

# Fear of Dark, Sleep Quality, and Cognitive Failure Among University Student



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**Fear of Dark, Sleep Quality, And Cognitive Failure Among  
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## Certificate

Certified that M.Sc Research report titled “ **Fear of Dark, Sleep Quality and Cognitive Failure Among University Students**” prepared by **Ms. Hannah Ashiq Gill** has been approved for submission to Quaid-i-Azam, University, Islamabad.



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**Fear of Dark, Sleep Quality and Cognitive  
Failures Among University Students**

*Dedicated To the Struggle I  
went through the journey*

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## Abstract

The present study was aimed to explore relationship between fear of dark, sleep quality and cognitive failure among university students. The sample comprised of 320 university students from Rawalpindi and Islamabad including both men (n=160) and women (n=160). Fear of Dark Scale (Kopsco et al.,2017) was used to measure fear of dark in adults. Sleep Quality Scale (Shin et al., 2006) was used to measure sleep quality in adults and the Cognitive Failure Questionnaire (Broadbent et al.,1982) was used to measure cognitive failures. The findings revealed that fear of dark is negatively associated with sleep quality among university students while it was associated with any cognitive failures also. Cognitive failure is affected by sleep quality. Gender differences are measured in this study. Family system and sleep issues also affect the cognitive issues. Moreover, poor sleep was negatively correlated with cognitive failures. Gender differences indicated that women score high of fear of dark, problematic sleep, and cognitive failures.

# **INTRODUCTION**

## Introduction

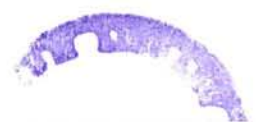
Fear is a self-realized sense of danger. It is naturally present in all human beings but mostly in children. There are many fears present in human beings. Fear of dark is an abnormal and persistent dread of the dark. Fear of the dark (FOD) is commonly conceptualized as a problem of childhood. However, recent research has suggested that FOD also exists in adults, and may be a significant factor in sleep problems (Carney, Moss, Atwood, Crowe, & Andrews, 2013; Moss, Carney, Atwood, Crowe, & Luminoso, 2011). It is normally present in all organisms but mostly in diurnal organisms (organisms that remains active during daytime, with a period of sleep at night i.e., most of the mammals). Fear is a normal and healthy part of life. In fact, fear plays a necessary role, preventing us from entering difficult and risky situations and helping us to choose when to get out of situations that are not certainly the best.

A phobia however, turns the normal fear response into something that is constant and difficult or intolerable to control. When fear of dark reaches to a severe degree it becomes nyctophobia. Nyctophobia is a Greek term based on two words. 'Nyx' means night and 'Phobos' means fear. Nyctophobia is an age-inappropriate fear of darkness that can prompt someone to limit their activities, avoid certain circumstances, and experience anxiety in anticipation of there being no light. It is sometimes called scotophobia (from 'darkness'), or lygophobia (from 'twilight'). It is an enfeeble perception of what would happen when there will be dark around Mikulas & William, (as cited in Mendez, & Garcia, 1996). The fear may not be related to darkness itself but unknown dangers hidden in the darkness (which is why horror and suspense movies often use darkness as a way to scare viewers). Lack of security and confidence can play role into this as well, especially if one tends to be afraid of the dark more often while alone.

Sleep is another phenomenon present in all living organisms. Sleep is a condition of insensibility from which one can be awakened. More than a periodic rest condition for the body and nervous system, it is an episode during which the body and nervous system can recuperate. It is observed that protein synthesis is more active

during sleep than waking hours (Chen et al., 2009). Sleep is also important for performing healthy tasks of daily routine, just like other vital mechanisms of living bodies. In fact, individuals with sleep deprivation mostly enter into a state called 'microsleep', where they fall asleep for very short episodes lasting for few seconds (mostly 30 seconds), during which time they are perceptually 'blind', mostly unaware that they have fallen asleep. Usually, sleep occurs in a regular pattern, however, critical illness can occur due to disturbance in sleep cycle and can be the reason of malfunctioning in a person's life style. Sleep quality as a whole effect social and psychological well-being of a person. Patterns of sleep are known to change throughout the life in various ways, including decreases in quantity and quality of sleep, with up to 50% of older adults' reporting difficulties in starting off and/or maintaining sleep (Crowley, 2011). Sleep disturbances and sleep deprivation are common in modern society. Many researches have shown that since the genesis of the century, populations have been subjected to a steady constant decline in the number of hours which were devoted to sleep. This decline is due to diverse changes in environmental and social conditions like less dependence on daylight for most activities, extended work shifts, and 24/7 round-the-clock activities (Cappuccio, Miller, & Lockley, 2010).

Cognition is an ultimate function of the brain. Cognitive processes involve marvelous products of modular processing to generate, for example, representational knowledge such as language and mechanisms that gets involved with stimulus and response, often in a 'top-down' or 'directive' manner to mediate and reconcile competition (Robbins, 2010). Cognitive failures are defined as lack of abilities to perform tasks successfully that one might typically be able to do on a regular basis. Some examples include forgetting important appointments, leaving mail unanswered for many days, failure to observe street sign boards, and having to reread things. These failures in daily activities are because of hidden problems in basic cognitive functions related to distractibility and memory (Broadbent, Cooper, FitzGerald, & Parkes, 1982). Present research aims to study the relationship of fear of dark with sleep quality. However, a variable 'cognitive failure' is also seen in this context to find out whether fear of dark and sleep quality do have any influence on cognitive functioning. Many studies have found close relation between poor sleep and cognitive failure, mostly in elderly populations. Cognitive abilities such as executive functions,



learning, and memory processes are affected by poor and disturbed sleep (Curcio, Ferrara, & De Gennaro, 2006). Recent work concludes that maintaining good sleep quality, at least in young, adulthood and middle age, encourages better cognitive functioning and helps to protect against age-related cognitive failures (Scullin & Bliwise, 2015).

### **Fear of Dark**

Fear of the dark is an evolutionarily adaptive mechanism for diurnal creatures (that are active during the day and not at night). Human fear levels are elevated in situations where they are deprived of crucial sensory information like visual cues. Humans generally exhibit a greater startle response in a dark room compared to a room with lights (Grillon, Pellowski, Merikangas, & Davis, 1997), which suggests that darkness may provoke heightened arousal, or fear. In the absence of light, visual information is decreased, which may decrease a sense of safety or increase feelings of vulnerability and uncertainty. In addition, there is evidence that nocturnal creatures exhibit a greater startle response in the light (Walker, Cassella, Lee, De Lima, & Davis, 1997), providing further support for the notion that during periods of the day when animals are not typically active, their fear levels are heightened.

While looking for biological explanation of fear of dark, scientists did experiments in search for molecules which is accountable for memory. In an experiment, rats, which are nocturnal animals, were trained to fear the dark and a chemical known as scotophobin was removed from the rats' brains; it was stated that for remembering the fear, this chemical was responsible, but the results disapproved this hypothesized notion. The fear response starts in a region of brain called the amygdala. It is an almond-shaped set of nuclei in the temporal lobe of the brain is committed to detecting the emotional salience of the stimuli (Pandarinath et al., 2017).

In a similar fashion night terrors are early childhood parasomnia associated with disturbance from non-REM slow-wave sleep (Boyden, Pott, & Starks, 2018). They are also known as sleep terrors. According to the American Academy of Sleep Medicine's (AASM) and International Classification of Sleep Disorders, night terrors (also known as sleep terrors) are defined as a cry or piercing scream, accompanied by



autonomic nervous system and behavioral manifestations of intense fear. Children show fears at extreme levels, sleep cries, or uncomfortable sleep. The situation can become alarmingly problematic for the children if these terrors persist. However, fear of dark can be differentiated from night terrors and night panics and it also prevails in adulthood.

Fear is present in every creature as mentioned above but fear of dark is most commonly present in children. They feel afraid when lights go off. Some of the children prefer door open while sleeping. Children around the ages of 2 to 3 years can feel fear of dark because they start thinking and making the figures, but they are not able to separate imaginations from the reality. Some children with this fear have parents with same darkness fear. So, it can be assumed that parents with fear of dark have children having same fear (Rosen, 2013).

A survey conducted by Virginia Tech University in 2012 showed that 40% of the adults are afraid to walk around the house in the absence of light. 10% reported that they tend to stay in bed when the light goes off or in the middle of night. All these people also reported that they suffer from poor sleep because of the fear. It was also reported in the survey that fear is not itself a problem for the individuals but the presence of unseen objects and the past events triggers such fears. The brain associates darkness with the frightening side of unlimited possibilities (Silverman & Ollendick, 2005). In 2000, another survey was conducted in Australia by Philips Lighting. Over 72% from 1000 individuals, reported that they suffer from darkness fear. It was reported in the results that individuals feel immediate physical activations like increased heart rate and breathing while the brain looks for escape solutions. It was also mentioned that basements, garages, hallways and lounge rooms are scariest for the individuals with fear of dark.

One of the reason of being afraid in the dark is negative experiences of past. When people have experienced many unpleasant things in the dark, this influence becomes more important than the influence of being afraid of the dark as a child. It could be so, that thinking about darkness make people more about the experiences they had in the past. In a research it was concluded that darkness triggers the onset of the sleep performance pathway (Grillon et al., 1997). The dark cues the initiation of control behaviors in preparation for the eventual attempt to produce sleep. As an

analogy, this first stage of the pathway is akin to setting up the stage in advance of a performance.

**Fear of dark in developmental context.** In the absence of light that arises as a result of darkness leads to a situation characterized by tension, anxiety, and uncertainty (Grillon et al., 1997). Some irrational fears of childhood can become realistic fears in adulthood. Persistent fear of dark from childhood to adulthood is more problematic. Adults with this fear may feel that they can be victimized more in the dark so they try to avoid such events and situations that occur in the evening. According to Ranschburg (as cited in Haupt 2001), a Hungarian child psychologist, three sides of darkness was proposed effecting emotional statuses of any individual. First is separation, the incidence of darkness represents separation, the disappearance of the individual and its environment. Second is organization of fantasy, during darkness fantasy contents could be projected into the environment with the hindrance of unbiased reality, thus those projections produce heightened fear. The third aspect explains that darkness produces concrete fears related to the sense of danger, when sense of safety is missing. During development fear of dark is common and considered as normal (King et al., 2005; Meltzer et al., 2008). Darkness accelerates a startle response in the brain that increases nervousness (Grillon et al., 1997) as it is said that “brain is wired to flinch first and ask questions later” (Begley, 2007, p. 2). Fear is of very short duration most of the time, but in some cases the fear can be very challenging. Sometimes it can persist throughout development and strengthen in intensity and then can cause problems in daily functioning (King, Muris, & Ollendick, 2005).

Many studies examined the components of adolescence and adulthood fears, investigating information about fear of dark, by factor diagnostic methodologies. Over the investigations, dread of the dim either comprised a free factor, or was incorporated into the elements of agoraphobic feelings of trepidation or dread of the obscure, together with things like being distant from everyone else at home, weird looking individuals, losing all sense of direction in a group, phantoms or creepy things and so on (Burnham & Gullone, 1997). Yet another explanation says that people having unpleasant experiences in the dark during childhood feels more terror when they face darkness in adulthood. Darkness reminds them about the traumatic and bad

experiences of their pasts. It is not that people forget their experiences in light but darkness creates anxiety in individuals (Hafer & Correy, 1999).

**Genetic and environmental influences.** In the acquisition of severe fears, phobia, and anxiety disorders, different factors play a role (Beidel & Turner, 2005; Lichtenstein & Annas, 2000; Silverman & Moreno, 2005). To check heretical studies and the effects of external stimulus on fears, phobias, and other anxiety problems twin and adoptions studies are useful methods. Study conducted on twin siblings indicated that the magnitude of self-reported fears in older twins, from early adolescence to young adulthood. Overall, the effects of genes were also found across the seven fear factors studied (small organisms; negative social interaction; social responsibility; deep water; loved one's misfortunes; dangerous places; and death of closed one's), but with some different fears. The intensities of these effects were also reported in another twin studies conducted on children and adults the results were obtained that there is some genetic component in the acquirement of fear, phobia, and anxiety complaints (Lichtenstein & Annas, 2000; Rose & Ditto, 1983; Silverman & Moreno, 2005).

**Trauma and fear of dark.** Darkness is a cue for danger, which has been reinforced through previous traumatic event(s). Interestingly a positive relationship between trauma and increased fear of dark has been found. Traumatic events that occur during wars, an assault, or even a work related accident can be re-experienced either symbolically or through reenactment in nightmares when there is the dark The researchers suggested that the veterans feel more aversive conditioning to the dark environment because of their experiences during war. Specifically, this relationship was observed especially when subjective measures of fear of dark were used. It was also explained in a research that the duration of trauma and intensity of the traumatic event also effects the startle responses of individuals (Grillon, Morgan, Davis, & Southwick, 1998). The first stage involves a dislike of the experience of being in the dark. It may be that the darkness triggers trauma-related reminders directly (Zayfert & DeViva., 2004).

Cumulatively research has shown that fear of dark is not a direct predictor of insomnia severity. The blinking of eyes (indicating amplitude and latency), mood variables (depression, anxiety, stress, pre-sleep arousal), and

trauma exposure significantly reports subjective discomfort in the dark. Subjectively, participants with insomnia did not report greater fear of the dark than those with good sleep on either the single item that queried about the dark. This result diverges from previous findings that individuals with poor sleep reported current fear of dark as compared to those with good sleep (Carney et al., 2013). Results from the study are also in contrast to past studies that found a greater strength of startle (eye blink amplitude) in the dark as compared to the light.

### **Theories on Fear of Darkness**

Different theories have been presented to explain fear of dark. Some of them are presented here. These include evolutionary theory, psychoanalytical theory, self-arousal theory, fear acquisition theory of Rachman.

**Evolutionary theory.** The dread of the dim is a developmental characteristic that individuals got to endure genuine predators stalking at the night time. Investigators have hypothesized that inherent fear stems from a point of human history when humans were nowhere near the top predators that they are today. Humans only authentically became super predators with the advent of technology, which was not that long ago. Before technology, our ancestors were constantly looked for predators that wanted nothing more than to hunt the humans. To make that scarier, most of these predators hunted at night. This means that it was really necessary for the ancestors to stay safe during night. If they did not, they would have died. This fear of night became part of our instincts with the passage of time and it is still being experience it as a state of mild anxiety in the presence of dark (Bushak, 2015).

Fear of the dark is basically, a fear of the unknown. One's thoughts fill with the unnecessary things when one cannot see what is around and it freaks the person out. For ancient humans, it was lions and other slayers, now in big predator-free cities, there are monsters. Civilization has moved people to cities but the traits of being afraid in dark have been passed on from ancestors (Young, 2006).

**Psychoanalytic theory.** Explanation of fear and phobia mostly comes from the popular perspectives of psychoanalysis and behaviorism. Psychoanalysis was

explained by Freud (1909). Starting with Sigmund Freud, it was considered that the fear of dark to be an indication of separation anxiety disorder. The psychoanalytic theory is mainly built on the ideas of displacement and repression. It is supposed that extreme fears like phobias are the results of unresolved struggles and issues between id and the superego. It was normally believed by the psychoanalysts that personality conflicts that started in childhood and were repressed or displaced onto the feared object. The true source of anxiety is not mainly the object of fear. In repression, the ego tries to forget that conflict is present. Hypnotists who claim to bring forward repressed memories base their work on the Freudian theory of repression. According to this theory, anxiety reactions of id that have been repressed by the ego are the main cause of phobias and fears. It can be assumed that the presently feared object is not the original subject of the fear.

A research has linked nighttime fears of adults with externalizing and internalizing problems (Zisenwine, Kaplan, Kushni, & Sadeh, 2014) like anxiety disorders, especially separation anxiety (Muris, Merckelbach, Ollendick, King, & Bogie, 2001). These internalizing problems are timid attachment and early maladaptive schemas developed during developmental stages (Kopcsó, & Láng, 2014). Separation anxiety is an experience faced by the individual during unrestrained anxiety in respect of separation from home or from people to whom the person has a durable emotional bonding like a parent, caregiver, significant other, or peers. According to the American Psychiatric Association, Separation Anxiety is a disorder which occurs due to repetitive exposure distress when tackled with circumstances of separation from the home especially at night times or from a specific attachment individual. Rather than the developmental level and age, anxiety that is expressed is considered as atypical. The intensity of the symptoms ranges from defensive uneasiness to full-blown fear related to separation. The feelings that are repressed are uprooted on to an object or on circumstances which are related to each other or which are related to darkness. Such circumstances become stimuli for the fear in dark and can be kept away. So, the individual is able to escape from facing and managing with the repressed conflict. It was assumed by Freud that conflicts which remains suppressed occurred in childhood (Muris & Merckelbach, 1998).

**Self-arousal theory.** (Bandura as cited in Deci, & Ryan, 2000) proposed the self-arousal theory, explains that conditional fear is aroused through fear-initiating thoughts. It was further stated that individuals who are aware that certain events forebode distress, such events activate fear-arousal of thoughts, which then produce emotional responses. Conditioning is a matter of belief that past contingencies remain in effect, the more severe the effects are expected to be the stronger the emotional arousal will be. A similar theoretical position was expressed by Beck (Beck, 1983; Beck, Emery, & Greenberg, 1985) in the perceived danger theory of phobia.

**Conditioning theory.** The conditioning theory of fear acquisition is also known as Rachman's theory (1977). This theory indicated that following learning events can be differentiated with reference to acquisition of fears and phobias. First being the aversive classical conditioning, direct aversive experiences through which a stimulus comes to evoke a fear response by association with some traumatic outcome (Davey, 1997), such an association may generate fear of dark in an individual. Secondly modeling or vicarious learning which is the learning through observing others that may come to induce such fears. Then importantly the negative information transmission, including exposure to negative information about the feared content may also be the possible mode of fear generation.

With specific reference to individuals with insomnia who become alert in bed after repeated pairings of the sleep environment (i.e., bed) with wakefulness, or arousal, and negative emotion (Perlis et al., 1997). In connection to these theoretical concepts it has been seen that large number of children (89%) assigns the fear to false information. Findings related to nighttime fears and fear of dark have also been observed where 77.5% of the participating children endorsed false information (especially from television), as the genesis of their fears. Moreover, 24% of fearful children mentioned none of these reasons, explaining that they did not have any idea where their nighttime fears came from. It has also been stated that human fears are 'largely restricted' to situations that threaten survival, have potential predators, unfamiliar places, the dark, etc. (Muris, Merckelbach, Mayer, & Prins, 2000).

## Sleep Quality

Sleep is a part of routine natural mechanism that is fundamental for the advancing well-being and ideal capacity (Pitcher, Ginter & Sadowsky, 1997). The physiology and brain functioning is much dependent upon one's sleep patterns, so the processes of immune system, metabolic activity, regulation of appetite, cardiovascular activity, and hormonal functioning are thus affected by the sleep. Proper healthy sleep is thought to be indicated by regularity and optimal timing, sufficient duration, quality, and lack of any sleep related issues or disorders (Watson, Badr, & Belenky, 2015). In human beings, it is related to the nighttime period of 24-hour time scale because of a complex collaboration of two frameworks, first being the circadian planning framework and second being the sleep/wake dependent homeostatic process (Dongen, Maislin, Mullington, & Dinges, 2003). Circadian process indicates a control of an internal circadian pacemaker, which initiates thresholds for the onset and offset of sleep. Interestingly, homeostatic part is dependent on the sleep-wake history of the individual, with a drive for rest (or rest weight) that develops mind-attentiveness (Borbely & Wirz-justice, 1982). Sleep wake cycle is critical for healthy life and for good performances in all domains of life. Sleep assumes an essential part for healthy and strong duration of the life of an individual.

From the time of famous Greek Era, the phenomenon of sleep has been much thought about but the systematization in the study of sleep has been attained only recently where objective measures are now being utilized. The technological advancement has also made way into the process where computer assisted measures like electroencephalograph (EEG) have assisted scientists to have a look at brain waves in the form of electrical patterns and functions during the sleep.. When exploring sleep and related processes, not all researchers agree on why one sleeps. Sleeping patterns tend to follow a bona fide schedule and experts have same opinion that sleep plays an important role in health and wellness of mind and body (Cherry, 2015).

Sleep quality has clinical significance because of two basic reasons. To start with, declarations about sleep quality are normal. Epidemiological overviews identify that 15-35% of the grown-up population grumbling about continuous sleep aggravation, for example, trouble nodding off or trouble to start with sleep (Bixler,

Kales, Soldates, Kales, & Healey, 1979; Karacan, Thronby, & Williams 1983; Lugaresi et al., 1983).

There are two basic elements of sleep, first is the protection of vitality and second is the rebuilding of the vitality. Protection of vitality is the strength of sleep, how strong sleep is and rebuilding of vitality is going back to deep sleep. Sleep is the key for restoration of the body and for taking care of imperativeness. Poor sleep quality or little sleep is integrated with an increased risk for the development of obesity, alcohol dependence, disease progression, mortality, and lower cognitive performance (Shapiro & Flanigan, 1993). Many studies have shown that sleep deprivation negatively effects mood and lowers cognitive functioning (Pilcher & Huffcutt, 1996).

Taub (1980) reported that uncertain changes in sleep patterns even about of two hours a day without changing the total sleep time can cause decline in both physical and psychological functioning among university students. Psychological problems are more frequent among university students that are caused by academic stress such as anxiety and depression (Hsie, Hsu, Liu, & Huang, 2011). These two studies include both cross-sectional and longitudinal designs. Sleep problems have also been related to the suicide and risk-taking behavior (Adrien, 2002). In addition, prolonged sleep duration is highly linked with lower levels of extroversion in the young adult, whereas better sleep quality is greatly linked with many positive effects like enjoying with friends or having good mood. Research has also predicted that sleep quantity as well as sleep quality may also play a role in cognition. One such study in elderly women has explained that disturbed sleep is associated with an increased and high risk of developing cognitive failures but not with accelerated cognitive deficits (Tworoger, Lee, Schernhammer, & Grodstein, 2006).

These studies thus guide that both physical and mental health of individuals are determined by the quality of sleep they get. Poor sleep and sleep deprivation affect both personal and social health of a person, that is, poor sleep is not only harmful for a person but also cause large scale damage in the life of a person. For example, insufficient sleep is considered as a part in human defaults connected to unfortunate mischances, for example, atomic reactor emergencies, grounding of huge boats, and aeronautics mishaps. A committee of scientists was formed to review recent reports



and related information on the role of human sleep and brain clocks (time-of-day variation in physiology and alertness) in the occurrence of medical and human error catastrophes (Columbus, 1986).

One's optimal sleep duration differs depending on the social context and also one's personal characteristics. A study has identified that the average number of hours' Korean adults (19 years of age and older) spent sleeping was 6 hours and 53 minutes per day, which decreased from 7 hours and 49 minutes in the 2009 data and was ranked the lowest among all Organization for Economic Cooperation and Development (OECD) countries (Kim, Kim, Park, Kang, & Choe, 2013).

### **Theories of Sleep**

Sleep mechanism is differently explained in many theories like repair and restoration theory, evolutionary theory, and information consolidation theory.

**Evolutionary theory.** Evolutionary hypothesis and adaptive theories of sleep proposed that times of movement and latency developed as a method for saving energy. As indicated by this hypothesis, all living organisms are regulated to rest in the middle of timeframes when attentiveness could be more unsafe Webb (as cited in Glossmann & Lutz, 2017). Bolster for this hypothesis originates from similar research with many species. Creatures that have few regular predators, for example, bears and lions, mostly sleep between 12 to 15 hours every day. Then again, creatures that have numerous characteristic predators, for example rabbit, deer, have just brief and small times of sleep, generally getting close to 4 or 5 hours of rest every day (Xie et al., 2013).

**Repair and restoration theory.** This theory indicate that sleep controls the activating and rebuilding of physical and psychological functions that makes the body and mind healthy and regulates the daily functioning. Repair and restoration theory proposed that non rapid eye movement sleep is necessary for rebuilding of physiological functions, while rapid eye movement sleep is important in restoring and repairing mental functions. NREM (non-rapid eye movement) is a sleep without dreams. The brain wave patterns are of high voltage and appears to be slow when electroencephalographic (EEG) patterns are viewed while non-rapid eye movement

sleep. The pulse rate and process of breathing works on lower level but is regular, the blood pressure gets down, and the sleeper is relatively still and calm. Research show that periods of rapid eye moment sleep increases strenuous physical activity. Sleep process in body also speeds up along with the rate of protein synthesis and cell division. This further signifies that repair and restoration happens mostly during sleeping (Oswald as cited in Rasch & Born, 2013).

Horne (1988) extends Oswald's theory and distinguished both patterns of sleep REM and Slow Wave Sleep (SWS). It was proposed that the cerebrum reclamation and renovation occur during center of sleep. Substantial reclamation happens during SWS and likewise happens at different times like during the times of loose alertness. The theory predicts that during the episode when the mind is developing or encountering rearrangement, there will be an expansion in the measure of REM sleep a person has. Secondly, sleep increases when the body undergoes repair. Furthermore, if a person is denied of sleep for a noteworthy period, he/she will try to get the sleep that has been lost. Lastly, sleep deprivation will bring about shortages in psychological working and negative affect.

**Information consolidation theory.** This theory of sleep depends on subjective research and proposes that individuals sleep with a specific end goal to process data that has been procured in the middle of the day. Notwithstanding handling of data from the day earlier, this hypothesis also contends that sleep allows the mind to prepare for the day to come. Some examination likewise recommends that sleep bonds the things one has learned throughout the day into long haul memory. Bolster for this thought comes from lack of sleep studies exhibiting that lack of sleep seriously affects the capacity to review and recollect information. Sleep greatly effects greatly in physiological processes, so it is extremely conceivable that sleep happens for some reason and purpose (Carpentar & Andrykowski, 1998; Iliescu et al., 2003).

Theories of sleep identify the mechanisms through which sleep-wake cycle works and effect physical and psychological health of a person. Harmful effects of poor and deficient sleep can appear suddenly like car accident or it can cause harm through ongoing sleep deficiency like chronic health problems. According to (Sajadi, Farsi, Rajaei, Mazhari, & Habibi, 2016) individuals with poor sleep quality and sleep deprivation are lazier and more tired as compared to the individuals with good sleep

and regular bedtime. Insufficient sleep, in terms of chronic sleep deprivation causes fatigue, mood disorders, poor cognitive performances, and daytime sleepiness.

**Clean-up theory of sleep.** In line with information consolidation theory this theory indicates that sleep allows the brain to clean itself up. Research has found that the brain cleans itself of toxins and waste produced during the day while asleep. Brain cells and neurons produce waste products during their normal daily activities. When one sleeps, fluid flow through the brain increases. This mechanism acts as a waste disposal system, cleansing out the brain of these waste products (Crick & Mitchison, 1983).

### **Cognitive Failure**

Cognitive failure is defined as absent-mindedness, that is, mistakes or errors people make because of slips of attention or memory failure (Reason & Mycielska, 1982). Cognitive failures and dissociation seem to encompass overlapping mental phenomena. Perceptual, attentional, memory, and action-related mental lapses are included in cognitive failures (Broadbent, Cooper, FitzGerald, & Parkes, 1982). Similarly, the defining feature of these disassociations is the disturbance of a person's usually disturbs the integrated mental processes, such as consciousness, memory, identity, and perception (American Psychiatric Association, 2000).

A valuable past literature has indicated that there are evidences of deficits in cognitive functioning on standard laboratory measures of cognition among older adults more than younger adults (Park, 2000). On the contrary, another study suggested that normal elderly people can and do whole or even superior performance on everyday tasks. For any difficult processing of information mental resources are required. These resources are also required when an individual looks for the information, for manipulating or trying to solve any problem. Few theorists have proposed that when general processing gets slower, the cognitive functioning also starts decreasing (Salthouse, 2000) this happens by the virtue of receding of resources available for processing in an individual (Baddeley, 2003; Wingfield, Tun, & McCoy, 2005). However, a thorough spreading of activation in semantic networks has also been proposed to happen with the process of ageing. (Burke & MacKay, 1997; Hasher & Zacks, 1988).

**Dimensions of cognitive failures.** Many studies have proposed that the cognitive failures include comical mistakes such as putting flour in one's own coffee or more serious mischiefs for example turning the road in wrong directions or crossing the roads unintentionally during traffic rush (Broadbent et al., 1982). It was proposed by Broadbent et al. (1982) that cognitive failures are categorized into low and high groups. However, when working on measures of cognitive failures some of the authors have also specified various factors alongside this general conceptualization (Unsworth et al., 2012). This underlying structure has been explained by three different studies about a frequently used measure of cognitive failures which is Cognitive Failure Questionnaire via factor analysis. The models proposed in the researches include either three factors (Broadbent et al., 1982), four factors (Wallace, Kass, & Stanny, AS2002). 2002) or five factors (Pollina, Greene, Tunick, & Puckett, 1992). All the presented studies explained that CFQ is mainly focused on memory and action slips, while perception, interpersonal intelligence, and distractibility were less focused. It was observed that in a healthy population CFQ was distributed normally, when doing gender based comparison however, incidence has been found more in women as compared to men (Boomsma, 1998; Kanai, Dong, Bahrami, & Rees, 2011).

Broadbent et al. (1982) findings predict that minor mental health symptoms of stress can be caused due to increased cognitive failures. In later research Broadbent et al. (1986) explained that during heightened anxiety states the incidence of mental slips and high scores on CFQ appears. It implies that in the absence of anxiety, these high scorers may perform similar to the low scorers. This also implies that individual differences are there in such trait-like domain where exposure to stress increases tendency to commit more failures cognitively; thus the negative effect of stress is further strengthened. These negative impacts can be anxiety and fear also.

In real world performance it is observed that subjective measures of cognition provide the understanding of cognitive functioning. Correlation has been observed between one's cognitive failure levels and spousal performance related ratings, the cognitive failures also have been seen to correlate with spousal ratings of performance; these ratings indicate how few errors are noticeable (Broadbent et al., 1982). When assessed in terms of T Scholastic Aptitude Test (SAT) the errors have been found to show moderate relationship with academic results (Unsworth et al.,

2012). In a similar fashion, self-reported failures committed cognitively also have been shown to display consonance with at fault traffic accidents (Larson & Merritt, 1991). In real life scenarios, his exceptional flair on part of self-reporting greatly helps in predicting even to the extent of life/death performance results. However, no correlation has been found between cognitive failures and standard intelligence test (Broadbent et al., 1982). Similarly, cognitive failures have been explained to have qualitative features when addresses in terms of attention management processes. Moreover they are not considered to be tied to IQ testing thought to be a difficult line of processes (Larson & Merritt, 1991).

### **Theories on Cognitive Failures**

Various theoretical explanations have been provided with reference to incidence of failures in cognitive functioning. Few have been outlined below.

**Biological explanation.** Cognitive failures also have some biological basis. Two MRI studies have reported that individuals with high distractibility in their daily routine have increased parietal grey matter (Kanai et al., 2011; Sandberg et al., 2014). It was also found by a group of researchers that decreased amount of GABA in the occipital lobe is associated with increased risk of cognitive failures. Both of these findings explained the role of organic deficiencies in daily processing. High neural density can be the indication of decreased synaptic pruning during developmental stages (Kanai et al., 2011). However, sensory information can be repressed by low levels of GABA (Sandberg et al., 2014). Since 50% of the interpersonal differences in cognitive failures are well explained by GABA levels and the volume of parietal grey matter (Sandberg et al., 2014). This explanation supports a neural basis for the inherit ability of cognitive failures.

**Cognitive theory.** Cognitive theory posits that depression is the reason of a negative cognitive set. Systematic disturbances in information processing are visible in maintaining belief in the validity of these views despite contradictory environmental reasons.

***The diffusion model.*** The diffusion model is a model of the cognitive processes involved in simple two-choice decisions. It differentiates the quality of

proofs entering the decision from decision milestones and from other non-decision. The model should be applied only to relatively fast two-choice decisions (mean reaction time less than about 1000 to 1500 ms) and only to decisions that are a single-stage decision process (as opposed to the multiple-stage processes that might be involved in, for example, reasoning tasks). The diffusion model proposed that decisions are made by a noisy process that collects data over time from a starting point toward one of two response criteria or boundaries. The process can face failure when noise tends to interfere with data accumulation and channelization (Voss & Lerche, 2015).

*Cognitive load theory.* Cognitive load theory is an idea which is first published by Sweller (1988). According to the idea, mental processing one should avoid overloading one's mental attempt when doing something (Jong, 2010). Otherwise failures are likely to occur. This theory delineates two kinds of loads that can make way to the processing of information. These include intrinsic and extrinsic factors. It is usually recommended to minimize the extraneous factors because they are known to lower the functioning and performance. The intrinsic factors however, are not in one's control like the inherent difficulty in the material to be learned.

### **Fear of Dark and Sleep Quality**

Individuals with sleeping disorder like insomnia experience more arousal of fear, when the lights go off or when they try to sleep. It was well explained by Grillon et al. (1997) in startle paradigm that individual are scared more in a dark room as compared to a room with lights. If an individual feels fear in the dark, one will also experience increased anxiety at bedtime. The fear of the dark is one of the most commonly reported fears among children (Muris et al., 2000). This fear of dark mostly disappears with increasing age. However, it also prevails in adulthood though the reason of fear of dark in adults is unknown. The fear explained as a conditioned arousal and it is somehow linked with bedtime routine with wakefulness and negative emotions (Perlis, Giles, Mendelson, Bootzin, & Wyatt, 1997) whereas conditioned arousal is a well-documented process, it is unknown if the situation itself, that is turning off the lights to begin the sleep may lead to heightened arousal. If someone is uncomfortable in the dark, their responses and reactions should increase because of the anticipatory anxiety initiated in the first dark exposure (Grillon et al., 1997), that

is, the amplitude should increase and the latency to blink should decrease in the second dark exposure.

Individuals having poor sleep had a higher rate of self-reported discomfort in the dark, as compared to people with good sleep. In fact, almost half of poor sleepers had confessed that they feel moderate disturbance and comfortability in the dark. This was interesting because it was a thought that the beginning of fear or discomfort in dark is somehow linked with childhood and that there would be under-reporting of this fear. This study suggests that adults may also report feeling discomfort in the dark situations when asked. There were no differences in self-reported childhood fear of the dark between good and poor sleepers. It is still unknown that if the poor sleepers have high fear of dark due to unresolved fear in the childhood or poor sleep initiates the fear of dark which was already resolved in the developmental process (Binks, Waters, & Hurry, 1999).

To study the role of darkness in context of various kinds of psychological influences two experiments were executed to investigate effects and presence of darkness. In the first experiment, when in a dark room participants, did not show any difference between the light and dark condition while using task performance and emotion based self-reports. In second experiment, possible experience was called upon from participants when they would be walking in a dark or a lighted street, people were asked to describe how they felt based on the condition about which the question was asked. To investigate the influence of darkness, overt, implicit, and behavioral measures were used. This results indicated that differences were between dark and lighted conditions were nonsignificant on performance and emotion based measures. During the light and dark conditions, task based performances and self-reports were same (Levos & Zacchilli, 2010).

In another study Levos and Zacchilli, two types of photos were used to check the responses of the individuals, alley photo and the nighttime gazebo photo. In regard to the photograph of the nighttime alley, most of the participants responded about the reasons that why they feel uncomfortability because they fear about being victimized. Responses such as the possibility of being attacked or the location being dangerous were frequent. Responses toward the nighttime gazebo images were very different.

Participants had a safe feeling in gazebo photos, they were comfortable because it was a lit and peaceful place.

People with sleeping issues may face fear of darkness and night. Few researchers say that some adults face insomnia driven by fear. Insomnia is a common sleeping disorder. Almost 30% of the adults face sleeping problems. Upto 15% have chronic insomnia. It includes difficulty falling or maintaining the sleep, waking up before time, or having poor sleep quality (Leger, Guilleminault, Dreyfus, & Delahaye, 2000; Morin, LeBlanc, Daley, Gregoire, & Mérette, 2006). In another research focused on fear of dark among adults facing some sleep issue. The researcher observed the blinking of eye of poor and good sleeper in the same room with lights and without lights. Speed of blinking, the size, and repetition of blinking was also observed. The poor sleepers tend to blink their eyes faster when they expose to dark with some noise. Not so good sleeper gave startle responses in the dark while individuals with good sleep get immune to dark even if there is noise (Carney et al., 2013). So according to the given results people who are poor sleepers may tend to be afraid in dark.

Fear of the dark contributes in increasing arousal once the lights are turned off for the individuals with poor sleep (Carney et al., 2013). In a research it was proposed that insomnia is a pervasive sleep disorder which mostly occurs with medical disorders. A recent study found that in young adults, fear of dark is higher among those with sleep problems (Carney et al., 2013). Fear of the dark is an evolutionarily adaptive mechanism for diurnal creatures. This fear elevates when there is no sensory information. Fear of dark is not an unusual or irrational experience. It is well confirmed that many individuals with insomnia experience a phenomenon of heightened physiological and cognitive arousal after turning out the lights in preparation for sleep.

### **Fear of Dark and Cognitive Failures**

Specific phobias play vital role in the development of psychological theories of anxiety and its treatment. Phobias always play role in increasing anxiety and cognitive disruption. Specific phobias are fear of some specific object or condition which usually interferes with the phobic individual's functioning and



it is linked with avoidance of the phobic stimulus regardless of the understanding that the terror is irrational or out of proportion. Phobias disturb person's emotional states for some particular time. The idea of fear based on anxiety, thus is supposed to influence cognitive functioning. Fear of dark when starts increasing in severity it become a phobia, disturbing the life of an individual. It is hypothesized that cognitive avoidance results in lack of focused attention and weak encoding of images. This conceptualization about cognitive avoidance is given by (Foa & Kozak as cited in Lazarus, 2006). Responsiveness is a linear and serial process which gets disrupted in the presence of the disorganized events and conditions (Broadbent as cited in Neisser, 2014).

A study was done to explain the reasons behind incidence of fear or phobia related to different objects. The results indicated that fear intensifies in relation to strength of negative beliefs regarding arousal of fear. This is an indication of the importance of cognitions. The results from these studies described here are evidence for the importance of cognitions in the maintenance of phobias. This had thus been hypothesized as being related to cognitive avoidance resulting in a failure of focused attention and consequent impoverishment of feature encoding and paucity of imagery (Foa & Kozak as cited in Lazarus, 2006).

### **Sleep Quality and Cognitive Failures**

A study highlights that in normal population lack of sleep negatively effects the cognitive functioning such as paying attention or use of working memory (Alhola, & Kantola , 2007). It was also mentioned in a study that not only sleep quality matters for cognition but sleep quantity also plays important role in cognitive functioning. It was also mentioned that women having disturbed sleep have more chances of having cognitive impairments (Tworoger, Lee, Schernhammer, & Grodstein, 2006). One study has explored that performance on memory tasks is considerably reduced on Monday morning because of delayed sleep on weekend (Yang & Spielman, 2001). In another study it was explained that people having insomnia have very decreased mental abilities as compared to the individuals with normal sleep so their cognitions are also disturbed and slow as compared to normal individuals (Fortier, Beaulieu, Ivers, & Morin, 2012).

Similarly, in context of Positron Emission Tomography (PET) it has been reported that brain is more active when resting or right after waking up than the brain without rest or having less sleep (Raichle & Mintun, 2006).

### **Fear, Anxiety, and Cognition**

At pharmacological, neural and social level it was predicted that presence of fear and anxiety are dissociable (Grillon et al., 1991; Grillon, 2008; Davis et al., 2010). Fear is of something and anxiety is about something. A main contributing factor which makes difficult to concentrate is the influence of anxiety on cognitive processing. At communal level and work surroundings lack of concentration appears to be problematic. Continuous worry can be seen as maladaptive in such situations. In some species anxiety is also similar to fear. In unaware and new environments, while balancing increased vigilance and action enthusiasm as an indication of imminent danger improves survival odds during thoughtful avoidance (Kalin & Shelton, 1989). However, adopting such behavior permanently can easily disturb one's life.

In the literature on anxiety, fear of dark is most commonly explained as an instant defensive reaction to frightening condition, however more diffused response with nervousness about some upcoming event is termed as anxiety (Beidel & Turner, 2005; Johnson & Melamed as cited in Kendall, 1994). In adults, behavior problems are most commonly seen due to anxieties, fears, and some specific phobias (Lichtenstein & Annas, 2000). Similarly, according to conditioning theory, it is predicted that fear or pains are linked with unbiased stimuli. These fears are most commonly learned and adopted when they get paired with similar stimuli, sometimes these fears become more intense when paired with original unconditional stimulus (Rachman as cited in Ollendick, & King, 1991).

Other risk factors that are suggested to be important contributors to anxiety disorders and specific phobia in youths are the beginner signs of severe behavioral inhibition (sometimes also termed as anxiety proneness or trait anxiety), and parents' own anxiety (Beidel & Turner, 2005; Shamir-Essakow, Ungerer, & Rapee, 2005; Silverman & Moreno, 2005). Briefly, adults with

behavioral inhibition are mainly described as fearful and avoidant when exposed to new objects and strange situations (Kagan, Reznick, Clarke, Snidman, & Garcia-Coll as cited in Reeve, 2014)

### **Role of Demographic Characteristics**

It was reported in some researches that men are less afraid in the absence of light as compared to women. Second, people who were more afraid of dark during childhood are less afraid when grown up. Self-reporting of men and women was also mentioned differently as men indicated that they have less fear of darkness. However, it was explored that on basis of gender differences while as children, men and women showed to be similarly scared in childhood (Carney et al., 2013). Women are more likely than men to see themselves as having a higher probability of being abused (Caiazza, 2005; Fetchenhauer & Buunk, 2005). The reason is that average males consider them as stronger than females and they feel less fear when alone in the dark.

Further, a study highlighted that adults confessed easily that they are afraid of dark. It was shocking that how many people acknowledged that they were afraid of the dark as adults. The startle reflex of adults is highly assisted by darkness, the individuals who reported higher childhood fear of the dark have shown more significant effects in adulthood (Grillon et al., 1997). In a survey conducted in UK, it was reported that 35% women are afraid of dark, compared to 25% men.

Other than fear of dark, sleeping problems are also observed with reference to gender differences (Leger et al., 2000). Gender differences during sleep deprivation could be due to either physiological or social factors. Brain structure and functioning of men and women differ from each other (Ragland et al., 2000; Cowell et al., 2007). The difference in brain structure and functioning is highly observed in cognitive functioning in normal, non-deprived conditions both. Some studies have explored gender differences in cognitive functioning while sleep disturbances. During an attentive performances of different tasks was more disturbed in men but returned to the normal in both men and women after recovery sleep (Corsi-Cabrera et al., 2003). Women performed better than men on tasks of memory as adults. Women exhibit better memory test performance than men in healthy older populations (Jorm, Anstey, Christensen, & Rodgers, 2004). In another research it was explained that men and

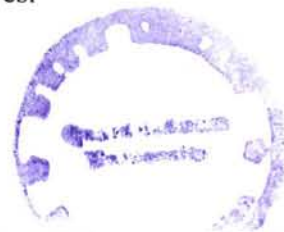
women socialize differently by their families and cognitive functioning can also be affected by other social units too (Willingham & Cole, 2013). There was a research conducted in America, Australia, and China and it was reported that higher levels of fears are present in girls than boys (Ollendick et al., 1996). It was an interestingly founded that in Nigeria no differences were found about fear of dark in both girls and boys (Jackson, 2009; Nasar & Jones, 1997).

### **Rationale of Study**

Humans are afraid of dark stated in many researches (Berk, 2011; Grillion et al., 1997; King, Muris, & Ollendick, 2005; Meltzer et al., 2008; Nasar & Jones, 1997). The experience of such kind of fear though is common but has been explored quite less in comparison to other kinds of fears. Such an experience of fear from the dark which depletes an individual from visual information induces startling responses and thus is supposed to disturb sleep patterns of an individual. Moreover, sleep disturbances being tied to producing cognitive deficits (Pilcher & Huffcutt, 1996) and can also be seen in terms of cognitive failures committed by an individual.

It is also being observed in previous literature that fear of dark is also present in adults, which may be because they can feel more chances of being victimized in the absence of light and visual stimuli (Caiazza, 2005). People having fear of darkness also show more sleeping problems, researches have shown that absence of sleep can impair cognitive functioning and affects the mood also (Pilcher & Huffcutt, 1996). Thus, in line with this, current research therefore aims to see whether fear of dark and sleep quality have an impact on cognitive failures committed by an individual. Present study also aimed to discover gender based differences on fear of dark, sleep quality and cognitive failures. Literature though guides that women have more probability of being oppressed in dark places (Caiazza, 2005; Fetchenhauer & Buunk, 2005). Younger women have more insecure feelings in the dark (Jackson, 2009; Nasar & Jones, 1997).

Specific phobias have been seen to interrupt overall functioning of an individual. In this context fear of dark is seen to be a potential anxiety provoking event that is susceptible to impact sleep quality and induce cognitive failures.



## **METHOD**

## Methods

### Objectives

Following are the objectives of the current study.

1. To explore the relationship between fear of dark and sleep quality and cognitive failures among university students.
2. To investigate the role of demographic variables including age, gender, education, family system sleep issues, and sleep alone or with someone in consideration to fear of dark, sleep quality, and cognitive failure among university students.

### Hypotheses

Following are some of the hypothesis proposed in this study.

1. There will be negative relationship between fear of dark and sleep quality.
2. There will be a negative relationship between sleep quality and cognitive failures.
3. There will be positive relationship between fear of dark and cognitive failures.
4. Women will score higher on fear of dark and poor sleep quality as compared to men.

### Conceptual and Operational Definition

Following are the conceptual and operational definitions of study variables.

**Fear of dark.** The lack of any kind of visual stimuli in the absence of light increases anxiety, uncertainty, and tension in people. A greater startle response in a dark room as compared to a lit room creates fear of dark (Grillon et al., 1997).

In this study fear of dark was operationalized through scores obtained on Fear of Dark Scale (Kopso et al., 2017). High scores on this scale indicates more fear of dark and low scores indicates less fear of dark.

**Sleep quality.** It includes quantitative phases of sleep, such as duration, sleep latency, or number of arousals as well as more purely subjective aspects, such as depth or restfulness of sleep (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).

In this study sleep quality was operationalized through scores obtained on Sleep Quality Scale (Shin et al., 2006). High scores on the scale indicates low sleep quality whereas low scores indicate good sleep quality. For the purpose of statistical clarity result section outlines scores with reference to sleep quality issues and thus delineates the construct with title of sleep problems.

**Cognitive failure.** Perceptual, attentional, memory, and action-related mental lapses are included in cognitive failure (Broadbent et al., 1982).

In this study cognitive failures were operationalized through scores obtained on Cognitive Failure Questionnaire (Broadbent et al., 1982). High scores of the scale indicate more cognitive failures and low score indicate fewer failures of cognitions.

**Forgetfulness.** It is an affinity to let go from one's mind something known or planned, for example, names, numbers, intentions, appointments, and words (Rast et al., 2008).

In this study forgetfulness was operationalized through scores obtained on forgetfulness subscale of Cognitive Failure Questionnaire (Broadbent et al., 1982). High scores on the scale indicate greater tendency to forget and vice versa.

**Distractibility.** It is mainly in social situations or interactions with other people such as being absent minded or easily troubled in one's focused attention (Rast et al., 2008).

In this study distractibility was operationalized through scores obtained on distractibility subscale of Cognitive Failure Questionnaire (Broadbent et al., 1982). High scores on the scale indicate greater tendency to distract and vice versa.

**False Triggering.** It is an interrupted processing of cognitive sequencing and motor actions (Rast et al., 2008). It may be seen as resulting from loss of activation in attentional resources (Norman & Shallice as cited in Miyake et al., 2000).

In this study false triggering was operationalized through scores obtained on false triggering subscale of Cognitive Failure Questionnaire (Broadbent et al., 1982). High scores on the scale indicate greater tendency to false triggering and vice versa.

### **Instruments**

Following scales were used in current study to measure the study variables.

**Fear of the Dark Scale (FODS).** This scale was developed by Kopso et al. (2017). The scale consists of 13 items, using a four-point rating scale where 1 indicates never, 2 for less, 3 for moderate and 4 for mostly. The internal reliability of the scale is Cronbach  $\alpha = .73$  (Kopso et al., 2017). The scale showed strong correlation with the frequency of fear of the dark (as measured by a single item; Spearman's  $\rho = .73$ ;  $p < .001$ ), which is indicative of the scale's concurrent validity.

**Sleep Quality Scale (SQS).** The scale was developed by Shin et al. (2006) The scale consists of 28 items using four-point rating scale. The item indicates (0 = "few," 1 = "sometimes," 2 = "often," and 3 = "almost always"). The SQS evaluates six domains of sleep quality including daytime symptoms, restoration after sleep, problems initiating, maintaining sleep, difficulty waking and sleep satisfaction. The scale has been validated in individuals aged 18–59 years. Internal consistency of the scale is .92, a test-retest reliability of .81 (Shin et al., 2006). The SQS is seen to be strongly correlated with results obtained on the Pittsburgh Sleep Quality Index ( Buysse et al., 1989).

**Cognitive Failure Questionnaire.** The CFQ was developed by Broadbent et al. (1982). It was consisted on 25 items. It is based on 4 point Likert scale. Response categories range from 0 to 4. The scale has 3 subscales. Eight item assess forgetfulness (Items 1, 2, 7, 16, 17, 20, 22, and 23), Nine item assess distractibility (Items 8, 9, 10, 11, 14, 19, 21, and 25) and nine items assess false triggering (Items 3, 4, 5, 6, 12,13, 15, 18, and 23). The scale has been observed to indicate good internal consistency of .80 (Broadbent et al., 1982).

### **Research Design**

The present research was a quantitative, correlational research examining the relationship of fear of dark, sleep quality, and cognitive failure. Fear of Dark Scale



(Kopso et al., 2017), Sleep Quality Scale (Shin et al., 2006), and Cognitive Failure Questionnaire (Broadbent et al., 1982) were used for this purpose. The study was done in two phases, first phase was of tryout and then in the main study empirical testing study was done to investigate the study proposed hypotheses. Survey method was used to collect data from participants.

### **Phase I: Tryout**

**Objective.** The tryout phase was designed to analyze the extent to which the items of instruments (including includes FODS, SQS, and CFQ) were comprehensible and understandable for the participants and the level of difficulty of items.

**Step I: Author's consent.** To use the above mentioned instrument it was ethically needed to take permission for using scales in this research so permission was taken from their authors (see appendix A).

**Step II: Sample opinion.** With the specific end goal to acquire sample opinion regarding appropriateness of each item according to their level of understanding they were asked to provide feedback on each item with reference to difficulty of the provided items. Twenty students were approached in university settings following convenient sample technique. The age range of participants was from 20 to 30 years. Every participant was clarified about the purpose of study and after their consent, sample participants were provided with written and verbal direction. Participants were ensured about confidentiality and ensured that all information will be utilized just for research purpose. Their queries regarding clarity of the items and their confusions were noted by the researcher herself cautiously. The sample opinion showed a query highlighted in the fear of dark questionnaires, this query was related to the meaning in of a single word of item no. four of this scale.

**Step III: Committee approach.** A committee was requested to give their recommendations and suggest substitute word for the highlighted phrases. Member of the committee comprised of two PhD scholars. The committee suggested a synonym to be incorporated in the item in bracket.

**Step III: Result.** In line with suggestion provided by experts modified item that is, synonym word in bracket was used in the final version that was used in main study.

## Phase II: Main study

Main reason of this study was to test the proposed hypotheses and in line with study objectives.

### Sample

For the main study, a sample of 320 students (160 boys and 160 girls) was selected. Age of participants ranged from 18-30 years ( $M = 2.13$ ;  $SD = .52$ ). They were the students of BS, M.Sc., and M.Phil. Students participated in research were from both discipline i.e., social sciences and natural sciences. The sample was drawn from different department of COMSATS, Bahria, Foundation, and Quaid-i-Azam universities of Islamabad. In the present research different demographic variables like gender, age, level of education, and few questions related to sleep and fear of dark. Detailed profile of participants with reference to these demographic variables is presented below.

Table 1

Demographic Details of Sample ( $N = 320$ )

Demographics	<i>f</i>	%
<b>Gender</b>		
Male	160	50%
Female	160	50%
<b>Age</b>		
20-25 years	279	87.2%
26-30 years	41	12.8%
<b>Education</b>		
BSc	143	44.7%
BS/MSc	77	24.1%
MS/MPhil	94	29.4%
Phd	6	1.9%

**Family System**

Joint	95	29.7%
Nuclear	225	70.3%

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Table 1 represents demographic profile of research participants approached for this study. It displays frequency and percentages of sample along with gender, age, family system, education, and questions related to the experienced sleep problems and sleeping alone or with someone.

**Procedure**

In order to collect data, permission was first acquired from administration of respective institutions. The participants were then approached in their class rooms. Then after explaining the study purpose, informed consent was taken from the participants. Then study questionnaire was handed over to the participants and they were assured for anonymity and data confidentiality. In addition, the right to quit at any stage was highlighted. They were given all instructions in detail and all their queries were addressed for the purpose of data collection. At the end respondents and institute authorities were acknowledged for their corporation.

## RESULTS

## Result

The study was aimed to explore the relationship between fear of dark, sleep quality, and cognitive failure among university students. Moreover, demographic variables including age, gender, and education, fears, sleeping issues, and sleeping patterns were also explored in relation to study variables. The quantitative analysis was carried out by using SPSS 21. The statistical analysis consisted of descriptive and inferential statistics. Descriptive statistics that include mean, standard deviation, range, skewness, kurtosis whereas, in inferential statistics correlation and *t*-test were used. To measure the internal consistency of the scales *Cronbach's* alpha coefficient reliability was used. *Pearson* product moment correlation analysis was used to explore the relationships among study variables. To investigate the role of gender, education, and sleeping issues and patterns independent *t*-test was used. The tabulated results are shown as follows:

Table 2

*Detailed Descriptive Statistics for all of the Variables and Alpha Reliabilities of the Scales (N = 320)*

Measures	No. of Items	<i>a</i>	<i>M</i>	<i>SD</i>	Range		Skewness	Kurtosis
					Potential	Actual		
FOD	13	.70	27.29	6.05	13-52	14-47	.42	.27
SQS	28	.83	39.53	12.04	0-84	14-71	.35	-.45
CFQ	25	.89	48.85	15.99	0-100	11-89	-.03	-.51
Fog	8	.71	15.86	5.64	0-28	1-25	.07	-.34
Dis	8	.74	16.51	5.89	0-28	2-26	.08	-.34
FTrig	9	.76	16.32	6.56	0-32	1-29	.13	-.68

*Note.* FOD = Fear of Dark; SQS = Sleep Quality Scale; CFQ = Cognitive Failure Questionnaire; Fog = Forgetfulness, Dis = Distractibility, FTrig = False Triggering.

Table 2 shows the alpha reliabilities, mean values, standard deviation, range of scores, skewness, and kurtosis of all the measures used in the study. Reliabilities of all the scales and subscales fall within the acceptable range. The mean values indicate average score on respective measure and standard deviation indicates degree of spread in the data. Skewness and kurtosis values are also observed within acceptable range i.e., +1 to -1 (Field, 2013).

Table 3

*Correlations Matrix Among Study Variables (N = 320)*

Variables	1	2	3	4	5	6	7
1. FOD	-	.25**	.02	-.01	-.02	.05	-.16**
2. SP		-	.18**	.12*	.24**	.14**	.03
3. CF			-	.88**	.87**	.90**	-.17**
4. Fog				-	-.66**	.71**	-.14*
5. Dis					-	.67**	-.14*
6. FTrig						-	-.16**
7. Age							-

*Note.* FOD = Fear of Dark; SP = Sleep Problem; CF = Cognitive Failure; Fog = Forgetfulness, Dis = Distractibility, FTrig = False Triggering.

Table 3 shows the correlation of all the variables along with the subscales which are used in the study. The result depicts that there is positive significant correlation between fear of dark and sleep problems. Therefore, the positive correlation coefficient is in line with the hypothesis that there will be a negative relationship between sleep quality and cognitive failures. Secondly, correlation between fear of dark and cognitive failure came to be nonsignificant. In addition, subscales of cognitive failures did not correlate with fear of dark. Then sleep problems had positive correlation with cognitive failure again they are in line with the proposed hypothesis that there is a negative relationship between sleep quality and cognitive failure. Similarly, the domains of cognitive failure also show significant positive correlations with sleep problem. These will also be interpreted in opposite direction and are in accordance with proposed notion. Moreover, domains of cognitive failure are all positively related with each other which provide evidence for the construct validity. With reference to age it can be observed that there is a negative relationship between fear of dark and age. Similarly age has negative relationships cognitive failures and its domains.

Table 4

*Mean Differences with Reference to Gender on Variables of Study (N = 320)*

Variables	Men (n = 160 )		Women (n = 160)		<i>t</i>	<i>p</i>	95 % <i>CI</i>		Cohn's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>	
FOD	25.95	6.11	28.64	5.70	-4.06	.00	-3.99	-1.39	.45
SP	37.80	10.93	41.27	12.87	-2.58	.01	-6.11	-.83	.37
CF	46.70	14.68	50.99	16.97	-2.40	.02	-7.80	-.78	.35
Fog	15.21	5.40	16.50	5.82	-2.04	.04	-2.52	-.05	.23
Dis	15.48	5.30	17.52	6.28	-3.14	.00	-3.33	-.76	.45
F.Trig	15.78	6.34	16.85	6.76	-1.46	.15	-2.51	.37	-

*Note.* FOD = Fear of Dark; SP = Sleep Problem; CF = Cognitive Failure; Fog = Forgetfulness, Dis = Distractibility, F.Trig = False Triggering.

Table 4 illustrates the mean based gender differences on fear of dark, sleep problems, cognitive failure, and its subscales. It is evident in the table that females have more fear of dark. Women have less sleep quality, indicated by higher score on sleep problems women than men since low scores on scale indicate more of sleep quality. For cognitive failures and its subscales forgetting and distraction, women scored higher as compared to men. Effect sizes are medium to high for fear of dark and distraction. For sleep problems, cognitive failures, and forgetting effect sizes are small to medium.



Table 5

*Mean Differences with Reference to Education Level on Variables of Study (N = 320)*

Variables	BS/MSc (n = 220)		M.Phil/PhD (n = 100)		t	p	95 % CI	
	M	SD	M	SD			LL	UL
FOD	27.30	5.85	27.28	6.50	.01	.98	-1.42	1.46
SP	38.75	11.70	41.24	12.66	-1.72	.09	-5.36	.37
CF	49.10	16.68	48.27	14.36	.43	.67	-3.00	4.68
Fog	16.07	5.91	15.39	4.10	1.00	.32	-.66	2.02
Dis	16.67	6.10	16.14	5.49	.73	.47	-.89	1.94
FTrig	16.36	6.70	16.21	6.28	.19	.85	-1.41	1.71

*Note.* FOD = Fear of Dark; SP = Sleep Problem; CF = Cognitive Failure; Fog = Forgetfulness, Dis = Distractibility, FTrig = False Triggering.

Table 5 illustrates education based mean differences on sleep problems, fear of dark, and cognitive failure. It is indicated that students of both the educational groups did not display significant mean based differences on any of the measured variable.



Table 6

*Mean Differences with Reference to Family System on Variables of Study (N = 320)*

Variables	Joint (n = 94)		Nuclear (n = 225)		<i>t</i>	<i>p</i>	95 % <i>CI</i>	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			<i>LL</i>	<i>UL</i>
FOD	26.94	6.15	27.45	6.03	-.69	.48	-1.98	.94
SP	40.21	10.76	39.16	12.50	.74	.45	-1.71	3.81
CF	48.84	14.77	48.95	16.47	-.06	.95	-3.99	3.76
Fog	16.04	5.17	15.79	5.84	.36	.72	-1.12	-1.61
Dis	16.31	5.40	16.61	6.09	-.43	.67	-1.73	-1.12
FTrig	16.49	6.13	16.30	6.69	.23	.82	-1.39	-1.71

*Note.* FOD = Fear of Dark; SP = Sleep Problem; CF = Cognitive Failure; Fog = Forgetfulness, Dis = Distractibility, FTrig = False Triggering.

Table 6 illustrates the mean differences on the basis of family system (i.e., Joint and Nuclear family systems) on fear of dark, sleep quality, and cognitive failure. The results indicate that there have been nonsignificant differences in any of the variables with reference to study variables.

Table 7

*Mean Differences with Reference to Sleeping Issues on Variables of Study (N = 250)*

Variables	Yes (n = 232)		No (n = 82)		t	p	95 % CI	
	M	SD	M	SD			LL	UL
FOD	27.61	6.16	26.39	5.68	1.57	.12	-0.31	2.74
SP	40.03	12.27	38.04	11.28	1.28	.20	-1.07	5.05
CF	49.37	16.28	47.35	15.12	.98	.33	-2.02	6.05
Fog	15.89	5.59	15.77	5.81	.17	.87	-1.30	1.55
Dis	16.67	6.05	16.05	5.40	.82	.41	-0.87	2.11
FTrig	16.58	6.64	15.53	6.31	1.25	.21	-0.60	2.70

*Note.* FOD = Fear of Dark; SP = Sleep Problem; CF = Cognitive Failure; Fog = Forgetfulness, Dis = Distractibility, F Trig = False Triggering.

Table 7 illustrates the mean based differences on fear of dark, sleep quality, and cognitive failures with reference to having or not having sleep issues. The results indicate that all the variables have no significant mean differences with reference to the experience of sleeping issues.

Table 8

*Mean Differences with Reference to Sleeping Pattern (Sleep Alone or With Other) on Variables of Study (N = 320)*

Variables	Alone (n = 166)		With Someone (n = 43)		T	p	95 % CI	
	M	SD	M	SD			LL	UL
FOD	26.36	6.06	28.40	7.24	-1.69	.09	-4.44	.37
SP	39.51	11.20	35.93	10.74	-1.87	.06	-.21	7.37
CF	50.37	14.34	46.16	16.81	1.65	.10	-.82	9.23
Fog	16.22	5.28	14.88	5.89	1.45	.15	-.49	3.17
Dis	16.93	5.39	15.21	5.69	1.85	.07	-.12	3.57
FTrig	17.11	6.20	16.07	6.84	.96	.34	-1.10	3.18

*Note.* FOD = Fear of Dark; SP = Sleep Problem; CF = Cognitive Failure; Fog = Forgetfulness, Dis = Distractibility, FTrig = False Triggering.

Table 8 indicates mean based differences on study variables with reference to sleeping alone or sleeping with someone else. It has been shown that there is no significant difference on any of the variable with reference to sleeping alone or with somebody else.

## **DISCUSSION**

## Discussion

Current research intended to study the relationship between fear of dark, sleep quality and cognitive failures among university student. Furthermore, demographic variables were also utilized to see the group based variation on study variables. These included age, gender, family status, education, presence of fears, sleep issues, and sleeping alone or with someone else. The study was conducted in two phases. Phase one consisted of try out for establishing the cultural understanding and appropriateness of the scales used in the research. For this purpose, 10 university students of Quaid-i-Azam University were approached for the try out phase. Most of the students responded that one of the item from the scale of Fear of Dark Scale was difficult. A word cellar was replaced by basement.

For the purpose of main study was to accomplish study objectives. For this purpose, Fear of Dark Scale (Kopcsó & Lang, 2017) was used to measure Fear of Dark, Sleep Quality Scale (Yi, Shin, & Shin, 2006) was used for measuring for sleep quality, and Cognitive Failure Questionnaire (Broadbent et al., 1982) was utilized for measuring cognitive failures among university students. The sample consisted of 320 students with age ranging from 20-30 years. Reliabilities of all the measures were computed (see table 2) which provide the evidence that the scales are internally consistent. Then, skewness and kurtosis showed that the data is distributed normally. To investigate mean differences in a study variable across gender, age, education level, family system, sleeping issues, and sleeping patterns independent sample *t*-test was also performed.

The first objective of the study was ‘to explore the relationship between fear of dark and sleep quality and cognitive failures among university students.’ For this purpose, it was hypothesized that ‘there will be a negative correlation between fear of dark and sleep quality.’ The results indicated that there was a negative relationship between fear of dark and sleep quality (see table 3; the correlation value was positive as low scores on sleep quality measure indicate good sleep, it is interpreted in opposite direction). So the findings support the proposed hypothesis. Past literature showed that Fear of Dark exists in adults, and may be a significant factor in sleep problems (Carney et al., 2013). Individuals with sleeping disorder, especially those

with insomnia disorder, mostly experience intensified arousal when the lights go off. This phenomenon, can be considered as a conditioned arousal and appears to be associated with repeated pairings of sleep routine with wakefulness or negative emotion (Perlis et al., 1997). A study investigating the relationship between poor sleep and discomfort in the dark in a sample of young adults found that poor sleepers both self-reported and physiologically experienced fear of the dark (Carney et al., 2013).

Then it was also hypothesized that ‘there will be a negative relationship between sleep quality and cognitive failures.’ Results indicated existence of such a trend (see table 3) as a positive correlation is depicted between sleep problems and cognitive failures. People having low sleep quality means they have more sleeping problems and the results indicate that individuals with sleeping problems show more cognitive failures. Many studies have indicated that short and long sleep and sleep problems are connected with poorer cognitive functions. Self-reported short sleep, tiredness, and fatigue are highly associated with subjective measures of cognitive function than with objective measures. Results from the Whitehall study indicates that harmful changes in sleep over time (decrease from 6, 7, or 8 hours, or increase from 7 or 8 hours) are linked with lower scores on different cognitive function tests (Kronholm et al., 2009). This also provides the clue that sleep lacking quality comes to deplete individuals of cognitive resources and thus cognitive functioning becomes less than optimally required.

Thirdly, it was hypothesized that ‘there will be positive relationship in fear of dark and cognitive failures.’ The results indicated that there was a non-significant correlation between the two (see table 3). So the study could not collect support for the proposed hypothesis. In some past literatures, it is slightly explained that the idea of fear arouses an individual (Corteen, & Wood, as cited in Posner, Snyder, & Solso, 2004), and when arousal consumes one’s energies one becomes depleted of it thus cognitive failures are probably likely to occur. But study findings are contrary and indicate that this depletion might not transform into cognition based failures rather may get neutralized after sleep.

The second objective of study was ‘to investigate the role of demographic variables including age, gender, education, family system sleep issues, and sleep

alone or with someone in consideration to fear of dark, sleep quality, and cognitive failure among university students. In line with literature it was hypothesized 'women will score higher on fear of dark and sleep quality as compared to men.' Study results also indicate that women not only scored higher than men on fear of dark and sleep problems rather they also scored more on cognitive failures (as well as on forgetting and distraction, difference were non-significant on false triggering; see table 4). These findings thus support the proposed hypothesis. Researches have shown that women experience more fear as compared to male (Caiazza, 2005; Fetchenhauer & Buunk, 2005). It has been disclosed that women have the affinity to be more scared of the dark as compared to men, while as children, men and women tends to be equally scared (Carney et al., 2013). In an experimental study the results of the experiment indicated that women report feeling less comfortable than men with all of the nighttime photos (Levos & Zacchilli, Year). Similarly, women have a higher probability of being abused than men (Caiazza, 2005; Fetchenhauer & Buunk, 2005). This is especially true for younger women (Jackson, 2009; Nasar & Jones, 1997). However, there were few studies conducted in different countries like Nigeria both males and females do not differ on any fear. These differences can be because of cultural differences. Eastern countries have different life styles and family systems so females tend to stay at home in the evening or at night. However, these trends are a little opposite in western countries.

With reference to age of the participant it was observed that it had a negative relationship with fear of dark (see table 3). So as observed in literature that during the developmental course the fear of dark is quite prevalent in childhood but then neutralizes with age such a trend has also been observed in current study even though respondent were all adults. Similarly, relationship was also observed to be negative with cognitive failures and its domains (see table 3), indicating that lapses in cognitive functioning lowers with age. Again this finding needs to be interpreted in context of demographic details of the sample there were only young adults in the sample.

With all the other demographics variables including education, family system, sleep issues, and sleep alone or with someone the differences were nonsignificant on study variables (see table 5-8).



## **Conclusions**

The present research was an attempt to find out the relationship between fear of dark, sleep quality, and cognitive failures among university student. Findings explained that the fear of dark was negatively associated with sleep quality but it did not relate with cognitive failures. Then it was seen that sleep quality was negatively associated with cognitive failures. It was observed that fear of dark, poor sleep quality, and cognitive failures were more prevalent among women as compared to men. Moreover, younger participants were more likely to experience fear of dark and cognitive failures.

## **Limitations and Suggestions**

Following are some of the limitations and corresponding suggestions from the current study.

- Convenient sampling method was used for data collection and only university students from Islamabad/Rawalpindi were included in the study which decreases the external validity of the study as it consists of a geographically confined sample. The study should be replicated with large sample, including other areas of country, so that rich information can be obtained and results can be more generalized.
- Data was collected with the help of self-report measures so the social desirability of data is questionable as veracity of the given responses may be compromised if the participants may not report genuinely.
- The study did not probe into the effect of other variables such as drugs related to sleep, health issues, duration of sleep etc. that can be critical with reference to study variables. Future researchers are recommended to consider such vital demographic attributes of participants taken.
- The research is a quantitative design based study. For further elaborations of the results use of qualitative research design is also required. Therefore, qualitative data collections like interviews are also recommended.

## **Implications**

The research indicated for relationship between sleep quality and cognitive failure, which clues that sleep quality can impact one's cognitive functioning. In this way this research could be very helpful for clinical psychologists and counselors in aiding people to attain positive health attributes. In doing so they need to give due consideration to sleep quality of an individual. The present research also added to existing body of literature which is comparatively new and less researched. Since research is scarce with reference to fear of dark and sleep quality.

## REFERENCES

## References

- Abela, J. R. Z., & Sarin, S. (2002). Cognitive vulnerability to hopelessness depression: A chain is only as strong as its weakest link. *Cognitive Therapy and Research*, 26, 811-829.
- Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in human: Critique and reformulation. *Journal of Abnormal Psychology*, 87, 49-74.
- Adrien, J. (2002). Neurobiological bases for the relation between sleep and depression. *Sleep Medicine Reviews*, 6(5), 341-351.
- Åkerstedt, T., Hume, K., Minors, D. and Waterhouse, J. (1994). The meaning of good sleep: A longitudinal study of polysomnography and subjective sleep quality. *Journal of Sleep Research*, 3(3), 152-158.
- Alfano, C., Beidel, D., & Turner, S. (2002) Cognition in childhood anxiety, conceptual, methodological: And developmental issues. *Clinical Psychology Review*, 22, 1209-1238.
- Alhola, P., Polo-Kantola, P. (2007). Sleep deprivation: impact on cognitive performance. *Neuropsychiatry Disease And Treatment*, 3(5), 553-567.
- Alloy, L. B., & Abramson, L. Y. (1979). Judgment of contingency in depressed and non-depressed students: Sadder but wiser? *Journal of Experimental Psychology: General*, 108(4), 441-485.
- Backhaus, J., Junghanns, K., Broocks, A., Riemann, D. and Hohagen, F. (2002). Test-retest reliability and validity of the Pittsburgh Sleep Quality Index in primary insomnia. *Journal of Psychosomatic Research*, 53(3), 737-740.
- Baddeley, A. (2003). Working memory: Looking back and looking forward. *Nature Reviews Neuroscience*, 4(10), 829-839.
- Beck, A. T. (1983). Cognitive therapy: New perspectives. In P. J. Clayton & J. E. Barnett (Eds.), *Treatment for depression: Old Controversies and New Approaches* (pp. 265-290). New York: Raven Press.



- Beck, A. T., & Emery, G. (1985). *Anxiety disorders and phobias: A cognitive Perspective*. New York: Basic Books.
- Begley, S. (2007, December). The roots of fear: The evolutionary primacy of the brain's fear circuitry makes it more powerful than reasoning circuits. New York: *Newsweek*, 150(26), 36-40.
- Beidel, D. C., & Turner, S. (2005). *Child anxiety disorders: A guide to research and treatment*. Maryland: Psychology Press.
- Binks, P. G., Waters, W. F., Hurry, M. (1999). Short-term total sleep deprivations does not selectively impair higher cortical functioning. *Sleep*, 22(3), 328-34.
- Bixler, E. O., Kales, A., Soldatos, C. R., Kales, J. D., & Healey, S. (1979). Prevalence of sleep disorders in the Los Angeles metropolitan area. *The American Journal Of Psychiatry*, 136, 1257-1262.
- Boomsma, D. I. (1998). Genetic analysis of cognitive failures (CFQ): A study of Dutch adolescent twins and their parents. *European Journal of Personality*, 12(5), 321-330.
- Borbély, A. A., & Wirz-Justice, A. (1982). Sleep, sleep deprivation and depression: A hypothesis derived from a model of sleep regulation. *Human Neurobiology*, 1(3), 205-210.
- Boyden, S. D., Pott, M., & Starks, P. T. (2018). An evolutionary perspective on night terrors. *Evolution, Medicine, and Public Health*, 2018(1), 100-105.
- Broadbent, D. (1958). *Perception and communication*. London: Pergamon Press.
- Broadbent, D. E., Cooper, P. F., FitzGerald, P., & Parkes, K. R. (1982). The cognitive failures questionnaire (CFQ) and its correlates. *British Journal Of Clinical Psychology*, 21(1), 1-16.
- Broadbent, D. E., Broadbent, M. H., & Jones, J. L. (1986). Performance correlates of self-reported cognitive failure and of Obsessionality. *British Journal Of Clinical Psychology*, 25(4), 285-299.

- Buboltz Jr. W. C., Brown, F., & Soper, B. (2001). Sleep habits and patterns of college students: a preliminary study. *Journal of American College Health, 50*(3), 131-135.
- Burnham, J. J., & Gullone, E., (1997) The Fear Survey Schedule for Children-II: A psychometric investigation with American data. *Behavior Research and Therapy, 35*(2), 165-173.
- Burke, D. M., & MacKay, D. G. (1997). Memory, language, and ageing. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences, 352*(1363), 1845-1856.
- Bushak, L. (2015). E-Books Are Damaging Your Health: Why we should all start reading paper books again. *Medical Daily, 1*, 11-15.
- Buysse, D. J., Reynolds , C. F, Monk, T. H., Berman, S. R. and Kupfer, D. J., (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*(2), 193–213.
- Caiazza, A. (2005). Don't bowl at night: Gender, safety, and civic participation signs: *Journal of Women in Culture and Society, 30*, 1607–1631.
- Cappuccio, F. P, Miller, M. A., & Lockley, S. W. (Eds.). (2010). Sleep, health, and society: *From etiology to public health*. Oxford University Press, USA
- Carney, C., Moss, T., Atwood, M., Crowe, B., Andrews, A., (2014). Are Poor Sleepers Afraid of the Dark? A Preliminary Investigation. *Journal of Experimental Psychopathology, 5*(1), 2-13.
- Carney, C. E., Moss, T. G., Atwood, M. E., Crowe, B. M., & Andrews, A. J. (2013). Are poor sleepers afraid of the dark? A preliminary investigation. *Journal of Experimental Psychopathology, 5*(1), 2-13.
- Carpenter, J. S. & Andrykowski, M. A., (1998). Psychometric evaluation of the Pittsburgh Sleep Quality Index. *Journal of Psychosomatic Research, 45*(1), 5–13.

- Chen, M. Y., Wang, E. K., & Jeng, Y. J. (2009). Adequate sleep among adolescents is positively associated with health status and health-related behaviors. *Biomedical Center Public Health*, 6(1), 59.
- Cherry, E. C. (2015). Some experiments on the recognition of speech with one and with two ears. *Journal of the Acoustical Society of America*, 25, 975–979.
- Coelho, C. M., & Purkis, H. (2009). The origins of specific phobias: Influential theories and current perspectives. *Review of General Psychology*, 13, 335–348.
- Corsi-Cabrera, M., Sanchez, AI., Del-Rio-Portilla, Y. (2003). Effect of 38 h of total sleep deprivation on the waking EEG in women: Sex differences. *International Journal of Psychophysiology*, 50(3), 213–24.
- Cowell, R. M., Blake, K. R., & Russell, J. W. (2007). Localization of the transcriptional coactivator PGC-1 $\alpha$  to GABAergic neurons during maturation of the rat brain. *Journal of Comparative Neurology*, 502(1), 1-18.
- Crick, F., & Mitchison, G. (1983). The function of dream sleep. *Nature*, 304(5922), 111-114.
- Crowley, K. (2011). Sleep and sleep disorders in older adults. *Neuropsychology Review*, 21(1), 41-53.
- Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep loss, learning capacity and academic performance. *Sleep Medicine Reviews*, 10(5), 323-337.
- Davey, G. C. L., (1997). Characteristics of individuals with fear of spiders. *Anxiety Research*. 4, 299-314.
- Davis, E. P., & Sandman, C. A. (2012). Prenatal psychobiological predictors of anxiety risk in preadolescent children. *Psychoneuroendocrinology*, 37(8), 1224-1233.
- Deci, E. L., & Ryan, R. M. (2000). The what and why of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227-268.

- De Jong, T. (2010). Cognitive load theory, educational research, and instructional design: some food for thought. *Instructional Science*, 38(2), 105-134.
- Fetchenhauer, D., & Buunk, B. P. (2005). How to explain gender differences in fear of crime: Towards an evolutionary approach. *Sexualities, Evolution & Gender*, 7(2), 95-113.
- Field, A. P., & Davey, G. C. (2001). Conditioning models of childhood anxiety. In W. K. Silverman & P. D. A. Treffers (Eds.), *Cambridge child and adolescent psychiatry. Anxiety disorders in children and adolescents: Research, assessment and intervention* (pp. 187-211). New York: Cambridge University Press.
- Field, A., (2013). *Discovering Statistics using SPSS* (4<sup>th</sup> ed.). Sussex: SAGE Publications.
- Fortier-Brochu, E., Beaulieu-Bonneau, S., Ivers, H., Morin, C. M., (2012). Insomnia and day time cognitive performance: A meta-analysis. *Sleep Medicine Reviews*, 16(1), 83-94.
- Glossmann, H. H., & Lutz, O. (2017). Torpor: The rise and fall of 3-monoiodothyronamine from brain to gut and from gut to brain? *Frontiers in Endocrinology*, 8(206), 118-158.
- Grillon, C., Morgan, C. A., Davis, M., & Southwick, S. M. (1998). Effects of experimental context and explicit threat cues on acoustic startle in Vietnam veterans with posttraumatic stress disorder. *Biological Psychiatry*, 44(10), 1027-1036.
- Grillon, C. (2008). Models and mechanisms of anxiety: Evidence from startle studies. *Psychopharmacology*, 199(3), 421-437.
- Grillon, C., Ameli, R., Woods, S. W., Merikangas, K., & Davis, M. (1991). Fear-potentiated startle in humans: Effects of anticipatory anxiety on the acoustic blink reflex. *Psychophysiology*, 28(5), 588-595.



- Grillon, C., Pellowski, M., Merikangas, K. R., & Davis, M. (1997). Darkness facilitates the acoustic startle reflex in humans. *Society of Biological Psychiatry*, *42*, 453–460.
- Gullone, E., (2000) The development of normal fear: A century of research. *Clinical Psychology Review*, *20*, 429-451.
- Hafer, C. L., & Correy, B. L. (1999). Mediators of the relation between beliefs in a just world and emotional responses to negative outcomes. *Social Justice Research*, *12*, 189-204.
- Hasher, L., & Zacks, R. T. (1988). Working memory, comprehension, and aging: A review and a new view. In G. H. Bower (Eds.), *The Psychology of learning and motivation: Advances in research and theory*, (pp. 193-225). San Diego: Academic Press.
- Haupt, E. J. (2001). Laboratories for experimental psychology: Gottingen's ascendancy over Leipzig in the 1890's. In R. W. Rieber & D. K. Robinson (Eds.), *Path in psychology. Wilhelm Wundt in History: The making of a Scientific Psychology* (pp. 205-250). New York: Kluwer Academic/Plenum Publishers.
- Horne, J. (1988). *Why we sleep: the functions of sleep in humans and other mammals*. New York: Oxford Medical Publications.
- Hsieh, Y. H., Hsu, C. Y., Liu, C. Y., & Huang, T. L. (2011). The levels of stress and depression among interns and clerks in three medical centers in Taiwan-a cross-sectional study. *Chang Gung Medical Journal*, *34*(3), 278-285.
- Iliescu, E. A., Coo, H., McMurray, M. H., Meers, C. L., Quinn, M. M., Singer, M. A., & Hopman, W. M. (2003). Quality of sleep and health-related quality of life in haemodialysis patients: *Nephrology Dialysis Transplantation*, *18*(1), 126-132.
- Jackson, J. (2009). A psychological perspective on vulnerability in the fear of crime. *Psychology, Crime, and Law*, *15*(4), 365-390.

- Jorm, A. F., Anstey, K. J., Christensen, H., & Rodgers, B. (2004). Gender differences in cognitive abilities: The mediating role of health state and health habits. *Intelligence, 32*(1), 7-23.
- Kagan, J., Reznick, J. S., Clarke, C., Snidman, N., & Garcia-Coll, C. (1984). Behavioral inhibition to the unfamiliar. *Child Development, 55*, 2212-2225.
- Kalin, N. H., & Shelton, S. E. (1989). Defensive behaviors in infant rhesus monkeys: Environmental cues and neurochemical regulation. *Science, 243*(4899), 1718-1721.
- Kanai, R., Carmel, D., Bahrami, B., & Rees, G. (2011). Structural and functional fractionation of right superior parietal cortex in bistable perception. *Current Biology, 21*(3), 106-107.
- Kanai, R., Dong, M. Y., Bahrami, B., & Rees, G. (2011). Distractibility in daily life is reflected in the structure and function of human parietal cortex. *Journal of Neuroscience, 31*(18), 6620-6626.
- Kendall, P. C. (1994). Treating anxiety disorders in children: Results of a randomized clinical trial. *Journal of Consulting and Clinical Psychology, 62*(1), 100-110.
- Kim, M. S., Kim, J. R., Park, K. S., Kang, Y. S., & Choe, S. P. M. (2013). Associations between sleep quality, daytime sleepiness, with perceived errors during nursing work among hospital nurses. *Journal of Agricultural Medicine and Community Health, 38*(4), 229-242.
- King, N. J., Muris, P., & Ollendick, T. H. (2005). Childhood fears and phobias: Assessment and treatment. *Child and Adolescent Mental Health, 10*, 50-56.
- King, N. J., Muris, P., Ollendick, T. H., & Gullone, E. (2005). Childhood fears and phobias: Advances in assessment and treatment. *Behaviour Change, 22*(4), 199-211.
- Kopcsó, K., Láng, A. Korai., (2014). Relationship between nearly maladaptive schemas, attachment quality, and fear of darkness. *Orvosi Hetilap, 155*(49), 1967-1972.

- Kopcsó, K., & Lang, A., (2017). *Nighttime fears of adolescents and young adults*. Hungary: SM Group.
- Kronholm, E., Sallinen, M., Suutama, T., Sulkava, R., Era, P., Partonen, T., (2009) Self-reported sleep duration and cognitive functioning in the general population. *Journal of Sleep Research*, 18(4), 436-446.
- Kuiper, N. A. (1978). Depression and causal attributions for success and failure. *Journal of Personality and Social Psychology*, 36(3), 236-246.
- Kushnir, J., Gothelf, D., Sadeh, A., (2014). Nighttime fears of preschool children: A potential disposition marker for anxiety? *Comprehensive Psychiatry*, 55, 336-341.
- Larson, G. E., & Merritt, C. R. (1991). Can accidents be predicted? An empirical test of the Cognitive Failures Questionnaire. *Applied psychology: An International Review*, 40(1), 37-45.
- Lazarus, R. S. (2006). *Stress and emotion: A new synthesis*. New York. Springer Publishing Company.
- Leger, D., Guilleminault, C., Dreyfus, J. P., & Delahaye, C. (2000). Prevalence of insomnia in a survey of 12,778 adults in France. *Journal of Sleep Research*, 9, 35-42.
- Levos, J., & Zacchilli, T. L. (2010). Nyctophobia: From imagined to realistic fears of the dark. *Psi Chi Journal of Psychological Research*, 20(2).
- Li, Y., Ma, W., Kang, Q., Qiao, L., Tang, D. (2015). Night or darkness, which intensifies the feeling of fear? *International Journal of Psychophysiology: Official Journal of the International Organization of Psychophysiology*, 97, 46-57.
- Lichtenstein, P., & Annas, P. (2000). Heritability and prevalence of specific fears and phobias in childhood. *Journal Child Psychology Psychiatry*, 41(7), 927-937.
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their

- contributions to complex frontal lobe task: A latent variable analysis. *Cognitive Psychology*, 41(1), 49-100.
- McCoy, S. L., Tun, P. A., Cox, L. C., Colangelo, M., Stewart, R. A., & Wingfield, A. (2005). Hearing loss and perceptual effort: Downstream effects on older adults' memory for speech. *The Quarterly Journal of Experimental Psychology*, 58(1), 22-33.
- Meltzer, H., Vostanis, P., Dogra, N., Doos, L., Ford, T., & Goodman, R. (2008). Children's specific fears. *Child, Care, Health, and Development*, 35(6), 781-789.
- Mendez, F. J., & Garcia, M. J. (1996). Emotive performances: A treatment package for children's phobias. *Child and Family Behavior Therapy*, 18(3), 19-34.
- Mikulas, W. L., Coffman, M. G., Dayton, D., Frayne, C., & Maier, P. L., (1985). Behavioral bibliotherapy and games for treating fear of the dark. *Child and Family Behavior Therapy*, 7(3), 1-7.
- Missig, G., Ayers, L. W., Schulkin, J., & Rosen, J. B. (2010). Oxytocin reduces background anxiety in a fear-potentiated startle paradigm: peripheral vs central administration. *Neuropsychopharmacology*, 35(13), 2488-2607.
- Morin, C. M., LeBlanc, M., Daley, M., Gregoire, J. P., & Merette, C. (2006). Epidemiology of insomnia: prevalence, self-help treatments, consultations, and determinants of help-seeking behaviors. *Sleep Medicine*, 7(2), 123-130.
- Muris, P., Merckelbach, H., Ollendick, T. H., King, N. J., Bogie, N., (2001). Children's nighttime fears: Parent-child ratings of frequency, content, origins, coping behaviors and severity. *Behavior Research and Therapy*, 39(1), 13-28.
- Muris, P., Merckelbach, H., Mayer, B, & Prins, E. (2000). How serious are common childhood fears? *Behavior Research and Therapy*, 38(3), 217-228.
- Muris, P., Merckelbach, H., Schmidt, H., & Mayer, B. (1998). The revised version of the Screen for Child Anxiety Related Emotional Disorders (SCARED-R): Factor structure in normal children. *Personality and Individual Differences*, 26(1), 99-112.

- Nasar, J. L., & Jones, K. M. (1997). Landscapes of fear and stress. *Environment and Behavior*, 29(3), 291-323.
- Neisser, U. (2014). *Cognitive psychology*: Routledge: Psychology Press.
- Oginska, H., Pokorski, J. (2006). Fatigue and mood correlates of sleep length in three age-social groups: School children, students, and employees. *Chronobiol International*, 3(2), 1317–1328.
- Ollendick, T. H., King, N. J. (1991). Origins of childhood fears: An evaluation of Rachman's theory of fear acquisition. *Behavioural Research and Therapy*, 29, 117-123.
- Ollendick, T. H., & King, N. J. (1998). Empirically supported treatments for children with phobic and anxiety disorders: Current status. *Journal of Clinical Child Psychology*, 27(2), 156-167.
- Ortega, F. B., Ruiz, J. R., Castillo. R., Chillón. P., Labayen. I., Martínez-Gómez D. (2010). Sleep duration and cognitive performance in adolescence. The AVENA study. *Acta Paediatrica*, 99(3), 454-456.
- Paas, F., Renkl, A. & Sweller, J. (2003) Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, 38, 1–4.
- Pandarínath, C., Nuyujukian, P., Blabe, C. H., Sorice, B. L., Saab, J., Willett, F. R. & Henderson, J. M. (2017). High performance communication by people with paralysis using an intra cortical brain-computer interface. *Elife*, 6(1), 1-28.
- Park, D. C. (2000). The basic mechanisms accounting for age-related decline in cognitive function. In D. C. Park & N. Schwarz (Eds.), *Cognitive aging: A primer* (pp. 3-21). New York: Psychology Press.
- Perlis, M. L., Giles, D. E., Mendelson, W. B., Bootzin, R. R., & Wyatt, J. K. (1997). Psychophysiological insomnia: The behavioural model and a neurocognitive perspective. *Journal of Sleep Research*, 6(3), 179-188.
- Pilcher, J. J. & Huffcutt, A. J., (1996). Effects of sleep deprivation on performance: A meta-analysis. *Sleep: Journal of Sleep Research & Sleep Medicine*, 19(4), 318–326.

- 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*, 583-596.
- Posner, M. I., Snyder, C. R., & Solso, R. (2004). Attention and cognitive control. In D. A. Batola & E. J. Marsh (Eds.), *Key readings in cognition. Cognitive psychology: Key readings* (pp. 205-223). New York: Psychology Press.
- Pollina, L. K., Greene, A. L., Tunick, R. H., & Puckett, J. M. (1992). Dimensions of everyday memory in young adulthood. *British Journal of Psychology*, *83*(3), 305-321.
- Prinz, P. N., Peskind, E. R., Vitaliano, P. P., Raskind, M.A., Eisdorfer, C., Zemcuznikov, N. (1982). Changes in the sleep and waking EEGs of nondemented and demented elderly subjects. *Journal of the American Geriatrics Society*, *30*(2), 86-93.
- Rachman, S. (1977) The conditioning theory of fear-acquisition: A critical examination. *Behavioural Research and Therapy*, *15*(5), 375-387.
- Ragland, J. D., Coleman, A. R., Gur, R. C., Glahn, D. C., & Gur, R. E. (2000). Sex differences in brain-behavior relationships between verbal episodic memory and resting regional cerebral blood flow. *Neuropsychological*, *38*(4), 451-461.
- Raichle, M. E., & Mintun, M. A. (2006). Brain work and brain imaging. *Annual Revised Neuroscience*, *29*(41), 449-476.
- Rasch, B., & Born, J. (2013). About sleep's role in memory. *Physiological Reviews*, *93*(2), 681-766.
- Reason, J. T., & Mycielska, K. (1982). Absent minded? *The Psychology of Mental Lapses and Everyday Errors*. New Jersey: Prentice Hall.
- Reeve, J. (2014). *Understanding motivation and emotion* (6<sup>th</sup> Ed.). New York: John Wiley & Sons Inc.
- Robbins, T. W., (2010). The neuro psychopharmacology of fronto-executive function: Monoaminergic modulation. *Annual Review of Neuroscience*, *32*(6), 267-287.

- Rose, R. J., & Ditto, W. B. (1983). A developmental-genetic analysis of common fears from early adolescence to early adulthood. *Child Development*, 54(2),361-368.
- Rosen, E. (2013, September). Autonomous emergency braking for vulnerable road users. *International Research Conference*, 13(17), 618-627. Gothenberg, Sweden: Proceedings of IRCOBI conference.
- Sahraian, A., & Javadpour, A. (2010). Sleep disruption and its correlation to psychological distress among medical students. *Shiraz-e-Medical Journal*, 11(1), 12-17.
- Sajadi, S. A., Farsi, Z., Rajaei, N., Mazhari, S. M., & Habibi, H. (2016). Sleep quality and the factors affecting the fatigue severity and academic performance of students at AJA University of Medical Sciences. *Journal of Advances in Medical Education*, 1(2), 9-15.
- Salthouse, T. A. (2000). Working memory as a processing resource in cognitive aging. *Developmental Review*, 10(1), 101-124.
- Sandberg, K., Blicher, J. U., Dong, M., Rees, G., Near, J., & Kanai, R. (2014). Occipital GABA concentration predicts cognitive failures in daily life. *Neuroimage*, 87(2), 55-60.
- Shamir-Essakow, G., Ungerer, J. A., & Rapee, R. M. (2005). Attachment, behavioral inhibition, and anxiety in preschool children. *Journal of Abnormal Child Psychology*, 33(2), 131-143.
- Scullin, M. K., (2013). Sleep, memory, and aging: The link between slow-wave sleep and episodic memory changes from younger to older adults. *Psychology and Aging*, 28(1), 105–114.
- Scullin, M. K., & Bliwise, D. L. (2015). Sleep, cognition, and normal aging: Integrating a half century of multidisciplinary research. *Perspectives on Psychological Science*, 10(1), 97-137.
- Shapiro, C., & Flanigan, M., (1993) Function of sleep. *British Medical Journal*, 306, 383-385.

- Silverman, W. K., & Moreno, J. (2005). Specific phobia. *Child and Adolescent Psychiatric Clinics, 14*(4), 819-843.
- Silverman, W. K., & Ollendick, T. H. (2005). Evidence-based assessment of anxiety and its disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology, 34*(3), 380-411.
- Thornby, J. I., Karacan, I., & Williams, R. L. (1983). Effects of brotizolam, flurazepam and placebo upon nocturnal auditory arousal thresholds. *British Journal of Clinical Pharmacology, 16*(S2).
- TwoRoger, S. S., Lee, S., Schernhammer, E. S., Grodstein, F. (2006). The association of self-reported sleep duration, difficulty sleeping, and snoring with cognitive function in older women. *Alzheimer Disease Associated Disorder, 20*(1), 41-48.
- Unsworth, N., McMillan, B. D., Brewer, G. A., & Spillers, G. J. (2012). Everyday attention failures: An individual differences investigation. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 38*(6), 1765
- Van Dongen, H. P. A., Maislin, G., Mullington, J. M., & Dinges, D. F. (2003). The cumulative cost of additional wakefulness: Dose-response effects on neurobehavioral functions and sleep physiology from chronic sleep restriction and total sleep deprivation. *Journal of Sleep and Sleep Disorders Research, 26*(2), 117-126.
- Vine, V. V., Gorter, J. A., Riede, S. J., & Hut, R. A. (2015). Diurnality as an energy-saving strategy: Energetic consequences of temporal niche switching in small mammals. *Journal of Experimental Biology, 218*(16), 2585-2593.
- Voss, A., Voss, J., & Lerche, V. (2015). Assessing cognitive processes with diffusion model analyses: A tutorial based on fast-dm-30. *Frontiers in Psychology, 6*(336), 1-14.
- Walker, D. L., Cassella, J. V., Lee, Y., De Lima, T. C. M., & Davis, M. (1997). Opposing roles of the amygdala and dorsolateral periaqueductal gray in fear-potentiated startle. *Neuroscience and Bio Behavioral Reviews, 21*, 743-753.



- Walker, M. P., & van der Helm, E. (2009) Overnight therapy? The role of sleep in emotional brain processing. *Psychological Bulletin*, 135, 731-748.
- Wallace, J. C., Kass, S. J., & Stanny, C. J. (2002). The Cognitive Failures Questionnaire revisited: Dimensions and correlates. *The Journal of General Psychology*, 129(3), 238-256.
- Watson, N. F., Badr, M. S., & Belenky, G. (2015). Joint consensus statement of the American academy of sleep medicine and sleep research society on the recommended amount of sleep for a healthy adult: Methodology and discussion. *Sleep*, 38(8), 1161-1183.
- Webb, W. B., Bonnet, M. and Blume, G. A., (1976) A post-sleep inventory. *Perceptual and Motor Skills*, 43(3), 987-993.
- Willingham, W. W., Cole, N. S., (2013). *Gender and Fair Assessment*. New York: Routledge.
- Wingfield, A., Tun, P. A., McCoy, S. L., (2005). Hearing loss in adulthood: What it is and how it interacts with cognitive performance. *Current Directions in Psychological Science*, 14(3), 144–148.
- Xie, L., Kang, H., Xu, Q., Chen, M. J., Liao, Y., Thiagarajan, M.,...Nedergaard, M. (2013). Sleep drives metabolite clearance from the adult brain. *Science*, 342, 373-377.
- Yang, C. M., Spielman, A. J., (2001). The effect of a delayed weekend sleep pattern on sleep and morning functioning. *Psychology and Health*, 16(6), 715-25.
- Yi, H., Shin, K., & Shin, C. (2006). Development of the sleep quality scale. *Journal of Sleep Research*, 15(3), 309-316.
- Young, L. (2006). *Fear of the dark race, gender, and sexuality in the cinema*. London: Routledge.
- Zayfert, C., & DeViva, J. C. (2004). Residual insomnia following cognitive behavioral therapy for PTSD. *Journal of Traumatic Stress*, 17, 69-73.

Zisenwine, T., Kaplan, M., Kushni, J., & Sadeh, A., (2014). Nighttime fears and fantasy-reality differentiation in preschool children. *Child Psychiatry and Human Development*, 44(1), 186-199.

## **APPENDICES**

## Appendix A

----- Original Message -----

Subject: Re: **Permission** for Nighttime Fears of Adolescents and Young Adults Scale

From: Krisztina Kopcsó

To: Hannah\_21gill@outlook.com

CC:

Dear Hannah,

Feel free to use the scale. You find the English translation of our Fear of the Dark Scale (Kopcsó & Láng, 2017)

here: <http://www.smgebooks.com/anxiety-disorders/chapters/ANXD-17-03.pdf>

We suggest the use of 13 items, indicted by \* in Table 1.

Best wishes,

(Miss) Krisztina Kopcsó



신철[ 교수 / 의과학과 ] <chol-shin@korea.ac.kr>

Thu 9/27/2018 11:36 AM

You ↕



Yes, you can do it.

I hope doing well.

Best,

Chol Shin

Chol Shin, M.D. Ph.D.

Division of Pulmonary, Department of Internal Medicine

Director of Sleep Disorder Center

Director of Human Genomic Study

Korea University Medical Center Ansan Hospital

Tel: 82-31-412-5603

Fax: 82-31-412-5604

## Appendix B

## Fear of Dark Scale

Please choose the score which most closely corresponds with your fear of dark

Statements	1. Never	2. Sometimes	3. Fairly Often	4. Always
1. I am afraid to walk on dark streets.				
2. It is frightening if a fallout occurs at night.				
3. I find darkness frightening in strange places.				
4. I am not afraid to go to a dark cellar(basement).				
5. In the night, I feel that darkness covers frightening things.				
6. It is frightening when it's dark on a vehicle for minutes when it passes through a dark street.				
7. There is nothing in the dark to be afraid of				
8. I am afraid in the dark.				
9. It is frightening for me, if I cannot see what is around.				
10. I can walk home easily by night, even if it's dark.				
11. I am not afraid of the dark in my own room.				
12. I am afraid of total darkness, even by day.				
13. I often have a bad sleep, because I am afraid in the dark.				

## Appendix C

## Sleep Quality Scale

This survey is to know the quality of sleep you had for the last one month. Read the question and chose the closest answer.

	Statements	Rarely	Sometimes	Often	Almost always
1.	I have difficult falling sleep.				
2.	I fall in a deep sleep.				
3.	I wake up while sleeping.				
4.	I have difficulty getting back to sleep once I wake up in the middle of the night.				
5.	I wake up easily because of noise.				
6.	I toss and turn				
7.	I never go back to sleep after awakening during sleep.				
8.	I feel refreshed after sleep.				
9.	I feel unlikely to sleep after sleep.				
10.	Poor sleep makes me irritating.				
11.	Poor sleep gave me headache.				
12.	Poor sleep makes me irritated.				
13.	I would like to sleep more after waking up.				
14.	Poor sleep makes me lose my appetite.				
15.	Poor sleep makes hard to me to think				
16.	I feel vigorous after sleep.				
17.	Poor sleep makes me lose interest in work or others.				
18.	My fatigue is relieved after sleep.				
19.	Poor sleep causes me to make mistake at work.				
20.	I am satisfied with my sleep.				
21.	Poor sleep makes me forget things more easily.				

22.	Poor sleep make it hard to concentrate at work.				
23.	Sleepiness interfere with my daily life				
24.	Poor sleep makes me lose desire in all things.				
25.	I have difficulty getting out of bed.				
26.	Poor sleep make me easily tired at work.				
27.	I have a clear head after sleep.				
28.	Poor sleep makes my life painful.				



## Appendix D

## Cognitive Failure Questionnaire

The following questions are about minor mistakes which everyone makes from time to time, but some of which happen more often than others. We want to know how often these things have happened to you in the past 6 months. Please circle the appropriate number.

	Statements	Very often	Quite often	Occasionally	Very rarely	Never
1.	Do you read something and find you haven't been thinking about it or must read it again?					
2.	Do you find you forget why you went from one part of the house to the other?					
3.	Do you fail to notice signposts on the road?					
4.	Do you find you confuse right and left when giving directions?					
5.	Do you bump into people?					
6.	Do you find you forget whether you've turned off the lights or a fire or locked the doors?					
7.	Do you fail to listen to people's name when you are meeting them?					
8.	Do you say something and realize afterwards that it might be taken as insulting?					
9.	Do you fail to hear people speaking to you when you are doing something else?					
10.	Do you lose your temper and regret it?					
11.	Do you leave important letters unanswered for days?					
12.	Do you find you forget which way to turn on a road you know well but rarely use?					
13.	Do you fail to see what you want in a supermarket (although it's there)?					
14.	Do you find yourself suddenly wondering whether you've used a word correctly?					
15.	Do you have trouble making up your mind?					
16.	Do you find you forget appointment?					

17.	Do you forget where you put something like newspaper or a book?					
18.	Do you find you accidentally throw away the thing you want and keep what you meant to throw away- as in the example of throwing away the matchbox and putting the used match in your pocket?					
19.	Do you daydream when you ought to be listening to something?					
20.	Do you find you forget people's name?					
21.	Do you start doing one thing at home and get distracted into doing something else (Unintentionally)?					
22.	Do you find you can't quite remember something although it's "on the tip of Your tongue"?					
23.	Do you find you forget what you came to the shop to buy?					
24.	Do you drop things?					
25.	Do you find you can't think of any thing to say?					

## Appendix E

### Informed Consent

I, Hannah Ashiq M.sc research student at National Institute of Psychology, Quaid e Azam University, Islamabad. I am conducting a research as per requirement of degree. This research aims to explore the Fear of Dark and Sleep Quality as a predictor of Cognitive Failure in University Student.

I request you to support my purpose and participate in this research. I assure you that information provided will be kept confidential and will only be used for research. You have all the right to quit at any stage of data collection.

Your, Help support and participation will be highly appreciated. Participation in this research is completely based on your willingness to participate. If you agree to participate then please sign below.

Thank You!

Hannah Ashiq

[Hannah\\_21gill@outlook.com](mailto:Hannah_21gill@outlook.com)

Signature \_\_\_\_\_

## Appendix F

## Demographic Sheet

**Gender:**                                      a) Female                                      b) Male

**Age:**                                     

**Education:**                                     

**Family System**                                      a) Joint                                      b) Nuclear

**Do you have any fear like?**

a) Spider                      b) Injection                      c) Darkness                      d) Others

**Have you ever faced Sleeping Issues?**

a) Yes                      b) No

**Do you sleep Alone?**

a) Yes                      b) No