relation to another. For example, the relationship between sleepovers with a significant other and with a non-significant other compared to cohabitation with a spouse and cohabitation with a significant other. Also, the

relationship between sleeping alone while in a serious relationship to sleeping with the partner and those effects on reported sleep quality. All of the different variations of these variables have not been assessed, leaving room for future studies. But with the growing trends of premarital cohabitation and sleepovers, these interactions are becoming more serious and important considering the importance of quality sleep. Work place performance, memory, learning, and performance are all variables that would decrease in relation to poor sleep (Luby, Frohman, Grisell, Lenzo, and Gottlieb, 1960 and Ratcliff & Van Dongen, 2011).

Data can overanalyze sleep and specific aspects of it to assess overall sleep quality while perceptions can be skewed due to what participants believe the study is about or a singular experience that stands out. Perceptions and data on sleep quality can be difficult to assess due to the mere difficulty of objectively identifying sleep onset. Most people can recognize when someone else is asleep, but it has been a hard term to operationally define or explain. Sleep is recognizable when there is a lack of responsiveness and movement (Siegel 2003). It is also identified when participants engage in rapid eye movements (REM) which indicate deep sleep. There are a variety of instruments that can be used to assess all of these identifiers of sleep like the electroencephalogram (EEG), electrooculogram (EOG), and electromyogram (EMG) (Adnane, Jiang, & Yan, 2012).

Despite the actigraph's quality, specificity, measurements, and validity, surveys and questionnaires are two of the best methods to assess people's personal perceptions of sleep quality. The actigraph does not identify or measure personal ratings and satisfaction with sleep or document the other variables that interplay. Multitudes of studies use subjective measures. For example, Rosenblatt's (2006) study used a sleep-log, surveys and questionnaires in addition to interviewing participants. Rigg and Cosgrove (1994) used a simple self-rating questionnaire to

assess aircrew wives beliefs of their quality of sleep when their husbands were present or away. Additionally, summary self-reports and social science survey methods were used to assess sleep quality in Egyptian families by Worthman and Brown (2012).

The effects of bed-sharing, co-sleeping, relationships, and sleep quality cannot all be tested at once. There will most likely never be a singular answer to each of the interactions because of all of the other variables that compose personal perceptions of sleep quality. A significant conclusion that should be remembered in other studies is the bidirectional correlation between sleep quality and relationships (Troxel, 2010). A point that Troxel, Robles, Hall, and Buysse (2007) make is that the participant's usual sleep arrangements also need to be taken into consideration. Sleeping in a lab or with a partner when it has not happened before or is irregular is guaranteed to negatively impact sleep quality perceptions. Also, if co-sleeping typically occurred in a large bed and then that couple was studied in a small bed, sleep quality would again likely be negatively impacted.

The factor of bed size was not mentioned or controlled for in any of the studies referred to here. The size of the bed that couples share could directly impact both subjective and objective measures of sleep quality. Some couples sleep in a twin size bed, like undergraduate students, others in a double, and others in a queen or king, typically married adults. It would be interesting to see the relationship between bed size and reported sleep quality. Smaller beds can make some people feel like they do not have enough space and are in a tight place, reducing sleep quality by hindering comfort. A hypothesis is that couples who have a queen or king sized bed would report better sleep quality and comfort than those sharing a twin sized bed.

In conclusion, this review illustrates that there is a factor of sleep quality that is not addressed in either subjective or objective measures. Troxel (2010) agrees that objective and subjective measures of sleep quality neglect to measure some unknown aspect of sleep that impacts couples ratings of sleep quality. This aspect could be fulfilling a deeper and inner requirement for humans. A possible variable could be the feelings of social support and connection, which is a variable that is not able to be measured yet.

Literature suggested that older adults and couples who have been together for an extended amount of time show better sleep quality when sleeping together than apart on both subjective and objective measures. In addition, younger adults and couples that have not been in a relationship for long illustrate that sleeping together decreases sleep quality in objective measures though many couples still report higher ratings in subjective measures of sleep quality. Therefore, it appears that relationship length influences reports of sleep quality. Relationships are a social construction important for happiness and survival. Social belonging and connections are significant in human life and are continuously being searched for.

Sleep is a social activity for humans (Myers, 2012). That is why it is important to consider that most people believe that they sleep better with their significant other than alone despite the data from objective measures that suggest worse sleep structure. Troxel (2010) suggests that there is a variable that is missed in qualitative and subjective assessments. Social reasons to continue research in this area are for the positive effects of sleep and the increasing rates of cohabitation and sleepover. A final conclusion given by Troxel, Robles, Hall, and Buysse (2007) is that they believe that studying the pathways of sleep may establish unknown pathways for close relationships which can positively impact physical and mental well-being. This could have huge societal effects.

The interplay of society on the basic human need of sleep is interesting and an aspect to be looked into. Both social scientists and sleep researchers need to come together to determine the magnitiude of social interactions on sleep quality and the perceptions of. Further research in the perceptions of sleep quality would also serve to further our knowledge about the difference between subjective and objective reports of co-sleeping. The lack of studies on sleep in couples who are not in a committed or long term relationship is disappointing. If relationship length and type affect sleep quality together, than studies in couples sleeping together not in a relationship would be beneficial to the body of research.

The take away message from this research is that a social aspect to sleep quality is not assessed in objective measures and indirectly assessed in subjective measures. Furthermore, do not go to bed angry at your bed-partner because it can impact the quality of both your relationship and sleep. The significance of social interactions needs to be stressed in the sleep research community since sleep appears to be an important form of social interaction. To establish ways to measure the social aspect sleep serves would be significant in the advancement of knowledge of sleep and relationships. Additionally, the bidirectional interaction between sleep and relationships need to be accounted for in future analyzes. By not accounting for the bidirectional interaction, large limits are put on research, knowledge, and understanding.

References

Aaronson S.T., Rashed, S., Biber, M.P., Hobson, J.A. Sleeping together: a video tape look at a couple's sleep. *Sleep Res* 1980;9:120.

Abowitz, D. A., Knox, D., Zusman, M., & McNeely, A. (2009). Beliefs about romantic relationships: Gender differences among undergraduates. *College Student Journal, 43*(2), 276-284.

Adnane, M., Jiang, Z., & Yan, Z. (2012). Sleep-wake stages classification and sleep efficiency estimation using single-lead electrocardiogram. *Expert Systems with Applications, 39*(1), 1401-1413.

Avi, S. (2011). The role and validity of actigraphy in sleep medicine: An update. *Sleep Medicine Reviews, 15*(4), 259-267.

Baumeister, R. F., Campbell, J. D., Krueger, J. I., & Vohs, K. D. (2003). Does high self-esteem cause better performance, interpersonal success, happiness, or healthier lifestyles? *Psychological Science in the Public Interest, 4*

Beaudreau, S. A., Spira, A. P., Stewart, A., Kezirian, E. J., Lui, L., Ensrud, K., et al. (2012). Validation of the pittsburgh sleep quality index and the epworth sleepiness scale in older black and white women. *Sleep Medicine Reviews, 13*(1), 36-42.

Beckwith, H. D., & Morrow, J. A. (2005). Sexual attitudes of college students: The impact of religiosity and spirituality. *College Student Journal, 39*(2)

Buysse,D.J., Reynolds,C.F., Monk,T.H., Berman,S.R., & Kupfer,D.J. (1989). The pittsburgh sleep quality index (PSQI): A new instrument for psychiatric research and practice. *Psychiatry Research, 28*(2), 193-213.

Cheng, S. H., Shih, C., Lee, I. H., Hou, Y., Chen, K. C., Chen, K. (2012). A study on the sleep quality of incoming university students. *Psychiatry Research, 197*(3), 270-274.

Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep loss, learning capacity and academic performance. *Sleep Medicine Reviews, 10*(5), 323-337.

Dashti-Khavidaki, S., Chamani, N., Khalili, H., Hajhossein T. A., Ahmadi, F., Lessan-Pezeshki, M., Ghaeli, P., Dalili, S., & Alimadadi, A. (2011). *Iranian Journal of Kidney Diseases, 5*(8), 404-409.

Diamond, L. M., Hicks, A. M., & Otter-Henderson, K. D. (2008). Every time you go away: Changes in affect, behavior, and physiology associated with travel-related separations from romantic partners. *Journal of Personality and Social Psychology, 95*(2), 385-385-403.

Dittam, J., Keckeis, M., Machatschke, I., Katina, S., Zeitlhofer, J., & Kloesch, G. (2007). Sex differences in the reactions to sleeping in pairs versus sleeping alone in humans. *Sleep and Biological Rhythms, 5*(4), 271-276.

Escobar-Córdoba F., & Eslava-Schmalbach J. (2005). Colombian validation of the pittsburgh sleep quality index. *Revista de Neurologia, 40*(3), 150-155.

Fortunato, V. J., LeBourgeois, M. K., & Harsh, J. (2008). Development of a five-dimensional measure of adult sleep quality. *Educational and Psychological Measurement, 68*(3), 488-514.

Galambos, N. L., Dalton, A. L., & Maggs, J. L. (2009). Losing sleep over it: Daily variation in sleep quantity and quality in canadian students' first semester of university. *Journal of Research on Adolescence, 19*(4), 741-761.

Galler, J. R., Harrison, R. H., & Ramsey, F. (2006). Bed-sharing, breastfeeding and maternal moods in barbados. *Infant Behavior & Development, 29*(4), 526-534.

Gast, H., Schindler, K., Rummel, C., Herrmann, U. S., Roth, C., Hess, C. W., et al. (2011). EEG correlation and power during maintenance of wakefulness test after sleep-deprivation. *Clinical Neurophysiology, 122*(10), 2025-2031.

Gritsch, J. F., Wood, P. A., Du-Quiton, J., Reynolds, J. L., Lis, C. G., Levin, R. D., Daehler, M. A., Gupta, D., Quiton, D. F. T., Hrushesky, W. J. M. (2011). Validation of actigraphy to assess circadian organization and sleep quality in patients with advanced lung cancer. *Circadian Rhythms, 9*(4)

Hale, L. (2010). Sleep as a mechanism through which social relationships affect health. *Sleep, 33*(7), 862-863.

Hasler, B. P., & Troxel, W. M. (2010). Couples' nighttime sleep efficiency and concordance: Evidence for bidirectional associations with daytime relationship functioning. *Psychosomatic Medicine, 72*(8), 794-801.

Hicks, A. M., & Diamond, L. M. (2011). Don't go to bed angry: Attachment, conflict, and affective and physiological reactivity. *Personal Relationships, 18*(2), 266-284.

Huang, P. M., Smock, P. J., Manning, W. D., & Bergstrom-Lynch, C. A. (2011). He says, she says: Gender and cohabitation. *Journal of Family Issues, 32*(7), 876-905.

Huffman, T., Chang, K., Rausch, P., & Schaffer, N. (1994). Gender differences and factors related to the disposition toward cohabitation. *Family Therapy, 21*(3)

Humphreys, T. P., Wood, L. M., & Parker, J. D. A. (2009). Alexithymia and satisfaction in intimate relationships. *Personality and Individual Differences, 46*(1), 43-47.

Jamison TB, G. L. (2011). "We're not living together": Stayover relationships among college-educated emerging adults. *Journal of Social and Personal Relationships, 28*(4), 536-557.

Jones, C., & Dawson, D. (2012). Eye masks and earplugs improve patient's perception of sleep. *Nursing in Critical Care, 17*(5), 247-254.

Kahn-Greene, E. T., Lipizzi, E. L., Conrad, A. K., Kamimori, G. H., & Killgore, W. D. S. (2006). Sleep deprivation adversely affects interpersonal responses to frustration. *Personality and Individual Differences, 41*(8), 1433-1443.

Kolber (2013). *The New Yorker.* 2013.

Krystal, A. D., & Edinger, J. D. (2008). Measuring sleep quality. *Sleep Medicine, 9, Supplement 1*(0), S10-S17.

Lebel, C., Beaulieu, C.,. (2011). Longitudinal development of human brain development wiring continues from childhood into adulthood. *The Journal of Neuroscience, 31*(30)

Lichter, D. T., Turner, R. N., & Sassler, S. (2010). National estimates of the rise in serial cohabitation. *Social Science Research, 39*(5), 754-765.

Lonardo, R. A., Manning, W. D., Giordano, P. C., & Longmore, M. A. (2010). Offending, substance use, and cohabitation in young adulthood. *Sociological Forum, 25*(4), 787-803.

Luby E.D., Frohman C.E., Grisell J.L., Lenzo J.E., Gottlieb J.S. (1960). Sleep deprivation: Effects on behavior, thinking, motor performance, and biological energy transfer systems. *Psychomatic Medicine, 22*(3), 182-192.

Meadows, R., Arber, S., Venn, S., Hislop, J., & Stanley, N. (2009). Exploring the interdependence of couples' rest-wake cycles: An actigraphica study. *Chronobiology International, 26*(1), 80-92.

Meadows, R., Venn, S., Hislop, J., Stanley, N., & Arber, S. (2005). Investigating couples sleep: An evaluation of actigraphic analysis techniques. *Journal of Sleep Research, 14*(4), 377-386.

Means, M. K., Edinger, J. D., Glenn, D. M., & Fins, A. I. (2003). Accuracy of sleep perceptions among insomnia sufferers and normal sleepers. *Sleep Medicine, 4*(4), 285-296.

Mortimore IL, Marshall I, Wraith PK, Sellar RJ, Douglas NJ. Neck and total body fat deposition in nonobese and obese patients with sleep apnea compared with that in control subjects. Am J Respir Crit Care Med. 1998;157:280–3.

Myers, D.G. (2013). Social Psychology. The McGraw-Hill Companies, Inc. New York, New York. (11).

Pankhurst, F.P. and Horne, J.A. (1994). The influence of bed partners on movement during sleep. *Sleep, 17*(4), 308.

Pilcher, J.J., Huffcutt, A.J. (1996). Effects of sleep deprivation on performance: A meta-analysis. US: American Academy of Sleep Medicine.

Pilcher, J. J., Ginter, D. R., & Sadowsky, B. (1997). Sleep quality versus sleep quantity: Relationships between sleep and measures of health, well-being and sleepiness in college students. *Journal of Psychosomatic Research, 42*(6), 583-596.

Polizzi, J., Byers, J. F., & Kiehl, E. (2003). Co-bedding versus traditional bedding of multiple-gestation infants in the NICU. *Journal for Healthcare Quality, 25*(1), 5-11.

Ratcliff, R., & Van Dongen, H. P. A. (2011). Diffusion model for one-choice reaction-time tasks and the cognitive effects of sleep deprivation. *Proceedings of the National Academy of Sciences of the United States of America, 108*(27), 11285-11290.

Rechtschaffen, A., Gilliland, M., Bergmann, B., & Winter, J. (1983). Physiological correlates of prolonged sleep deprivation in rats. *Science, 221*(4606), 182-184.

Rigg, R. C., & Cosgrove, M. P. (1994). Aircrew wives and the intermittent husband syndrome. *Aviation Space and Environmental Medicine, 65*(7), 654-660.

Rosenblatt, P. C. (2006). Two in a bed: The social system of couple bed sharing. *State University of New York Press: Albany, NY,*

Rosenthal, L., Roehrs, T. A., & Roth, T. (1993). The sleep-wake activity inventory: A self-report measure of daytime sleepiness. *Biological Psychiatry, 34*(11), 810-820.

Sadeh, A., & Acebo, C. (2002). The role of actigraphy in sleep medicine. *Sleep Medicine Reviews, 6*(2), 113-124.

Sagaspe, P., Leger, D., Taillard, J., Bayon, V., Chaumet, G., & Philip, P. (2010). Might the berlin sleep questionnaire applied to bed partners be used to screen sleep apneic patients? *Sleep Medicine, 11*(5), 479-483.

Sassler, S. (2010). Partnering across the life course: Sex, relationships, and mate selection. *Journal of Marriage and Family, 72*(3), 557-575.

Schalet, A. (2010). Sex, love, autonomy in the teenage sleepover. *SelectedWorks of Amy Schalet,*

Servaty, L., & Weber, K. (2011). The relationship between gender and attitudes toward marriage. *Journal of Student Research.,*

Skrobot, S. L. (2010). Dating and hooking up: An analysis of hooking up as a campus norm and the impact on women's self perception.

Souders, M. C., Mason, T. B. A., Otto Valladare, O., Bucan, M., Levy, S. E., Mandell, D. S., Weaver. T. E. & Pinto-Martin, J. (2009). Sleep behaviors and sleep quality in children with autism spectrum disorders. *Sleep, 32*(12), 1566-1578.

Takano, K., Iijima, Y., & Tanno, Y. (2012). Repetitive thought and self-reported sleep disturbance. *Behavior Therapy, 43*(4), 779-789.

Thomas, K. P., Salas, R. E., Gamaldo, C., Chik, Y., Huffman, L., Rasquinha, R., et al. (2012). Sleep rounds: A multidisciplinary approach to optimize sleep quality and satisfaction in hospitalized patients. *Journal of Hospital Medicine, 7*(6), 508-512.

Thomas, M., Sing, H., Belenky, G., Holcomb, H., Mayberg, H., Dannals, R., et al. (2000). Neural basis of alertness and cognitive performance impairments during sleepiness: Effects of 24 h of sleep deprivation on waking human regional brain activity. *Journal of Sleep Research, 9*(4), 335-352.

Troxel, W. M., Buysse, D. J., Hall, M., Matthews, K. A. (2008/12/22). Marital happiness and sleep disturbances in a multi-ethnic sample of middle-aged women. *Behavioral Sleep Medicine, 19:7*(1)

Troxel, W. M. (2010). It's more than sex: Exploring the dyadic nature of sleep and implications for health. *Psychosomatic Medicine, 72*(6), 578-586.

Troxel, W. M., Buysse, D. J., Matthews, K. A., Kravitz, H. M., Bromberger, J. T., Sowers, M., et al. (2010). Marital/Cohabitation status and history in relation to sleep in mid life women. *Sleep, 33*(7), 973-981.

Troxel, W. M., Robles, T. F., Hall, M., & Buysse, D. J. (2007). Marital quality and the marital bed: Examining the covariation between relationship quality and sleep. *Sleep Medicine Reviews, 11*(5), 389-404.

Tworoger, S. S., Davis, S., Vitiello, M. V., Lentz, M. J., & McTiernan, A. (2005). Factors associated with objective (actigraphic) and subjective sleep quality in young adult women. *Journal of Psychosomatic Research, 59*(1), 11-19.

Virkkula, P., Hytonene, M., Malmber, H., Salmi, T., & Maaslita, P. (2005). Patient and bed partner reported symptoms, smoking, and nasal resistance in sleep-disordered breathing. *CHEST Journal, 128*(4), 2176-2182.

Wade, A. G. (2011). The societal costs of insomnia. *Neuropsychiatric Disease and Treatment, 7.*

Willoughby, B. J., & Carroll, J. S. (2011). Correlates of attitudes toward cohabitation: Looking at the sssociations with demographics, relational attitudes, and dating behavior. *Journal of Family Issues, 33*(11).

Willoughby, B. J., Carroll, J. S., & Busby, D. M. (2011). The different effects of "living together": Determining and comparing types of cohabiting couples. *Journal of Social and Personal Relationships, 29*(3), 397-419.

Worthman, C. M., & Brown, R. A. (2007). Companionable sleep: Social regulation of sleep and cosleeping in egyptian families. *Journal of Family Psychology, 21*(1), 124-135.

Worthman, C. M., & Brown, R. A. Sleep budgets in a globalizing world: Biocultural interactions influence sleep sufficiency among egyptian families. *Social Science & Medicine,* (0).