

## The Effect of Bedtime Procrastination on the Functioning of Young Adults

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### ABSTRACT

Bedtime procrastination is a health-related behaviour that is proven to cause poor sleep quality and reduced functioning. This correlational study aims to study Bedtime Procrastination mainly in relation to Future Time Perspective, Self-efficacy and Self-regulatory fatigue. It was a correlational study conducted on a sample population of young adults aged 18-26 years. The current study's results indicate a significant but mild positive correlation between self-regulatory fatigue and bedtime procrastination. It also indicates that there are no gender differences that can be observed in the bedtime procrastination scores obtained. The findings also indicate that bedtime procrastination does not mediate between self-efficacy and future time perspective. The study will help design interventions, especially in the Indian context to prevent indulgence in bedtime procrastination and also provide a base for future research.

**Keywords:** *Bedtime Procrastination, Self-Efficacy, Self-Regulatory Fatigue, Future Time Perspective, Correlational*

Procrastination is an act everyone takes part in, irrespective of their position and situation. Sleep is also an integral part of one's routine, and getting quality sleep, including sufficient hours of sleep, is just as essential for the body to function optimally.

Bedtime Procrastination is an interesting phenomenon that needs to be adequately studied. It has gained prominence, especially after the pandemic and the advent of electronic media. No studies have correlated Bedtime Procrastination with the above-mentioned variables, which leads to this research idea. There is no clear evidence of how often it occurs, as there are not many definitive studies on the subject. (Deeg, 2022)

### Conceptual Definitions

- **Bedtime Procrastination (BP):** "It is defined as failing to go to bed at the intended time when no external circumstances prevent the person from doing so." (Kroese et al., 2014).

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- **Self-Efficacy (SE):** “It refers to an individual's belief in their capacity to execute behaviours necessary to produce specific performance attainments.” (Bandura, 1977) (Carey & Forsyth, 2009)
- **Self-Regulatory Fatigue (SRF):** “It refers to the temporary depletion of individuals' capacity for self-control. In a state of self-regulatory fatigue, individuals find it harder to resist making impulsive purchases, inhibit prejudice, or regulate their own emotions.” (Cameron & Webb, 2013)
- **Future Time Perspective (FTP):** “It refers to the timing and ordering of personalised individual events. It refers to an individual's tendency and attitude to strive for future goals and rewards. Thus, it plays a crucial role in predicting the probability of achieving a well-desired outcome.” (Meng et al., 2021) (Chen et al., 2022).

### THEORETICAL FRAMEWORKS

*Sleep* plays a vital function. Inadequate and insufficient sleep adversely affect individuals' physiological and psychological health. It also has an impact on their subjective well-being and cognitive functioning. Research studies have shown that very short or extremely long hours of sleep are risk factors for common chronic diseases like obesity and hypertension. (Bernecker & Job, 2019).

Ahead (2022) surveyed how the COVID-19 outbreak and the ensuing lockdown affected people's daily lives. 32,000 Indians from 322 districts participated in this poll, with 31% of female respondents and 69% of male respondents. According to the poll, 38% of participants obtained between 6 and 8 hours of sleep, compared to 6% who claimed to get 8 to 10 hours. In India, 1 in 2 people sleep for less than 6 hours continuously each night, and 1 in 4 people sleep for less than 4 hours each day. Additionally, 52% of the population claimed that the pandemic had altered their sleep patterns. Bedtime Procrastination, a concept introduced by Kroese et al. (2014), is explained by taking a self-regulation perspective towards insufficient sleep. (Bernecker & Job, 2019).

**Bedtime Procrastination** is defined as “unnecessarily and voluntarily delaying going to bed, despite foreseeably being worse off as a result” (Kroese et al., 2014). Bedtime procrastination, like general procrastination, is associated with poor self-regulation, decreased quality of life and more significant eveningness tendencies. It also limits the quality and the number of hours one sleeps. (Chung et al., 2019) (Bernecker & Job, 2019).

Short-term mood restoration may be accomplished through Bedtime procrastination. After an exhausting day, people may feel good after watching a movie, playing a video game, or participating in other hobbies or leisure activities. In this way, bedtime procrastination may be related to procrastinating in its general sense: procrastinators often give in to their temptations to feel good because doing so results in temporary mood improvement. (Sirois et al., 2019)

Evidence suggests that self-control plays a vital role with respect to the precursors of Bedtime Procrastination. (Bernecker & Job, 2019). It can be seen as a phenomenon that happens as a result of impairment of self-control on the part of people who, although being aware of the benefits, influences, and effects of having an appropriate bedtime, give in to immediate desires that might undermine their goals to get to bed early. For example, individuals may take some ‘me’ time to relax after a tiring day, leading to such behaviours.

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It is seen that implicit theories of willpower and stress can be used to explain the behaviour of Bedtime Procrastination. According to the *Strength Model of Self-Control* proposed by Baumeister et al. in 1998, actions of self-control can result in a state of "ego depletion," which unmistakably causes failure of self-control. Self-control is also said to depend on finite resources. And also, according to the *Limited Theory of Willpower*, people must replenish resources used when resisting desires, doing demanding mental activities, or controlling their emotions in order for their willpower to function properly again.

Restoration of resources can be achieved, for instance, by taking a break or eating. The *Non-Limited Theory of Willpower* states that people think their willpower may be activated through self-control exertion. According to studies, those who adhere to the restricted hypothesis fared worse on a self-control task if they had already completed a self-control exercise. (Bernecker & Job, 2019)

Procrastination can be considered as a battle between the limbic system and the prefrontal cortex. (Johnson, 2021)

### *The Clocks Theory*

Our lives are controlled by the Social Clock, Sun Clock and the Biological Clock. The Sun Clock and the Social Clock were supposed to run in tandem; noon was roughly when the sun was at its highest point, and midnight was 12 hours later, halfway between dusk and dawn. Being on time for appointments like school, work, trains, and planes is made possible by the Social Clock, which also allows for the exchange of activities and communication with others. Since the Earth began to rotate around its axis reliably and the sun, social time has been connected to the Sun Clock. (Roenneberg et al., 2003)

The rotation of the Earth has not always produced a 24-hour day. Earlier days on Earth were less than seventeen hours long when the first circadian clocks emerged around three billion years ago, mostly in single-cell ancestors of today's cyanobacteria. Since then, Earth's rotation has slowed by about two milliseconds per century—time scales that allow evolution to adapt biological clocks to changing day lengths easily. (Roenneberg et al., 2003) (Roenneberg et al., 2019)

On the other hand, the changes made to a person's social clock cannot be kept up with by our biological evolution. Before time zones were established in the 19th century, the Social Clock and Sun Clock were in sync. As previously stated, noon coincided with the moment the sun was at its greatest position, and midnight occurred 12 hours later, halfway between dusk and dawn. Since the establishment of time zones, the phrase "noon" has only ever been used to describe the time of the Sun Clock on the meridian that establishes the specific time zone, making it more arbitrary. (Roenneberg et al., 2019)

Biological Clocks need cyclic environmental signals (zeitgebers) to synchronise with the cyclic environment. Zeitgebers are environmental time cues for resetting the circadian system. (Caliandro et al., 2021). These zeitgebers were weakened mainly due to the advent of electricity, leading to a broader range of Chronotypes and, thus, increasing the discrepancy between the Social and Biological Clock. A dark-light zeitgeber is appropriate for humans, and the most common zeitgeber for humans is the natural day sunlight and night darkness. (Roenneberg et al., 2003)

Anything can act as a zeitgeber if it satisfies the requirement that neither its photoperiod nor the related scotoperiod has an excessively short duration. The period of the light-dark cycle

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should be close to 24 hours, and the strength of the contrast between the photoperiod and the scotoperiod is sufficient to be referred to as zeitgeber strength. (Roenneberg et al., 2019).

The following theories show how the circadian system functions and how it affects physiological mechanisms. According to a description of the circadian disruption theory, age-related chronic diseases are more likely to occur and the ageing process is sped up when the circadian system isn't functioning properly. Inadequate circadian system functioning in a person with a period of more than 24 hours can lower the body's adaptability and shorten lifespan, according to the *circadian resonance hypothesis* put forth by Pittendrigh and Minis in 1972. This concept has also recently been supported. (Borisenkov et al., 2019).

### *Mammalian Circadian Clock*

This system is organised hierarchically. The hypothalamus's Suprachiasmatic Nucleus (SCN) houses the master clock, while all other cells and tissues in the body contain peripheral clocks. It may not surprise that light, the most reliable and consistent environmental Zeitgeber, resets the master clock of light every day through photoentrainment. (Caliandro et al., 2021).

A specialised class of retinal photoreceptors which process visual or photic information are called photosensitive retinal ganglion cells (ipRGCs). Morning sunlight, typically characterised by short wavelengths (i.e., blue light of ~480 nm), triggers the strong activation of the ipRGCs. In contrast, the evening sunlight—characterised by longer wavelengths (>600 nm)—has a minimal effect on those cells. (Roenneberg et al., 2003)

The retinohypothalamic tract is used to carry the photic information from the ipRGCs to the SCN. Through various neuronal and humoral signals, messages from the SCN synchronise the clocks of peripheral cells and tissues. Feeding signals have a stronger influence for adjusting the peripheral clock than light cues. (Caliandro et al., 2021).

As defined by Zimbardo and Boyd in their conceptual model, *Time Perspective* is “the often-nonconscious process whereby the continual flows of personal and social experiences are assigned to temporal categories, or time frames, that help to give order, coherence, and meaning to those events.” (Borisenkov et al., 2019).

The success of our educational and professional endeavours and our general health and happiness may all be predicted by our temporal perspective, which includes our propensity to dwell in the past, live exclusively in the now, or be imprisoned by our hopes and aspirations for the future. (Collingwood, 2016)

According to Zimbardo, one's time perspective affects our judgments, decisions, and actions. A future time perspective also aids students in their studies and advancement to higher education. The view that time perspective is mostly learned in childhood and is impacted by culture is shared by many scholars. (Collingwood, 2016)

Zimbardo & Boyd (1999) distinguished five-time perspective types: past-positive, past-negative, present-fatalistic, present-hedonistic and the future-perspective. (Sobol-Kwapińska et al., 2018). “The *Past-Positive type* is usually expressed in a warm, sentimental attitude toward their past life. The *Past-Negative type* involves having a generally aversive or pessimistic view of the past. The *Present-Fatalistic types* usually reveal a helpless and hopeless attitude toward the future and a consequent focus on the present. The *Present-*

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*Hedonistic types* usually reflect a hedonistic, risk-taking attitude toward time and life, and the individuals with a *Future perspective type* reflect a general future orientation.” (Borisenkov et al., 2019).

There is also an additional dimension that is added to the time perspective theory, that is *Transcendental-future-orientation*, where people of this type believe that life after death is more important than the life they are living. They may invest heavily in the afterlife during their current lifetime (for example, the Egyptians and the pyramids they built). (Sword & Zimbardo, 2016).

The theory states that the *Future Perspective* types are highly ambitious, focused on goals, and tend to feel a sense of urgency that can cause stress. Investment in the future can come at the cost of close relationships and recreation time. (Collingwood, 2016)

There is a close relationship between Time Perspective and LHS. People with Present Time Perspective display characteristics consistent with a fast LHS, and those with Future Time Perspective display the characteristics of a slow LHS. There exists a relationship between Time Perspective and circadian rhythm. People with present TP have a late chronotype, and those with future TP have an early one. (Borisenkov et al., 2019).

Studies on the relationship between chronotype, reproductive behaviour and personality traits. People with a late chronotype become sexually active at an earlier age, have more and shorter relationships with sexual partners and are more prone to aggressive behaviours and suicidal tendencies. (Borisenkov et al., 2019).

FTP is a construct included in the theoretical framework Socio-Emotional Selectivity Theory. (Coudin & Lima, 2011)

Older adults and people in poor health frequently report having limited FTP, which is linked to a propensity to prioritise emotional well-being. On the other hand, younger, healthier groups frequently report expansive FTP, which increases their propensity for long-term planning. The employment of effective active and emotion-focused coping mechanisms as well as expansive perceptions of the future time, have both been associated with increased treatment adherence (e.g., cognitive reappraisal and exercise of feelings of hope and general optimism). (Fennell et al., 2021)

The *socioemotional selectivity theory*, which examines how people perceive their future, can also be used to explain FTP. This idea contends that as people become older, their goals alter and become more emotionally meaningful, placing a higher priority on relationships with their close friends and family. However, young people place more importance on practical objectives like learning new things and growing their social networks. FTP is a flexible, ageing-related construct that evolves over the course of a person's lifetime. FTP changes as a result of people becoming more and more conscious as they become older that their time on earth will soon be over. Some consider FTP to be a unidimensional construct while others also consider it to be having a two-dimensional structure that consists of limited (focus on the limitations) and open-ended (focus on the opportunities). However, most studies focus on it as a unidimensional construct. (Henry et al., 2017)

*Self-efficacy* is a significant component of the *Social-Cognitive Theory (SCT)* developed by Bandura. This theory states that behaviour is strongly stimulated by self-influence. Self-

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efficacy theory (SET) is a subset of Bandura's (1986) Social Cognitive Theory. A strong sense of self-efficacy is seen to promote accomplishment and personal well-being. (Bandura, 2010)

An individual with high self-efficacy sees problems as opportunities to learn, not as dangers to be avoided. These people can bounce back from failure more quickly and are more inclined to blame laziness for failure. They approach potentially dangerous circumstances with the conviction that they are in charge. These factors have been connected to lower levels of stress and a decreased susceptibility to depression. (Bandura, 2010)

One has a tendency to stay clear of situations that are thought to be beyond his or her scope of competence and engage actively in endeavours for which one feels competent. Social cognitive theory bases its main proposition on the premise that success experiences increase self-efficacy while repeated failures decrease it. Moreover, secondary to repeated successes, enhanced self-efficacy often generalises to new situations. (Wilde & Hsu, 2019) (Iroegbu, 2012)

Strong self-efficacy beliefs improve well-being and human achievement in various ways. People who have a strong sense of their competence in a particular area view complex tasks in that area as challenges to be conquered rather than risks to be avoided, and they also have a strong sense of intrinsic motivation for their work, set ambitious goals and stick to them, increase their efforts when they fail, more quickly regain their confidence after failures or setbacks, and blame failure on their lack of knowledge or skills. High self-efficacy promotes sentiments of calm when tackling challenging tasks and activities. (Wilde & Hsu, 2019) (Iroegbu, 2012)

SET theory follows the principle that people are likely to engage in activities they perceive themselves as competent in. Self-efficacy is the belief one has in their effectiveness in performing specific tasks. The theory suggests that individuals use four sources of self-efficacy beliefs to develop their beliefs: performance accomplishments or outcomes, vicarious experiences (mainly through social role models), social persuasion and physiological and emotional states. (Kangal, 2019)

*Performance Outcomes* or *Mastery Experiences* are the most influential source of information that affects one's beliefs. It refers to the interpreted result of one's previous performance or mastery experience. It includes the experiences one gains when one takes on a challenge and performs it successfully.

The second source is *Vicarious experiences*, where one learns through vicarious experiences that are provided by social models. This is called Modelling, and it can cause expectations to rise in observers so that they can improve their performance through this vicarious learning experience. One is more likely to engage in oneself some of the positive views about oneself when they have positive role models in their life, especially if those models are those who exhibit a good, high and healthy level of self-efficacy. (Lopez-Garrido, 2020) (Wikipedia contributors, 2023)

The third source is *Social Persuasion*. These include activities where people believe they can cope successfully with specific tasks through suggestions. Some examples include Coaching and Evaluative Feedback. People are likelier to believe they have the knowledge

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and talents to succeed when they receive encouraging verbal comments while working on a challenging activity.

The fourth source is *Emotional and Physiological States*. One's emotional and physiological states affect self-efficacy judgements concerning specific tasks. Emotional reactions to such tasks can lead to negative judgments of one's ability to complete the tasks. (Lopez-Garrido, 2020) (Kangal, 2019) (Wikipedia contributors, 2023)

Another researcher, James Maddux, developed a fifth source of self-efficacy beliefs, called, *Imaginative experiences or Visualisation*. Imaginative experiences include someone attempting to show that their goals are achievable. It refers to visualising oneself as behaving effectively or successfully in a given situation. (Lopez-Garrido, 2020).

Self-efficacy can also be explained from the *Social Learning perspective*, which describes acquiring skills developed exclusively and primarily through interactions within a social group. Social learning encourages the growth of personal emotions, practical abilities, and an accurate assessment of oneself and acceptance of others. It depends on how individuals succeed or fail at dynamic interactions within communities. (Wikipedia contributors, 2023)

*Self-concept theory*, which aims to explain how people perceive and interpret their existence from cues they obtain from other sources, focuses on how these impressions are organised and how they remain active in the lifespan and can be used to explain self-efficacy. How people have come to interpret their connections with others and with themselves is directly tied to both successes and failures. According to this idea, self-concept is organised (in how it is applied to oneself), taught, and dynamic (i.e., constantly changing and not fixed and restricted at a certain age). (McAdam, 1986)

*Attribution theory* is another approach to understanding the concept of self-efficacy. This concept focuses on how people attribute events and how those beliefs affect one's self-perception. According to attribution theory, there are three leading causes: The locus is where the alleged cause is. If the locus is internal (dispositional), success will increase sentiments of self-esteem and self-efficacy, while defeat will decrease them. (Wikipedia contributors, 2023)

Whether a cause is viewed as static or dynamic across time is determined by its stability. It is directly tied to expectations and objectives because when people blame stable elements like the difficulty of a task for their failures, they will anticipate failing at that task in the future. Whether someone feels actively in charge of the cause is referred to as controllability. Failure at a task one believes they have no control over might result in embarrassment, shame, and/or rage. (Wikipedia contributors, 2023)

Self-efficacy theory states that people's beliefs in their ability to perform their activities influence the choice of their behaviour and situations which will be avoided or attempted. It also influences the effort spent attempting a particular task as more energy is devoted to a task perceived as one that will be successful. It also influences how long a person persists with a task and the emotional reactions associated with the threat of failure. According to Bandura, there is no global sense of self-efficacy, which differs from self-esteem. (Lawrance & McLeroy, 1986)

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People with high and low self-efficacy differ in four major psychological processes: cognition, emotion, motivation and affect. (Wilde & Hsu, 2019)

**Self-regulation** refers to control over one's cognition, emotions, behaviours, and impulses and has been associated with better outcomes in life. (Reed et al., 2020)

Younger adults with greater self-regulatory capacity and ability (i.e., motivation and capacity to meet self-regulatory demands) may be identified using two measures. Neuropsychological tests are used to evaluate the first measure, **Executive Function (EF)**, which frequently entails working with abstract information like numbers, characters, and colours. It demonstrates the ability to successfully use working memory and set-shifting, inhibition, and updating. Younger adults had a greater correlation with lesser tendencies towards concern, ruminating, and mind-wandering. (Reed et al., 2020)

The second measure is called **Heart rate variability (HRV)**. Research has shown that it reflects the activity of the central inhibitory network, which is responsible for both the EF and the Self-regulatory functions. Numerous ideas support the idea that the parasympathetic nervous system, which affects cardiac activity and permits a high degree of heart rate variability, is influenced by the medial prefrontal cortex and other prefrontal cortical areas. (Reed et al., 2020)

Higher resting HRV was associated with better self-regulatory performance on questionnaire measures of self-regulatory function, including emotional control, cognitive control, impulse inhibition, active coping, and frustration tolerance, in younger adults (e.g., persistence, emotion management). Younger people's self-regulation is often evaluated using this combination of three interconnected factors: behaviour (self-regulation), cognition (EF), and physiological (HRV). (Reed et al., 2020)

**Self-regulation** refers to the capacity to alter or change the self and its responses to align them with various standards such as goals and ideals. It is useful for managing motivational conflicts. The state of reduced self-regulatory resources has been termed as **ego-depletion**. Depletion of resources affects tasks that call for initiative or self-control but not those that are automatic and effortless. (DeWall et al., 2008)

**Self-regulatory fatigue** occurs due to the overriding of the self-regulation mechanism. An influential self-regulation theory is the **Strength Model (SM)**, which is based on the premise that all self-regulatory efforts rely on a limited and common energy source, leading to self-regulatory fatigue or ego depletion. This, in turn, causes regulatory fatigue. The model proposed that regulation of one's cognitions, emotions, or behaviours relies on the common energy source used up due to engaging in previous acts of self-regulation. It is similar to how the skeletal muscles become fatigued and unable to sustain work due to prior exertion. (Evans et al., 2016).

Two basic groups of processes play a significant role in self-regulation: volitional processes that facilitates self-regulation and impulsogenic processes that undermine or prevent self-regulation. Self-regulation may result from weak volitional processes and from impulsogenic processes. (Kadzikowska-Wrzosek, 2018)

The latest version of the SM model is based on glucose levels and hence is called the '**glucose depletion hypothesis.**' According to the glucose depletion hypothesis, a lack of

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glucose caused muscular and self-regulatory weariness. The brain needs glucose to carry out its essential processes, and after completing challenging tasks, its glucose oxidation has increased. Additionally, research showed that self-regulatory tasks reduced blood sugar in much larger amounts than non-self-regulatory tasks and that performing a subsequent self-regulatory work while replenishing glucose with sugar rather than a placebo drink was more effective. (Evans et al., 2016)

Most recently, motivation and resource allocation have taken precedence over resource availability when explaining self-regulatory tiredness. According to this viewpoint, self-regulation causes a change in motivation and attention, which increases the likelihood that self-regulation may fail in a later activity. According to this paradigm, participants who put more effort into self-control feel more ok with "slacking off" on following tasks. Other theories propose that the feeling of self-regulatory tiredness is the consequence of intricate brain calculations, including opportunity costs or the benefits lost while forgoing one activity in favour of another. This approach is congruent with the idea that mental resources are constrained due to allocation rather than depletion and is a version of the idea that mental exhaustion is a type of goal conflict. (Evans et al., 2016)

There are four main ingredients of the self-regulation process. The first ingredient is standards. Effective self-regulation requires a clear, not vaguely stated standard. Ambiguous, uncertain, inconsistent, or conflicting standards make self-regulation a difficult task. The second ingredient is self-monitoring, as it is impossible to regulate behaviour or emotion without being aware of it. One significant aspect was to integrate the feedback-loop theory to human self-regulation. The person performs a test by comparing the self to the standard. The third ingredient is the motivation to meet standards, monitoring the situations and thoughts that precede breaking standards. The last ingredient is willpower, which consists of internal strengths and urges. (Baumeister & Vohs, 2007).

Different models of Self-regulation differ with respect to what they emphasise as the essential nature of self regulation. First, Self-regulation might be considered a knowledge structure where self-regulation consists of a master schema about controlling the self and managing responses. Therefore, in accordance with this view, initial self-regulation activities lead to better accessibility to self-regulation schemas. If self-regulation operates like a schema or other knowledge structure, activating it should facilitate subsequent self-regulation. (Muraven et al., 1998)

Secondly, it is possible to consider self-regulation to be a skill. Thus, self-regulation is understood as the ability to govern oneself that has been overlearned. This ability is eventually developed via practice and is constant throughout all trials. It holds that regulating oneself once won't impact how one governs oneself later. Another perspective holds that self-control is a finite but constant ability. According to this theory, using self-control or regulation simultaneously on different tasks will have an adverse effect each of them since they both consume the same energy resource, but once the first activity is completed, the resource will be completely available for the following activity. Hence, it won't impact subsequent acts; nevertheless, simultaneous acts will be affected. (Muraven et al., 1998)

Self-regulation can also be understood in relation to the glucose depletion hypothesis. Glucose is a chemical in the bloodstream made from nutritious intake and then converted into neurotransmitters used as fuel for brain processes. Self-regulation is considered to be

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one of the most metabolically expensive activities. When there is a conflict between impending and inhibiting processes, as seen with self-regulation, the brain uses up more glucose than when these conflicts are absent. The self-regulatory process decreases glucose concentration faster than the rate of replenishment. This reduces people's capacity to self-regulate, especially in simultaneously occurring situations. (DeWall et al., 2008)

Bedtime procrastination causes sleep deprivation, leading to impaired and slow thinking, low attention levels, bad memory, bad decision-making, stress, anxiety and irritation. It also results in poor sleep quality and causes associated psychological problems. (Starkman, 2021). Insufficient sleep during adolescence is associated with risky behaviour, including heavy alcohol, cigarette, and marijuana use, high-risk sexual conduct, and auto accidents. Moreover, inadequate sleep increases the chances of obesity, depression, and suicide attempts. It impacts mood and emotion control and is linked to poor emotional intelligence (Magalhães et al., 2020).

Not many studies have correlated Bedtime Procrastination with the abovementioned variables, which leads to this research idea. There is an increasing tendency among individuals who delay their bedtime, leading to a host of other issues like sleep disorders, anxiety and self-regulatory issues. Sleep loss is a public health crisis and this study aims to shed more light on this topic. (Dolan, 2022)

There have hardly been any studies conducted on the topic of Bedtime Procrastination in the Indian setting, targeting the young adult population, thus addressing the research gap present. It also is novel with respect to the aspect that bedtime procrastination is tested as a mediating variable between the constructs of self-efficacy and future time perspective.

Bedtime procrastination is a specific type of sleep-related health procrastination behaviour that may result in poor sleep quality, general procrastination and other cognitive impairments, which makes it imperative to study in detail the factors causing and contributing to the occurrence of the behaviour.

In the research study by Kroese et al. (2014) examined the associations between night time procrastination and subjective and objective sleep outcomes and the relationships between general procrastination, self-regulation, and bedtime procrastination. The research demonstrated a negative correlation between bedtime procrastination and self-regulation using a community sample of 177 adults. This indicates that participants who reported more bedtime procrastination tended to score worse on self-regulation measures.

Further, the study by Kroese et al. (2016) aimed to study how self-regulation, bedtime procrastination, and perceived lack of sleep in the general population relate to one another. The study included 2106 participants who completed the 7-day bedtime diary, representing a typical sample of Dutch citizens participating in monthly online surveys. According to the report, a significant fraction of the general population gets too little sleep and stays up later than they would like. The study also found a relationship between self-regulation and the perception of insufficient sleep, mediated by bedtime procrastination.

To further investigate the relationship between bedtime procrastination and sleep insufficiency, Herzog-Krzywoszanska & Krzywoszanski (2019) conducted a study to examine the relationship between demographic characteristics and bedtime procrastination (BP) and how it affected the quality of sleep. Two samples were used, one made up of

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college students and the other of those who responded to email invites. Findings showed that females had higher scores than males and that BP scores decreased modestly with age. Place of residence, amount of education, cohabitation with a spouse or partner, and presence of children had no bearing on BP values. BP was positively correlated with weekday sleep length relative to workdays, sleeping later than intended, and a sense of exhaustion, and negatively correlated with a sense of sleep sufficiency and workday sleep length. Demographic factors also have an impact on sleep outcomes.

Furthering the understanding of bedtime procrastination in relation to poor sleep quality, the study by Ma et al. (2020) attempted to examine the relationship between bedtime procrastination and poor sleep quality among Chinese college students. The sample for the study consisted of 1550 students. The prevalence of poor sleep quality among Chinese undergraduates was 39.42%. Age, education, and bedtime procrastination independently predicted the prevalence of poor sleep quality. Bedtime Procrastination was a significant contributor to the severity of poor sleep quality.

Chronotype is defined as the person's temporal orientation or the phase of entrainment in the circadian framework, which is orchestrated by the master pacemaker in the brain, the SCN. (Fischer & Hilditch, 2022). Time and Chronotype are believed to have an effect on bedtime procrastination behaviours.

The purpose of the study by Meng et al. (2021) was to examine, among college students, a pre-and post-COVID-19 outbreak in China, the association between time perspective (TP) and bedtime procrastination (BP), as well as the impact of TP on the relationship between bedtime procrastination (BP) and chronotype. After the COVID-19 pandemic, students with more BP behaviours diverged significantly from those with a balanced TP, according to the study's 628 student survey. Future orientations and past-negative orientations each individually contributed to BP behaviours. Morningness was linked to a more forward-looking TP, which reduced blood pressure in samples taken before and after the COVID-19 epidemic. However, morningness was linked to a less past-negative-oriented TP, which only reduced blood pressure in the sample collected after the COVID-19 epidemic.

The COVID-19 pandemic has significantly impacted individuals' mental health and made people more vulnerable to mental illnesses due to the social isolation it creates. The following study by Oliveria et al. (2021) examined the associations between bedtime procrastination and sociodemographic traits, sleep patterns, perceived daily exhaustion, dinnertime, and activities before bedtime. This study was conducted during the second lockdown in Portugal. Over half of the 560 adult survey respondents felt exhausted most of the time; those who said they put off going to bed felt much more exhausted. According to the study, bedtime procrastination was linked to eating dinner and doing things right before night.

Bedtime procrastination impacts one's psychological function and is seen as a source of stress. In order to test this statement, the study by Dardara & AL-Makhalid (2021) examined college students' stress levels, bedtime procrastination, and overall well-being. Males outnumbered females in the sample of 536 students, which included more guys, and it was discovered that the non-stressed students had higher levels of well-being than the stressed group. Bedtime Procrastination has a negative correlation with well-being and a positive correlation with stress. Males were more likely than females to delay going to bed, and

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students who live alone are more likely to put off going to bed than those who live with their families.

The research study by Teoh et al. (2021), examined how inattention and procrastination before bedtime affected the connection between boredom and sleep quality. The study, which involved 270 people between the ages of 18 and 69, discovered that boredom propensity predicted inattention, which in turn was linked to more procrastination before bed and less restful sleep. However, the addition of pacing and daydreaming had no appreciable effects on serial mediation. As opposed to fidgeting and daydreaming, bedtime procrastination is directly connected to poor sleep quality. This study shows that boredom can also be a factor that promotes the practice of bedtime procrastination.

The study by Cui et al. (2021) intends to learn more about the long-term relationships between problematic mobile phone use, putting off going to bed, sleep quality and depressive symptoms among college students. Two questionnaires were given to 1181 students, with a 12-month gap between each response. The results show a significant inverse association between sleep quality, poor mobile phone use, and depression symptoms. There are also one-way connections between problematic mobile phone use, future sleep calibre, and upcoming depressive symptoms. The paper emphasises the demand for targeted interventions to minimise problematic mobile phone use, sleep problems, and depression symptoms in college students.

The study by Meng et al. (2022) study focused on the mediating role of harm avoidance and the moderating role of novelty seeking as it examined the relationship between self-efficacy and bedtime procrastination. The study hypothesised that low self-efficacy is expected to promote the fast LH strategy and should be negatively correlated with bedtime procrastination. According to the study involving 552 Chinese students, novelty-seeking moderates the association between self-efficacy and bedtime procrastination, while harm avoidance mediates this relationship. The study also discovered that the interplay between novelty seeking and harm avoidance impacted bedtime procrastination.

The study by Chen et al. (2022) aimed to examine the current state of bedtime procrastination among nursing students and use this as a base to improve their sleep quality. The sample was 1827 junior nursing college students, and variables such as Future Time Perspective, Personality, Demographics, Self-regulatory fatigue and problematic mobile phone usage were evaluated. The study results indicated that the students had moderate levels of Bedtime procrastination, which was predicted by higher monthly household income; personality traits of extroversion, conscientiousness, and neuroticism; self-regulatory fatigue; future time perspective; and problematic mobile phone use.

The study by Solberg Nes et al. (2010) studied matched patients with chronic multisymptomatic diseases and pain-free controls to determine the association between personality traits (dispositional optimism, conscientiousness, and self-consciousness) and self-regulatory fatigue. A high or low self-regulation task, followed by a perseverance challenge, was given to participants at random. The findings indicated that prolonged persistence was positively correlated with optimism and scrupulosity. Yet, when self-regulatory effort or exhaustion was present, the beneficial benefits were diminished. Likewise, controls experienced the effects of optimism and diligence more so than patients. The study by Triantoro & Safaria (2013) compared Pakistani high school students' self-efficacy, academic success, and course preferences. According to the findings, students who

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felt confident in their ability to succeed did better on a maths test and selected more challenging courses. Furthermore, it was revealed via the examination of student comments that those with strong self-efficacy were more likely to continue graduate degrees. 15 fifth-grade boys from a local school formed the sample.

The study by Nes et al. (2014) compared self-regulatory fatigue, quality of life, and health-related behaviours in patients before and after hematopoietic stem cell transplantation. According to the study, higher levels of self-regulatory fatigue were associated with lower physical, social, emotional, and functional quality of life both before and a year after the surgery. The study also examined coping mechanisms related to self-regulatory exhaustion before the surgery.

The study by Doménech-Betoret et al. (2017) intended to understand how academic self-efficacy affects students' performance and satisfaction by analysing the motivational mechanisms at play. The sample included 797 Spanish secondary school students. The findings suggested that students' expectancy-value beliefs (Subject value, Process value, Accomplishment value, and Cost value) mediated the relationship between academic self-efficacy and achievement/satisfaction.

The study by Gao et al. (2021) wanted to see if self-regulatory fatigue and trait self-control influence dietary adherence in Chinese patients with peritoneal dialysis. The sample consisted of a total of 192 patients undergoing peritoneal analysis. In Chinese peritoneal dialysis patients, education level and place of residence significantly impacted their dietary compliance. On the other hand, self-regulatory exhaustion and trait self-control are independent predictors of dietary adherence.

The research paper by Guha & Chakraborty (2021) offers an analytical review of the research on the relationship between occupational self-efficacy and job performance in the fields of education, medicine, and knowledge sharing. It emphasises the value of self-efficacy in learning and motivation and its use in the development of human resources during the past 40 years. The review discovered that although self-efficacy beliefs can predict performance across cultural boundaries, their impacts may vary depending on the setting.

The study by Zebardast et al. (2011) investigated the relationship between self-efficacy and time perspective. The sample consisted of 391 students (140 boys and 251 girls). The findings revealed a significant negative correlation between self-efficacy and present fatalistic and negative past time perspective, a significant positive correlation between self-efficacy and future time perspective, and a significant negative correlation between self-efficacy and present fatalistic and negative past time perspective. According to the study, people who have higher degrees of self-efficacy have better temporal perspectives.

The research by Fang & Zhang (2019) examined how college students in China and Thailand responded to academic deferral of gratification and their future time perspectives. 200 students were randomly chosen from each country to fill out a questionnaire. In accordance with the findings, future time perspectives significantly influenced academic delay of gratification for Chinese students but not for Thai students.

The study by Barber & Strickland-Hughes (2019) had a main objective was to understand how FTP evolves with ageing, with particular attention paid to the three-component model

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of FTP and its connection to older persons' memory beliefs. The study's results, which involved 189 people in San Francisco and Los Angeles aged 60 to 85, validated the concept by demonstrating a relationship between optimistic views of the future and thoughts about having the capacity to seize new opportunities and set goals. The study also discovered a link between the constraint scale's results and pessimistic views on the future. Finally, the study demonstrated a link between FTP Opportunity scores and views about memory management.

The study by Mao et al. (2022) examines the factors influencing bedtime procrastination and the impact of future time perspective, the dual model of self-control, and problematic smartphone use. In accordance with the findings of the study, which involved 3687 Chinese students between the ages of 11 and 23, bedtime procrastination is predicted by future time perspective, dual-mode self-control, and problematic smartphone use. Future time perspective has a negative impact on bedtime procrastination, which is negatively mediated by the impulse system, control system, and problematic smartphone use both individually and serially.

The present study will focus on studying Bedtime Procrastination in correlation with constructs like Self-Efficacy, Self-Regulatory Fatigue and Future Time Perspective in young adults. Bedtime procrastination is a health behaviour-related area that has emerged recently as a construct.

There is little literature on the Bedtime Procrastination, and none has studied its relationship with Self-Efficacy, Self-Regulatory Fatigue and FTP in a single paper. Also, this topic has not been well researched in the Indian context. It will provide valuable contributions to furthering future studies on the topic and bridging the existing gaps in the literature. It will also help differentiate the revenge bedtime procrastination phenomenon from bedtime procrastination.

### **METHODOLOGY**

The sample population consisted of individuals aged 18-26 years who were Indian citizens currently residing in India or are of Indian origin. The sample size comprised of 249 individuals. The sample framework mainly consisted of participants were mainly recruited from apartment complexes and universities. The main sampling technique used were purposive sampling and snowball sampling.

The inclusion criteria were that participants must fall in the age category of 18-26 years. They must be citizens of the Republic of India and currently residing in India or must be of Indian origin. They must not be diagnosed with any psychological disorders and must not be diagnosed with sleep apnea or any other sleep disorders.

The exclusion criteria were that individuals who are suffering from chronic sleep deprivation, individuals who are under medications or are under therapy for sleep disorders and individuals who have not been brought up in or have had prolonged exposure to the Indian culture have been excluded from participation in the study.

#### ***Instruments***

Four measures were used in this study:

- 1. Bedtime Procrastination:** The Bedtime Procrastination Scale was developed by Kroese et al. (2014). The scale consists of nine items with items in a five-point scale

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with responses ranging from 1(Never) to 5(Always). The total scores are to be computed by averaging the individual items, and the scores may range from 1 to 5 points, with a midpoint of 3 points. An exploratory factor analysis using principal component analysis revealed a single-factor solution (Eigenvalue = 5.57), indicating that the scale assesses a uniform construct as intended. It also had a Cronbach alpha value of  $\alpha = 0.92$  (Kroese et al., 2014)

- 2. Self-Efficacy:** General Self-Efficacy Scale (GSES) developed by Schwarzer, R., & Jerusalem, M. (1995). The scale consists of 10 items, the responses are made on a four-point scale, and the composite scores range between 10 and 40. In samples from 23 nations, Cronbach's alpha values ( $\alpha$ ) ranged from **.76 to .90, with the majority in the high .80s.** (The General Self, n.d.)
- 3. Self-Regulatory Fatigue:** Self-Regulatory Fatigue Scale developed by Vincent et al. (2013). The scale consists of 18 items, with both positive and negative items. The obtainable score for the scale ranges between 18-90. Internal consistency and reliability were acceptable with a Cronbach's alpha value of  $\alpha = 0.81$ . (Vincent et al., 2013)
- 4. Future Time Perspective:** Future Time Perspective Scale developed by Carstensen & Lang (1996) (Also available online on the Stanford University Website) It is a scale that consists of 10 items and the participants are asked to rate them on a 7-point scale from 1 (Definitely disagree) to 7 (Definitely agrees). The higher the general score, the greater is the future time perspective of the individual. Its Cronbach Alpha Value for internal consistency  $\alpha = 0.92$ . (Lang & Carstensen, 2002)

### *Procedure*

A Google form was prepared that included the Informed Consent form, Socio-demographic profile, and the scales measuring the variables of interest represented as different sections of the form. Participants were briefed, and their queries, if any, were addressed before beginning the collection of responses. Data was collected and saved on the researcher's google drive, and after the participants had filled the form, they were debriefed. Following the data collection, statistical analysis for correlation and mediation was conducted, and the resulting findings were reported. After this, the paper was sent to peer-reviewed journals for publishing purposes.

BP, FTP, SRF and SE variables were tested for normality as individual variables. The Shapiro-Wilk test showed that the BP and gender data was normally distributed, while the data of the other variables was not normally distributed. Following this, Independent Sample T-Test was performed to identify any gender differences. Correlational analysis indicated that the correlation between self-regulatory fatigue and bedtime procrastination was found using the non-parametric test Spearman's Rank Order Correlation and the correlation between the number of hours slept and the hours of gadget use was correlated with Bedtime Procrastination using the same test. Following this, Mediation analysis was conducted to examine whether bedtime procrastination is a mediating variable in the relationship between self-efficacy and future-time perspective.

The participants were given the choice to opt-out of the study at anytime. They were not be coerced into participating in the study. Participants knew the study's purpose, benefits, and risks before they agreed or declined to participate in the study. It was ensured that the participants did not suffer physical, psychological, emotional, or social harm. To maintain this, the participants were provided with an outline of the hypothesis and what would be

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required of them throughout the experiment before they consent to take part in the study. (Bhandari, 2022).

Beneficence means that research must be undertaken with the intention of doing good and limiting danger, whereas nonmaleficence means that research cannot be carried out with the intention of doing harm or killing. Fundamentally, non-maleficence requires that research should not cause any damage others. These were ensured in the conduction of the study. (Liddell, 2021).

Anonymity refers to the fact that the researcher is cannot identify the participants or connect their personal information to their data. Knowing the participants' identities yet omitting their names from your report demonstrates confidentiality. (Bhandari, 2022). The participants' identities were kept confidential and not mentioned in any reports or other published documents. Only their initials were collected at the time of data collection for documentation purposes.

### RESULTS

The current study was conducted on a sample population of individuals aged between 18-26 years and were mostly undergraduate students and postgraduate students. The sample size was 249 individuals, with 162 females and 87 males. The study was conducted with the aim to understand the effects of bedtime procrastination on the functioning of these young adults.

*Table 1 Test of Normality- Gender and Bedtime Procrastination*

Variable	Gender	Shapiro-Wilk Test		
		Statistic	df	Sig.
BP	Male	0.984	87	0.341
	Female	0.988	162	0.179

The data were analysed using IBM SPSS Software, Version 21. As seen in Table 1, The results of the Normality testing with respect to gender and bedtime procrastination showed that the data were normally distributed. The results indicate that both Male and Female groups have high Shapiro-Wilk statistics of 0.984 and 0.988, respectively, which suggests that the data for both groups is normally distributed. Both the groups also have a p-value of 0.341 and 0.179, respectively, which suggests that as they are above the baseline value of 0.05, the data is normally distributed.

*Table 2 Group Statistics*

Variable	Gender	N	Mean	Std. Deviation	Std. Error Mean
BP	Male	87	34.3908	4.07304	0.43668
	Female	162	34.0370	4.33946	0.34094

*Table 3 Independent Samples T-test*

Variable		Levene's Test for Equality of Variances		T-test for Equality of Means	
		F	Sig.	t	df
BP	Equal Variances assumed	0.271	0.603	0.626	247
	Equal Variances not assumed			0.639	185.906

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As seen in Table 2 and its subsections, the results of the Independent Samples T-test used to examine the existence of gender differences with respect to bedtime procrastination, the Levene's Test for the equality of variances shows that there is no significant difference in the variance between the two groups- Male and Female since the significance value is greater than the baseline p-value of 0.05 ( $p=0.63$ ). The t-value obtained (0.626, 0.639) is also lower than the critical t-value (1.96) for the 95% confidence interval. This indicates that there is no significant difference between the genders. Therefore, the results showed a failure to reject the null hypothesis.

**Table 4 Test of Normality for the four main variables (BP, FTP, SE, SRF)**

Variable	Shapiro-Wilk Test		
	Statistic	df	Sig.
<b>BP</b>	0.988	249	0.033
<b>FTP</b>	0.955	249	0.000
<b>SE</b>	0.985	249	0.008
<b>SRF</b>	0.971	249	0.000

As seen in Table 3, on testing the four variables for normality, three variables out of the four- FTP, SE and SRF have p-values lesser than 0.05. The values are 0.000, 0.008, and 0.000, respectively. This indicates that the data is not normally distributed. However, the variable BP has a p-value of 0.033, just slightly below the threshold value of 0.05, indicating that the data is more or less not normally distributed.

**Table 5 Spearman's Correlation- between SRF and BP**

Variable		SRF	BP
<b>SRF</b>	Correlation Coefficient	1.000	0.287
	Sig. (2-tailed)		0.00
	N	249	249
<b>BP</b>	Correlation Coefficient	0.287	1.000
	Sig. (2-tailed)	0.00	
	N	249	249

As seen in Table 4, on testing for correlation between the variables Self-regulatory Fatigue (SRF) and Bedtime Procrastination (BP), the correlation coefficient indicates the strength and the direction of the relationship between the two variables, SRF and BP. The correlation coefficient is 0.287, and the p-value is 0.00, which is lesser than the baseline value of 0.05, indicating a mild positive correlation between the two variables. Hence, there is a statistically significant positive correlation. Specifically, as values of SRF increase, values of BP tend to increase as well. The results show that the null hypothesis can be rejected.

**Table 6 Spearman's Correlation- between BP, Hours of Sleep and Gadget Usage**

Variable		BP	Hrsleep	Gadget Use
<b>BP</b>	Correlation Coefficient	1.000	-0.171	0.265
	Sig (2-tailed)	.	0.007	0.000
	N	249	249	249
<b>Hrsleep</b>	Correlation Coefficient	-0.171	1.000	-0.057
	Sig (2-tailed)	0.007	.	0.367
	N	249	249	249
<b>Gadget Use</b>	Correlation Coefficient	0.265	-0.057	1.000
	Sig (2-tailed)	0.000	0.367	.
	N	249	249	249

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As seen in Table 5, Correlation analysis was also conducted to understand the relationship between Bedtime Procrastination, Hours of sleep and Gadget Usage. It was found that BP in relation to Hours of Sleep had a correlation coefficient value of -0.171, with a p-value Of 0.007, which indicates that there is a mild negative correlation between the two variables and that the correlation is statistically significant. Therefore, it indicates that as the number of hours of sleep increases, bedtime procrastination decreases and vice versa. The correlation coefficient value between the variables BP and gadget use was 0.265, with a p-value of 0.000, indicating that the correlation is statistically significant and that there is a mild positive correlation between the two variables. It shows that as gadget use increases, Bedtime Procrastination also increases. Both these results show that the null hypotheses were rejected.

**Table 7 Mediation Analysis- Bedtime Procrastination (Mediating Variable)**

<b>Total Effect of X on Y</b>					
<b>Effect</b>	<b>se</b>	<b>t</b>	<b>p</b>	<b>LLCI</b>	<b>ULCI</b>
0.3953	0.0486	8.1342	0.0000	0.2996	0.4910
<b>Direct Effect of X on Y</b>					
<b>Effect</b>	<b>se</b>	<b>t</b>	<b>p</b>	<b>LLCI</b>	<b>ULCI</b>
0.3960	0.0489	8.1035	0.0000	0.2998	0.4923
<b>Indirect effect (s) of X on Y</b>					
<b>Variable</b>	<b>Effect</b>	<b>BootSE</b>	<b>BootLLCI</b>	<b>BootULCI</b>	
BP	-0.0007	0.0053	-0.0132	0.0098	

Lastly, as seen in Table 6, Mediation analysis was conducted to examine if bedtime procrastination acted as the mediating variable between self-efficacy and future-time perspective. Here, variable X is Self-efficacy (SE), variable Y is Future Time Perspective (FTP), and variable M is Bedtime Procrastination. The results of the analysis using the mediation model indicate that the overall impact of X on Y is reported in the table's first portion. The whole relationship between X and Y, excluding the impacts of any confounding factors, is known as the total effect. The overall effect in this instance is reported to be 0.3953 with a standard error (se) of 0.0486. The entire effect is statistically significant, as shown by the t-value of 8.1342 and the p-value of 0.0000. The cumulative effect's 95% confidence interval (CI) spans from 0.2996 to 0.4910.

The direct impact of X on Y is reported in the second segment of the table. The relationship between X and Y unaffected by the intermediary variable is known as the direct effect (BP). In this instance, a direct effect of 0.3960 and a se of 0.0489 are reported. The direct effect is also statistically significant, as shown by the t-value of 8.1035 and p-value of 0.0000. The direct effect's 95% confidence interval lies between 0.2998 and 0.4923.

The table's third section details any indirect effects of X on Y through the mediating variable (BP). In this case, only one indirect effect is reported, corresponding to the effect of X on Y that BP mediates. With a bootstrap standard error (BootSE) of 0.0053, the indirect effect is indicated as -0.0007. The indirect effect's bootstrap 95% confidence interval (CI) spans from -0.0132 to 0.0098. The fact that the 95% confidence interval for the indirect effect contains 0 shows that it is not statistically significant.

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Overall, the results of this mediation analysis indicate that variable X has a considerable overall effect and direct effect on variable Y, but that X has no significant indirect effect on Y through the mediating variable (BP). This suggests that rather than any indirect effects that BP mediates, the link between X and Y is explained mainly by the direct influence of X on Y. Therefore, we failed to reject the hypothesis as evidenced by the results.

### DISCUSSION

Bedtime Procrastination results in sleep deprivation. Unlike individuals with sleep disorders, people who procrastinate their bedtime are able to get sufficient sleep, but they become sleep deprived because they delay their bedtime against their better judgement. (Nauts et al., 2016)

The present research study investigated the effect of Bedtime Procrastination on the functioning of young adults. We attempted to find the correlation between BP, Number of Hours of Sleep, Gadget Use and Self-regulatory Fatigue. It also investigated the possibility of gender differences in Bedtime procrastination and also attempted to study Bedtime procrastination and mediating variable in the relationship between variables like Self-Efficacy and Future Time Perspective.

Without adequate sleep, the mind and body cannot function properly, which also results in the reduced functioning of memory, decision making and thinking capabilities. It has also been observed that bedtime procrastinators tend to spend more time on gadgets like phones, three hours before their bedtime (79.5 minutes), whereas low bedtime procrastinators spend lesser time in comparison (17.6 minutes). (Rubin, 2020).

People who have high-stress jobs, those who work for long hours and do strenuous activities and have little time to themselves during the day are more likely to engage in bedtime procrastination behaviours. (Cherry, 2023). Studies have also indicated that perceived social support negatively correlates with procrastination, and negative emotions mediate this relationship. (Yang et al., 2021)

Research has also shown that Sleep time is perceived as the end of the day and affects how individuals view their future. In the short term, people impair learning, sleep and memory, and some long-term effects include a tendency to gain weight and develop diabetes, hypertension and heart disease. (Shukla & Andrade, 2023).

The results of the current study indicate that the number of hours of sleep an individual gets is also correlated to bedtime procrastination behaviours. Studies have stated that the quality of sleep differs depending on whether or not it is a school/work night or a non-school/non-work night. Bedtime procrastination is seen as having difficulty with self-control and has been linked to poor sleep outcomes (later timing, shorter length, lower quality). With increased bedtime autonomy, a later chronotype, and a still-developing capacity for self-control, it has more significant effects on younger individuals. (Pu et al., 2022). Other studies have also proven that hours of sleep are negatively associated with bedtime procrastination. (Kadzikowska-Wrzosek, 2018).

University students are more vulnerable to bedtime procrastination, due to academic deadlines, examinations, social commitments and screen time temptations. Teenagers and young adults, particularly students, who lack set routines for caring for their homes and jobs and who might participate in screen-related activities before turning in for the night are at

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risk for BP. The study results also prove that individuals who spend more time on gadgets during the day are more likely to procrastinate their bedtime as they have a mild positive correlation. (Shukla & Andrade, 2023).

The results of the current study disprove this finding as it found no significant variations in the scores obtained by Males and Females with respect to bedtime procrastination. Research studies have shown that females are more likely to engage in bedtime procrastination behaviours than males and that females report higher rates of insomnia and higher rates of study holism. (Herzog-Krzywoszańska & Krzywoszanski, 2019) (Alshammari et al., 2023). Females are also seen to have better sleep quantity than sleep quality. However, individual differences can exist in these due to hormones, circadian rhythms and sleep cycles. Therefore, it is important to remember that sleep can vary considerably from person to person and is influenced by many factors, which can account for the lack of significant differences. (Suni & Suni, 2023)

Social support also has a role to play in procrastination behaviours. Chronic procrastination can lead an individual to experience negative emotions that harm physical and psychological health. Perceived social support refers to the subjective feeling of being supported by others, and students' procrastination tendencies are negatively related to this. Therefore, the presence of a support system and a regulating presence like family and friends may play a role in the tendencies of individuals to engage in bedtime procrastination. (Yang et al., 2021)

According to the Strength Model, self-control is based on the belief that an individual's self-control is based on a limited self-control resource. Self-regulatory fatigue occurs when the individual's self-control resources are depleted. Students and Working professionals are often pressured to meet strict deadlines and often have college and office hours take up a more significant part of their day. Their lives also include participation in social and other activities and studies-related activities to attend to. All these activities take up larger chunks of their self-control activities. (Chen et al., 2022)

Studies have often indicated that self-regulation is associated with health-related behaviours. Bedtime procrastination is seen to be negatively related to self-regulation abilities and to morningness. Individual differences in self-regulation skills are related to hours of sleep, and daytime fatigue. Self-regulation skills play a vital role in the transition from intention and behaviour consistent with this intention. When someone procrastinates, it suggests they have an intention but cannot turn it into action. (Kadzikowska-Wrzosek, 2018).

Self-regulation also includes emotional regulation, and individuals with higher self-compassion are less likely to engage in BP behaviours due to their use of healthy emotion regulation strategies that downregulate negative mood. (Sirois et al., 2019)

Hence, procrastination is not caused by a lack of drive but rather by weak behaviour control or low self-regulation. Studies have shown that self-regulation and the fatigue associated with the lack of sleep due to the lack of self-control are seen to be correlated with bedtime procrastination. (Kadzikowska-Wrzosek, 2018). The results of the current study also support this finding, as there was a mild positive correlation between self-regulatory fatigue and bedtime procrastination.

In India, technology has become advanced over the years and continues to grow. Almost everyone in the country owns a smartphone and has access to the internet and information

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available worldwide. Excessive use of electronic gadgets leads to indulgence in entertainment and other associated activities, which leads to bedtime procrastination. (Chen et al., 2022)

Research has shown a relationship between FTP and General and Academic procrastination and that FTP can reduce the instances of bedtime procrastination in individuals. (Choy & Cheung, 2018) (Jin et al., 2019).

Studies have associated Smartphone use disorder (SUD) with an individual's Future Time Perspective. FTP is seen to predict depression which in turn positively predicts SUD negatively. FTP acts as a protective factor for SUD, while depression acts as a risk factor. People with low levels of FTP only focus on the past and present and lack a proper focus for the plan of behaviour. They also have the tendency to engage in impulsive behaviours and seek immediate gratification. In contrast, individuals with higher levels of FTP have better self-regulation, are rational and make proper plans for their future. (Zhang et al., 2020)

Researchers have also attempted to study various personality traits in association with procrastination. As explained before, loss of self-control results in the individual altering their dominant response to situations and thus may cause the occurrence of procrastination. Self-efficacy refers to the individual's belief in their competence to execute their desired behaviours and obtain the required outcomes. It determines the individual's task initiation and perseverance, and individuals with low self-efficacy tend to engage in behaviour avoidance, and bedtime procrastination is considered an avoidance-related behaviour. It is therefore believed that individuals with low self-efficacy do not initiate and persevere with their tasks, and hence low self-efficacy was found to be positively correlated with Bedtime procrastination. (Przepiorka et al., 2019)

According to the results obtained in the current study, Self-efficacy directly affects Future Time Perspective, but Bedtime procrastination does not mediate this relationship. Self-efficacy describes 40% of the variance seen in FTP. Future time perspective is expressed in the individual's perceptions, attitudes and emotional expressions that can help students with regard to their confidence associated with their activities, including their bedtime activities. (Przepiorka et al., 2019) (Chen et al., 2022).

Self-efficacy refers to competency beliefs; hence, the relationship between SE and FTP is that one affects the other, as one's beliefs about oneself and their abilities in a situation reflect on their ability to make future plans and meet their outcome goals. Even though studies have shown that BP has a negative correlation with both these variables, the results of the current study states that BP does not act as a mediating variable in the relationship between SE and FTP.

According to current research, some common reasons behind bedtime procrastination behaviours include that most students know how detrimental pre-bedtime screen viewing is. When they have a commitment the next day, they ensure they do not spend too much time on the screens. Many individuals forget that they must sleep while using the screens to socialise, increasing sleep latency. The fear of missing out also plays a role in this late-night socialisation. Habitual poor sleeping habits also play a role, as this shows the individual's lack of self-control is also a reason. (Patrick, 2021)

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Thus, the current study does have several implications for the prevention and designing of an intervention in the Indian context to reduce the tendencies of engaging in bedtime procrastination among young adults. It has been shown that bedtime procrastination is related to the number of hours of sleep and the extent of gadget use seen among individuals. It is also seen that there is a mild positive correlation between self-regulatory fatigue and bedtime procrastination, which can be attributed to the depletion of self-control resources in individuals.

It was also found that there were no gender differences in the bedtime procrastination scores obtained, going against the findings of other studies, which state that women have a greater tendency to engage in bedtime procrastination. The mean scores obtained by males and females are similar with respect to bedtime procrastination.

The results of this study suggest that bedtime procrastination does not act as a mediating variable between self-efficacy and future time perspective. On working on these aspects, an intervention can be designed to target and build individuals' self-efficacy beliefs and future time perspectives and enhance the resources available for adequate self-regulation. These interventions must also improve individuals' sleep schedules and quality.

### CONCLUSIONS

The present study aims to investigate the effect of bedtime procrastination on the functioning abilities of young adults. The results mainly showed that gadget use and self-regulatory fatigue were positively correlated with bedtime procrastination, and hours of sleep in a day were negatively associated with bedtime procrastination. There were no significant differences observed between the genders with respect to bedtime procrastination scores. The results have also shown that bedtime procrastination does not act as a mediating variable in the relationship between self-efficacy and future time perspective.

The study demonstrated that bedtime procrastination could significantly affect aspects of an individual's functioning and thus may hamper their life satisfaction and performance in activities of daily living. It will affect their initiatives, goal-directed behaviour, physical, psychological and social health, and activities.

#### *Limitations and Directions for Future Research*

The current study does have its limitations. The study was conducted on a sample of individuals with the age range of 18-26 years. It consisted primarily of students, so future research must investigate the older working population to deepen the understanding of the phenomenon, especially amongst the professionals in the IT and financial sectors in India.

There could have been confounding variables that might affect the results due to existing individual differences and situations, which were not controlled. This study has not assessed the relationship between bedtime procrastination, chronotype and social jetlag, which may further the deepen the understanding of the predictors of bedtime procrastination, especially in the Indian context. Due to the cross-sectional nature of the research design, we could not establish any causal relationships. The sample population had a greater ratio of females than males and majorly consisted of undergraduate and postgraduate students hence, the representativeness of the sample was reduced to a certain extent.

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I, Aishwarya Venkataraman the author, declared no conflict of interest.

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