2025

A1: Research Report

ID7 - DNB311: CAPSTONE

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AUTHENTICITY STATEMENT

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

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Date: **02/09/2025**

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1.0

INTRODUCTION

Epilepsy is one of the most common neurological conditions amongst Australians and it is characterised by recurrent seizures which are caused by a temporary disruption of the electrical activity in the brain (Australian Institute of Health and Welfare, 2022). Seizures can be triggered from a variety of sources, but the most common and dangerous is sleep deprivation. Sleep can affect the frequency, occurrence, timing, and length of seizures in epileptics especially which can range from all ages (Petrina Hollingsworth MA et al., 2018).

The most common age among epileptics are adolescents and children. Sleep disorders are most common within this age range as well due to poor sleeping habits, intracranial infections, and birth complications (Symon M Kariuki et al., 2021). These factors can also lead to other underlying issues, especially within their social life. Children with epilepsy have found to exhibit lower social competence, high rates of social problems, and difficulties developing relationships with others which can negatively affect their quality of life (Bettina K. Steiger et al., 2017).

Cognitive impairments are associated with childhood epilepsy and can relate to underlying aetiology, abnormal brain structure and epileptic activity. These same cognitive impairments can also negatively impact their IQ, memory, and behaviour (Leanne Menlove et al., 2015).

AIM

The purpose of this project is to gain insight into the lives of children with epilepsy and how sleep affects their daily life, specifically it's mental, psychological, and social side effects. Through thorough data analysis and research, this study will reveal how to improve sleep in children afflicted with epilepsy, which in turn will help combat other serious side effects and decrease the risk of seizure activity.

1.0

BACKGROUND

Secondary research was conducted to understand existing treatments, products, triggers for seizures, and underlying issues related to people of all ages with epilepsy and sleep disorders. There are many varying epilepsy disorders that can affect a variety of demographics and can create many underlying issues and side effects.

EPILEPSY DISORDERS & DEMOGRAPHICS

Juvenile Myoclonic Epilepsy (JME) affects adolescents and children and is often a hereditary condition that can be managed but dangerous if left untreated. This condition is characterised by myoclonic jerks, generalised tonic-clonic and absence seizures which usually occur early in the morning or within a couple hours of awakening (Epilepsy Queensland, 2019).

Dravet Syndrome is a rare generic epilepsy disorder that begins in infancy with prolonged fever-related seizures. It is a clinical diagnosis that affects 1:15,700 infants and can lead to a spectrum of disorders ranging from migraines, childhood epilepsy, or even more severe, life-long epilepsy syndromes (Dravet Syndrome Foundation, 2025). These seizures are often resistant to treatment and can continue to worsen overtime.

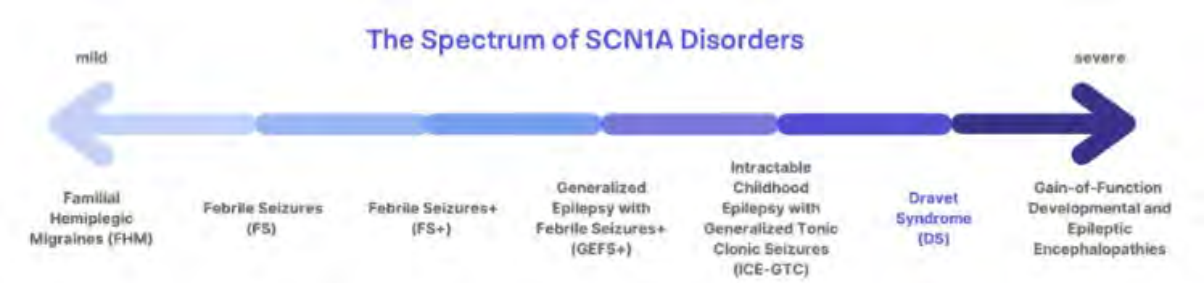

Figure 1

This figure displays a spectrum of SCN1A-related disorders ranging from mild to severe, all of which are disorders that stem from the mutation often found in Dravet Syndrome patients (Dravet Syndrome Foundation, 2025).

Idiopathic Generalised Epilepsy (IGE) is the most well-recognised subgroup of generalised epilepsies and specifically refers to other epileptic conditions like Juvenile Myoclonic Epilepsy (JME), Juvenile Absence Epilepsy (JAE), Childhood Absence Epilepsy (CAE), and Generalised tonic-clonic seizures. Patients with IGE have no evidence of structural brain lesions and often lack symptoms in onset epilepsy (Matthew McWilliam et al., 2024).

Frontal Lobe Epilepsy seizures originate in the brains frontal lobe and can trigger unusual movements, vocalisations, or emotional outbursts, particularly during sleep. Patients with this form of epilepsy are likely to manifest forms of depression, anxiety, neuroticism, impaired memory, and social limitations. Existing studies have shown patients with frontal lobe epilepsy decrease in cognitive functions and increasing mental health issues as well (Helmstaedter, 2001).

TABLE 1.

Baseline electroclinical characteristics.

Age at evaluation, years, median (IQR)	35 (IQR 25–41)
Age at seizure onset, months, median (IQR)	6.5 (IQR 3–17)
Age at LGS diagnosis, years, median (IQR)	6 (IQR 3.75–9)
Epilepsy duration, years, median (IQR)	34 (IQR 24–29)
Seizure type at onset	89 (58.2)
Epileptic spasms, *n* (%)	23 (60.5)
Focal seizures, *n* (%)	16 (42.1)
Generalized tonic–clonic seizures, *n* (%)	7 (18.4)
Atypical absences, *n* (%)	5 (13.1)
Tonic seizures, *n* (%)	2 (5.2)
Atonic seizures, *n* (%)	1 (2.6)
Frequency of seizures at epilepsy onset	
Daily, *n* (%)	19 (50)
Weekly/monthly, *n* (%)	12 (31.6)
Less than monthly, *n* (%)	7 (18.4)
Epilepsy etiology, *n* (%)	
Combined structural and genetic, *n* (%)	9 (23.7)
Genetic, *n* (%)	4 (10.5)
Structural, *n* (%)	8 (21.1)
Hypoxic–ischemic, *n* (%)	4 (10.5)
Unknown, *n* (%)	11 (28.9)
Infectious, *n* (%)	1 (2.6)
Metabolic, *n* (%)	1 (2.6)

Figure 2

This table displays genetic testing done in 25/38 (65.8%) of patients found with single-gene or with a targeted panel including 1060 genes associated with epilepsy & other neurodevelopment disorders (Emanuele Cerulli Irelli et al., 2024).

Lennox-Gastaut Syndrome (LGS) is a severe childhood condition with multiple seizure types which include tonic (stiffening) and atonic (drop) seizures which are often associated with intellectual disability and developmental delays. Adults who have been afflicted with this disease have shown significant difficulties with daily life and social skills as well (Emanuele Cerulli Irelli et al., 2024).

EXISTING TECHNOLOGY FOR EPILEPTICS

There are a wide variety of treatments available for epileptics, however, there are also products available for those who are more resistant to medication or who prefer more unique, easier, therapeutic ways to help deal with their condition.

	Emrace2 by Empatica	SmartWatch Inspyre by Smart Monitor	Blue Light Smart Glasses
Use	• A seizure detection wristbands that detects generalised tonic-clonic seizures.	• Detects repetitive movements which include seizures.	• Reduces photosensitive seizure triggers.
Technology	• Measures motion, skin conductance, and temperature.	• Accelerometer-based motion sensing technology.	• Apps or lenses that blocks flickering/blue lights.
Benefits	• Sends automatic alerts to caregivers & logs seizure activity to detect patterns.	• Can alert caregivers in real-time during a generalised seizures; syncs with mobile apps.	• Some people with JME are photosensitive; these tools help reduce visual triggers.

Table 1: Juvenile Myoclonic Epilepsy (JME) existing products
(Embrace2, n.d.), (Inspyre, 2025), (Epsy, 2023)

	Emrace2 by Empatica	Seizure Tracker & EpIDiary Apps	Vagus Nerve Stimulation therapy
Use	• A seizure detection wristbands that detects generalised tonic-clonic seizures.	• Used for generalised epileptic patients to track the frequency, duration, and type of seizures and triggers.	• Uses electrical pulses to reduce the frequency and severity of seizures in patients.
Technology	• Measures motion, skin conductance, and temperature.	• Uses apps to share data with neurologists for treatment adjustments.	• Sends electrical pulses to the vagus nerve & can be activated manually if need be.
Benefits	• Sends automatic alerts to caregivers & logs seizure activity to detect patterns.	• Useful for people who are in need of specialised treatments and to detect seizures.	• Useful for people who are resistant to drugs and other medications.

Table 2: Generalised Epilepsy existing products
(Embrace2, n.d.), (Mohsen Zaied Alzamanan et al., 2021), (Mayo Clinic Staff, 2024)

	Helmet & Fall Protection Gear	Seizure Monitoring Cameras	Vagus Nerve Stimulation therapy
Use	• For children at great risk of falls in or near dangerous environments.	• Detects unusual movement during sleep & alerts caregivers.	• Uses electrical pulses to reduce the frequency and severity of seizures in patients.
Technology	• Uses traditional materials like nylon, EVA foam, plastics for protection + comfort.	• Provides video logs for medical review.	• Sends electrical pulses to the vagus nerve & can be activated manually if need be.
Benefits	• Provides protection against head injuries during atonic or tonic-clonic seizures.	• Useful for nocturnal seizures, which are common in Dravet Syndrome patients.	• Useful for people who are resistant to drugs and other medications.

Table 3: Dravet Syndrome existing products
(British Epilepsy Association, 2023), (Epilepsy Foundation, 2025), (Mayo Clinic Staff, 2024)

	Seizure monitoring wearables	Responsive Neurostimulation	Intracranial EEG/Stereo-EEG
Use	• Detecting & alerting during seizures, especial motor seizures.	• Treating focal seizures, including those from the frontal lobe.	• Mapping seizure origin when non-invasive EEG is inconclusive.
Technology	• Measures motion, temperature, and seizures.	• A small device is implanted in the skull, with electrodes placed in or near the seizure focus.	• Involves placing electrodes directly on or in the brain to pinpoint seizure focus in the frontal lobe.
Benefits	• Helpful for tracking patterns & alerting caregivers for tonic-clonic episodes.	• Can detect abnormal brain activity & delivers custom electrical stimulation to prevent seizures.	• Used before surgery to localise seizures in complex or drug-resistant cases.

Table 4: Frontal lobe epilepsy existing products
(Rachel Nall et al., 2023), (Alendia Hartshorn et al., 2018), (Barbara C Jobst et al., 2020)

	Ketogenic Diet Support Technology	Seizure Tracking & Management Apps	Video EEG Monitoring Systems
Use	• Apps & devices that help manage strict high-fat, low-carb diets to reduce seizures.	• Mobile apps for logging seizures, medications, triggers, and recovery periods.	• Hospital-based or at-home systems that record brain activity & video footage simultaneously.
Technology	• Tracks food intake, ketone levels, and supports dietary compliance.	• Share detailed reports with healthcare teams for better treatment decisions.	• Diagnoses seizure types & patterns, which is crucial in LGS due to mixed seizure types.
Benefits	• The ketogenic diet is often effective in reducing seizures in children with LGS.	• Parents and caregivers can track multiple seizure types & care routines.	• Creating individualised treatment plans or surgical evaluations.

Table 5: Lennox-Gastaut Syndrome existing products
(Kaleem Imdad et al., 2022), (Alendia Hartshorn et al., 2018), (Minguez, 2025)

1.0

BENCHMARKING

The following product matrix and benchmarks provide information on existing epileptic products for people with sleep issues. These products can lie between medicinal, therapeutic, and technological to provide varying benefits, and decrease or remove any unnecessary risks or side-effects.

PRODUCT MATRIX

There are many abundant sleep products that vary depending on the target demographic and benefits they offer for their users. This product matrix evaluates each of the following products' safety and complexity they provide for their users.

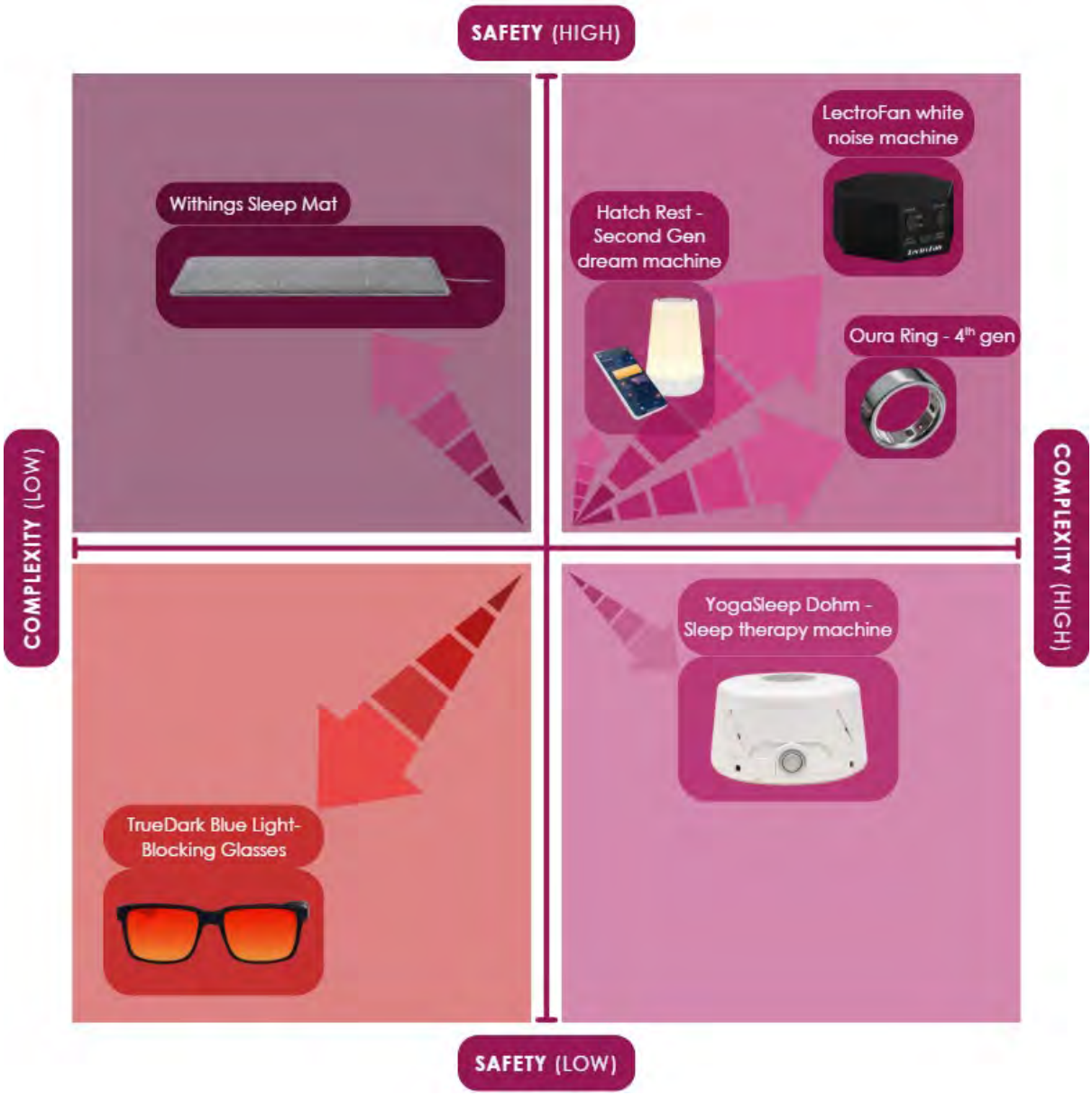

Figure 3: Sleep-related product evaluation matrix
(Withings, 2025), (Yoga Sleep, n.d.), (Oura, 2025), (Asprey, 2025), (Adaptive Sound Technologies Incorporated , n.d.), (Bulin, 2025)

Figure 3 displays the most common products used by epileptics to improve their quality and quantity of sleep through various methods. Hatch Rest, YogaSleep, and LectroFan use white noise and sleep therapy machines to accelerate the user's sleep cycle towards the third stage of sleep known as deep sleep or N3 sleep (Suni, Stages of Sleep: What Happens in a Normal Sleep Cycle?, 2025). This stage is critical for restorative sleep, particularly in people with epilepsy, thus decreasing the risk of seizures.

Figure 4: Sleep Cycle

Withings and Oura both utilise products to track the users sleep patterns and heart rate to better prepare them for the possibility of future incidents. Both of those products provide less real-time benefits; however, they are optimal tools for optimal sleep preparation. TrueDark's Blue Light-Blocking Glasses, whilst primarily used during the day can also be used for people with epilepsy. The warm shades of light within the glasses help increase natural melatonin hormones within the brain, which can then lead to the deep sleep stage (Suni, Light and Sleep, 2023).

Figure 5: Colour spectrum for sleep

The comparison between these products is clearly vast both in cost and efficiency within epileptic users, however, they also work to improve specific problematic areas of risk that are prevalent in epilepsy and also the quality of sleep as well.

MEDICATION MATRIX

Medication is the most common form of treatment for epileptics and allows for a quick and reliable recovery process. Most medications are easy to take and often decrease the risk of seizure activity within the brain, however, they can also deliver possible negative side-effects for their users.

The following product matrix includes multiple different medications commonly used for people with both epilepsy and sleep issues. Due to the fact that both go hand-in-hand and can often negatively impact one another, these brands and types are proven to be the most effective.

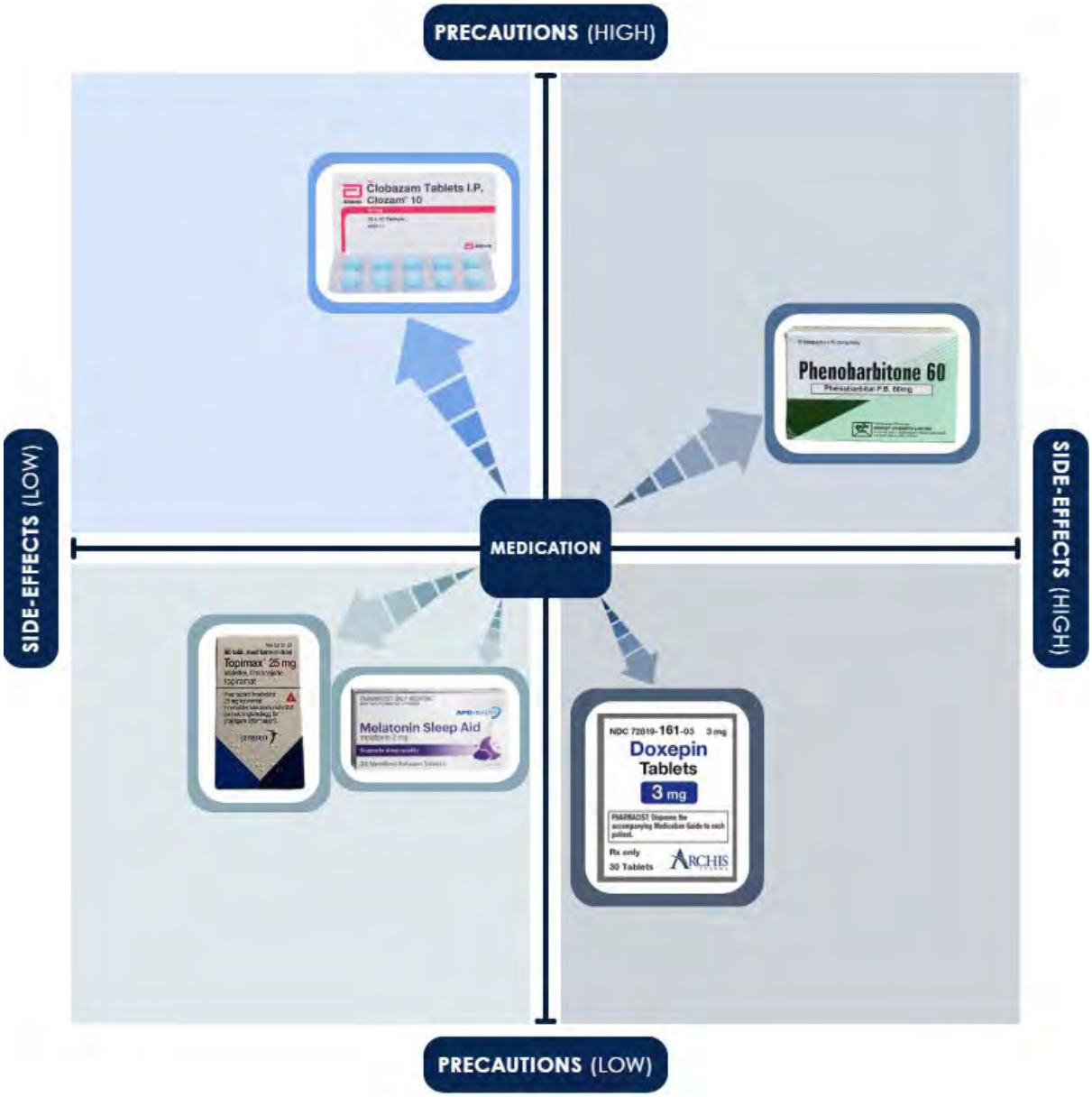

Figure 6: Epilepsy and sleep-related medication evaluation matrix

(NSW Government, 2025), (Epilepsy Foundation, 2024), (Cassaundra B. Lewis et al., 2024), (Holland, 2021), (Anasheh Almasi et al., 2024)

Figure 6 displays the level of precautions that need to be taken when using these medications as well as it's varying side-effects. Melatonin and Doxepin are effective at reducing depressive episodes and insomnia which are common mental side effects within epileptics, however, both medications can also lead to burning and tingling sensations within the body which can lead to dizziness, blurred visions, and headaches.

Clobazam, Topiramate XR, and Phenobarbital are specifically designed to treat epilepsy as they are primarily anti-seizure medications, and while effective they do cause negative side-effects for their users. Phenobarbital requires the most precautions during usage due to the seriousness of its side-effects, whilst both Clobazam and Topiramate XR offer little side-effects which include dizziness, fatigue, nervousness, and unsteadiness.

While potent and effective, medicinal treatments can act as a double-edged sword for many due to the side-effects that they can cause for their users. Some treatments are also not as affective on others due to their individual genetic variations, seizure types, and lifestyle factors (Wahab, 2010).

SECTION TWO

- RESEARCH
- ANALYSIS & FINDINGS

2.0

RESEARCH

After thorough benchmarking research into existing products enough insight was gathered to determine the target demographic most affected by epilepsy and more importantly, the effects that sleep deprivation can have on a developing brain. Adolescents and children are the most common demographic who tend to develop epilepsy and the type of epilepsy can vary as well.

EXISTING SLEEP-RELATED STUDIES

According to a study done by (M. Furones García et al., 2024) children with epilepsy tend to present a greater prevalence of sleep disorders than the general population. Epilepsy and sleep disorders have a bidirectional relationship and children with epilepsy present some type of sleep alterations, cognitive problems, and learning difficulties. The cause of these sleep disorders can be related to poor sleeping habits, requiring the presence of other family members to fall asleep, or having to share a room with others.

Sleeping disorders as a result of poor sleeping habits or epilepsy can result in seizures during sleep (nocturnal epilepsy). These seizures can occur between 8:00pm and 8:00am which can be extremely dangerous for those afflicted with epilepsy.

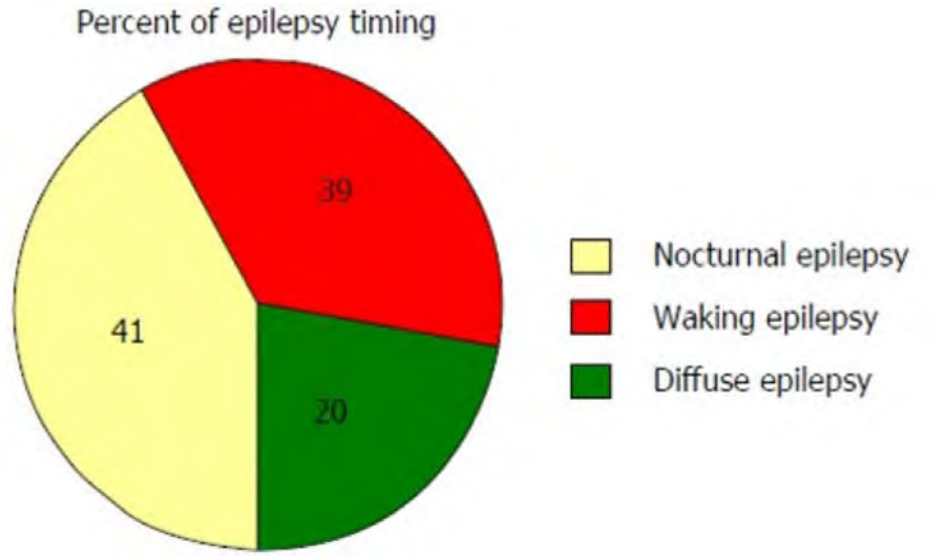

Figure 7: Percent of epilepsy timing in children

Many researchers showed the occurrence of generalised discharges and clinical seizures during NREM/Deep Sleep. NREM sleep can be considered as a natural “epileptic agent” which can also enhance interictal epileptiform discharges in both partial and generalised seizures while REM sleep limits the spread of epileptic discharges outside the area that started seizure activity (Al-Biltagi, 2014). Understanding the importance of NREM sleep and its relation to epilepsy in children will allow for a more efficient design process and the creation of more effective design solutions as well.

EXISTING SOCIAL & COGNITIVE CHILDHOOD STUDIES

Social stigmas surrounding epilepsy are another major problem among the many negative impacts that epilepsy can have on a child's life. The quality of a child's social life can be negatively impacted if their condition is not well-maintained which can then contribute to social, intellectual, and psychological issues (Bettina K. Steiger et al., 2017). Patients suffering with temporal lobe epilepsy often suffer the most with memory and other cognitive functions, again most notably due to sleep deprivation.

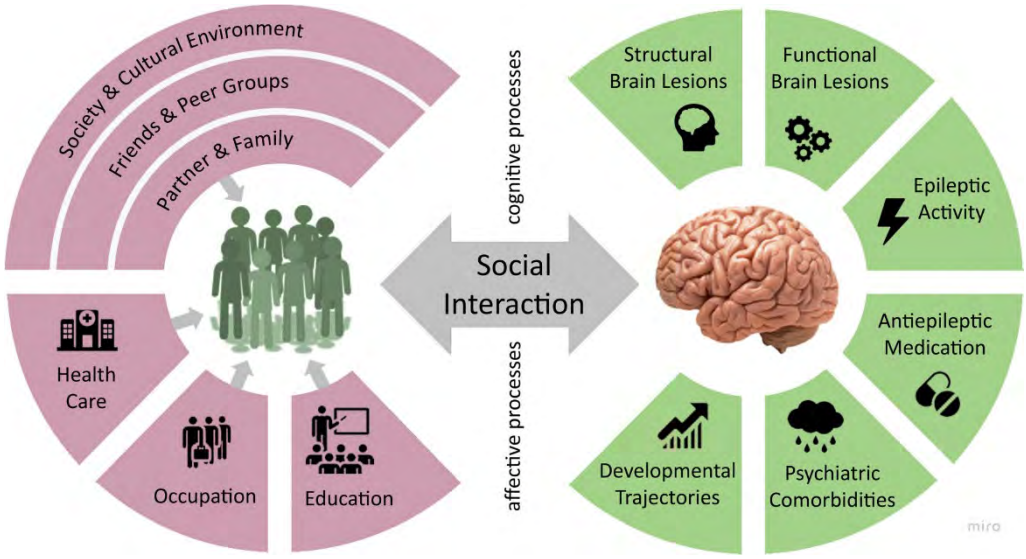

Figure 8: Social interactions and cognitive processes relationship

PRIMARY DATA METHODOLOGY

Qualitative and quantitative data was utilised through surveys and interviews to yield strong, in-depth results from professionals who are experienced in the field of treating epilepsy or those who are afflicted with epilepsy themselves. Quantitative data was used to gather accurate percentage data whilst qualitative data was used to gather descriptive, opinionated perspectives and allow for optimal product design solutions to match the target audiences needs and wants.

SURVEY PARTICIPANTS

The survey study was split into multiple parts to gather information that is beneficial for the specific target audience that is being focused on. The relationship between sleep and epilepsy was heavily marketed throughout the survey to allow the participants to understand the scope of what they are participating in. The survey delves into both sleep and epileptic-related questions to gather insight into their knowledge of existing products, possible triggers, needs for improvement, and any products they use to help them sleep or control their condition. Gathering multiple perspectives from a variety of different focus groups provides unbiased, detailed data for optimal design solutions.

INTERVIEW PARTICIPANTS

A structured approach was used during the interview process to allow for a seamless transition between questions and natural, detailed answers and data. The interview participant had a set of questions unique to them and their own experiences with epilepsy. Before they were interviewed, they were also provided with a consent form to ensure they were fully committed to answering each question from the interview.

The interview participant who was chosen as part of this study is Marni Casih who is a patient who suffers from a form of epilepsy known as tonic-clonic or grand-mal epilepsy. This is a form of epilepsy characterised by generalised tonic-clonic seizures, clonic muscle contractions, and loss of consciousness (Thomas V.kodankandath et al., 2023). Gaining her insight is important in knowing how to better treat or assist patients who suffer from epilepsy and potential design solutions that can stem from her answers.

2.0

ANALYSIS & FINDINGS

SURVEY

Eight survey responses were collected over a week-long period which, although were not as much as expected, still provided the qualitative and quantitative data needed. The 18-question survey was conducted through Google Forms and sent through email to various participants. The participants were kept anonymous and only the data from their responses were collected. The survey was broken into two different phases of questions regarding two different topics, epilepsy and sleep.

FIRST PHASE

Multiple-choice questions were used to collect accurate quantitative data from the participants on certain topics regarding their knowledge of epilepsy. Short and long form questions were used to collect qualitative information regarding the participants knowledge of the types of epilepsy they have seen or have themselves, products or treatments that are best suited for epileptic patients, potential room for improvement in existing products, and technology they wish to have if they had epilepsy.

Figure 9: Survey Q2

The participants were asked if they had or knew anyone else that has any forms of epilepsy and what forms they had. The responses from the participants indicated that Juvenile myoclonic epilepsy was the most common form due to adolescents and children being the most common age bracket that has epilepsy.

Figure 10 and ***11*** both corroborated with ***figure 9*** regarding the age bracket that epilepsy was most common in which were adolescents. The 40% of participants who responded to the question and had epilepsy also indicated that they too were or are adolescents who had epilepsy in the following question.

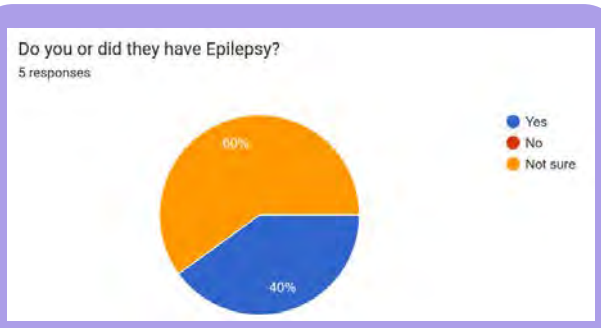

Figure 10: Survey Q4

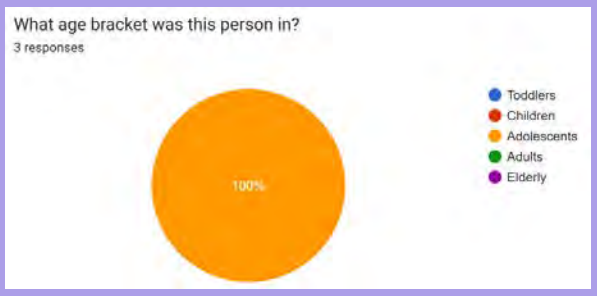

Figure 11: Survey Q5

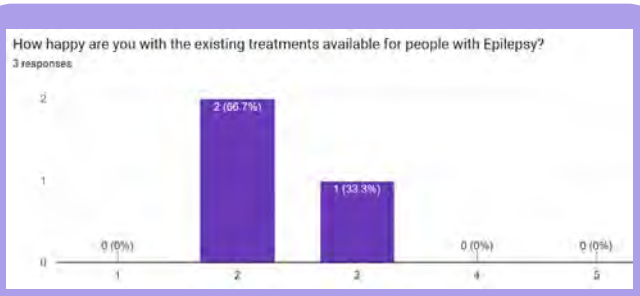

Figure 12: Survey Q10

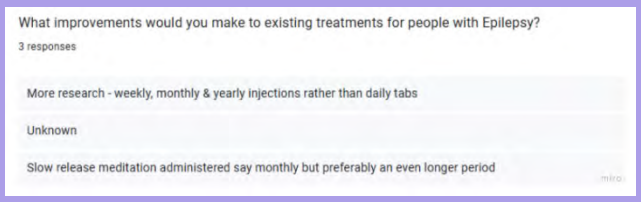

Figure 13: Survey Q11

The participants were asked about existing technology, potential improvements, and what they wanted to see for future developments in anti-seizure treatments. The majority of the responders in ***figure 12*** were unhappy with already existing technology to treat epilepsy, and suggested regular treatments administered to the patients rather than products.

SECOND PHASE

The second phase regarding the topic of sleep included the same forms of questioning to the first phase to gather similar quantitative and qualitative sleep-related data and how it relates to epilepsy.

The multiple-choice questions were used to gather information about their sleep habits, quality and quantity of sleep, possible side effects from sleep deprivation, and any technology they use to improve their quality of sleep. Only one long-form question was incorporated into the survey to gather information about any specific existing technology or products that the participants use to improve their quality of sleep. This question provides crucial information about possible product solutions based on previous technology.

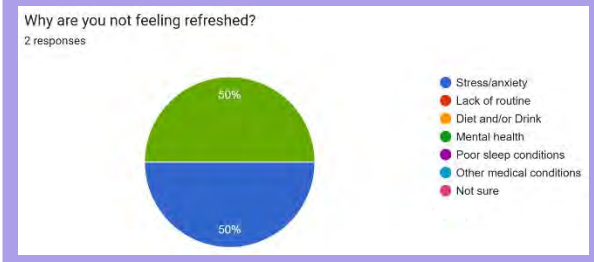

Figure 14: Survey Q15

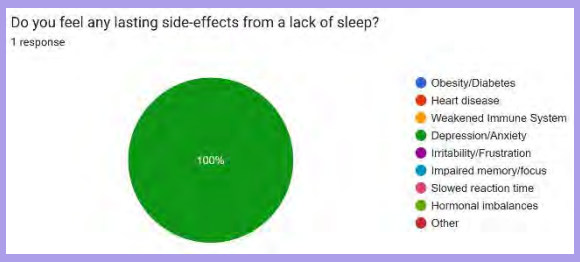

Figure 15: Survey Q16

In the second phase of questioning the participants were asked if they weren't feeling refreshed due to the lack of sleep, as well as the side-effects from the sleep deprivation. Those without epilepsy felt tired due to mental health or stress which then led to depression and anxiety, often common in both epileptics and non-epileptics from sleep deprivation.

Figure 16: Survey Q17

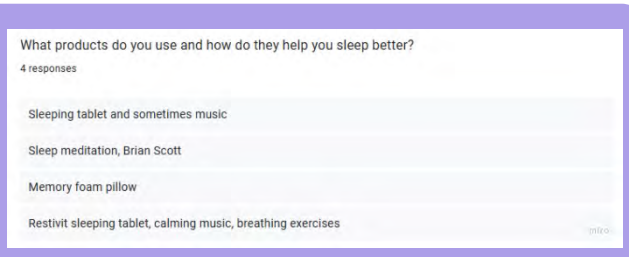

Figure 17: Survey Q18

The participants were asked if they used any products to help them sleep which allows for better insight into what products are effective and the technology they used. Calming music was the most common technology used amongst the participants which is also a common therapeutic treatment for those suffering with insomnia and epileptics.

INTERVIEW

The participant who disagreed for the interview to be audio/video recorded had their transcripts written down instead and analysed to validate their own words as accurate. Once collected, the transcripts were written down in a separate word document in relation to the questions. Due to the fact that only one interview could be conducted there was no reason for coding and analysing between multiple interviews. Thus, the qualitative data was analysed and extracted.

GENERAL UNDERSTANDING

Questions/Prompts	Response
Q5. Do you experience any long-term effects from seizures?	"...always having it in the back of your mind that you could have a seizure...It can have social impacts, financial, employment...it impacts ease of access to other things in life...I think my memory has somewhat been impacted..."

Table 6: Ouestion 5

A general understanding of the long-term effects seizures can have on a person's life was the first targeted subject for this interview. Marni's fear of seizures can create social impacts due to its effect on her mentality. Seizures also limited her freedom due to her inability to drive, and her memory. The secondary research on epilepsy's effect on memory and the primary data collected during this interview both corroborate the necessity for sufficient treatment.

PATIENT EXPERIENCE

Questions/Prompts	Response
Q9. What advice do you give other people with epilepsy about lifestyle adjustments?	"...I find the most effective way of doing this is a full night's sleep of 8 hours every night...reduce all stress...if you think you're at risk of having a seizure then have a day at home in bed to rest and recover..."

Table 7: Question 9

Discussing the patient experience with epilepsy allows for an in-depth understanding of the patient's own experiences and tools that helped them progress and successfully deal with their condition. Marni's best solution to combat seizures were rest and recovery. This is validated by the research conducted regarding the most common source of seizure activity being sleep deprivation and the importance that sufficient rest can have on the brain.

RESEARCH & ADVANCES

Questions/Prompts	Response
Q11. What exciting new therapies or technologies for epilepsy are you most hopeful about?	"Perhaps if they understood it more it could help, better medication, smart watch which may detect risk of seizures and is accessible to all would be helpful."

Table 8: Question 11

Due to the research and advances in recent technology to combat or treat epilepsy, it was important to understand Marni's perspective on the prospect of potentially easier, more efficient and comfortable ways of treating her condition. She explained that understanding epilepsy and making accessible products is a major factor for potential treatments which is important not just for children, but all demographics who suffer from epilepsy.

SOCIAL & POLICY ASPECTS

Marni recounts the cost and wait for specialists as extensive and unnecessary, as well as being non-accessible for some people due to their income and location. Thus, the need for treatments that are accessible, cheap, and effective are important.

Questions/Prompts	Response
Q12. What are the biggest barriers you face when trying to access treatment in Australia (or globally)?	"I think the wait for specialists and the cost of specialists, when it is a need is too much and non-accessible for some people."

Table 9: Question 12

SECTION THREE

- DISCUSSIONS
- DESIGN IMPLICATIONS
- CONCLUSION

3.0

DISCUSSIONS

The background research that was conducted was primarily on the specific types of treatments available for epileptics from all demographics and ages, as well as the common triggers that cause seizures to occur. Further benchmarking into sleep-related products for epileptics was conducted to understand the technology that was most effective against the risk of seizure activity. Using the knowledge of what demographic was considered the most at risk, existing technology, and the biggest trigger for seizures, extended secondary research could be conducted.

The secondary research primarily focused on the side-effects of sleep deprivation in adolescents and children as it is the most common and dangerous cause for seizures in epileptics. This is due to the fact that it lowers the seizure threshold within the brain and disrupts its electrical balance. This is most common in adolescents and children due to poor sleeping habits, and a still developing brain which is more susceptible to seizure activity. Thus, the primary focus of the following survey and interview were related to sleep and its effects within epileptic patients, as well as the need for future technological innovations that provide sleep benefits for the intended target audience.

The qualitative and quantitative data from both of the primary studies presents the common thread of the importance of sleep and its effects on patients. The interview with Marni Casih particularly highlighted the negative impacts epilepsy and sleep deprivation can have on a person's mental and physical health, and sociability as well. The interview corroborated with previous secondary sources that sleep deprivation and epilepsy can negatively impact memory and decrease the seizure threshold in epileptics as well.

LIMITATIONS

Many of the limitations throughout this study were mostly present in the number of participants in the survey and interview. Other interview participants which included neurologist Dr. Dan McLaughlin and Dr. Harry Singh were emailed, called, and had transcripts of the interview questions sent through with the hope of gathering their knowledge and perspective on the questions that were provided for them. However, due to their busy schedules they were unable to get back in time.

The lack of interview participants constricted the possibility of coding similarities and differences between multiple interviews to gather varying or similar perspectives.

3.0

DESIGN IMPLICATIONS

The research conducted on the existing market for sleep-related epileptic products revealed areas for improvement and a specific target demographic that isn't as protected. The following will present possible design solutions for sleep deprivation and its effects in children and adolescents with epilepsy.

LIGHT WAVELENGTHS

Specific light wavelengths can be used to induce melatonin hormones within people, particularly children which can accelerate the sleeping cycle to NREM/Deep sleep. Warmer colours (yellow, orange, pink) not only achieve this but also don't affect the seizure threshold unlike colder colours (blue). Incorporating warm colours into products that are easily used and can be displayed effectively from all angles can achieve the best melatonin activation within the brain.

SOUND WAVELENGTHS

Gamma waves (40 Hz) and complex tones have shown to decrease the risk of nocturnal seizures within children and increase their quality of sleep as well. Including certain sound frequencies within products for children can target specific areas of the brain including the frontal cortex and decrease potential abnormal seizure activity.

3.0

CONCLUSION

The purpose of this study was to utilise both secondary research and primary qualitative and quantitative data on the relationship between sleep and epilepsy and its effects on children and adolescents specifically. Background research and benchmarking were able to provide sufficient information into the methods used to increase the quality of sleep within epileptics, as well as decrease the risk of seizure activity.

This research led to a short survey completed by 8 epileptics and non-epileptics to provide multiple perspectives on the importance of sleep and its relationship with epilepsy. Existing products were further discussed to gage an understanding of the technology used to induce sleep and reduce seizures. This was also discussed in an interview with an epileptic patient to gather qualitative data based on similar topics, as well as the mental, psychological, and social effects that this neurological condition can have on a person.

The topics of sleep and epilepsy in both studies were compared with the existing market for sleep-related products and how it can be utilised for the adolescent target demographic. Further potential technological opportunities were explored to provide anti-seizure and sleep-inducing properties. The consequence from this study is to formulate the initial ideation process and criteria to create an effective design solution.

4.0

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