SLEEP ISSUES AMONG STUDYING/ WORKING DEMOGRAPHICS

ASSESSMENT 1: RESEARCH REPORT
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ABSTRACT

In the age of information and with self-care being more accessible than ever, it is evident that accessibility and awareness alone are not indicative of practice and habit. Sleep issues are particularly prevalent in studying/working class adults aged 18+ despite being heavily documented and studied. Proactivity and a lack thereof to maintain sleep hygiene is a chief reason for sleep issues among the target demographics. This research report aimed to study existing literature to identify holes in the existing data and knowledge that could be researched utilising primary methods by this report.

The report first conducted a literature review, analysing sources that fell under 4 key topics: Sleep issue frequency among 18-50 year olds, causal connection between habits/practices and sleep issues, cognitive and physiological effects of sleep issues, and sleep hygiene awareness. From this review, an abundance of authoritative literature was apparent for the first 3 of 4 mentioned key topics. The review collated data from multiple contexts with the relevant data on sleep issue frequency among the target demographic and confirmed sleep issues to be prevalent in the mentioned crowd. Causes of sleep issues were well documented and studied with plenty of corroboration between sources suggesting common ground and understanding universally of triggers, both common and uncommon, of general sleep issues. Cognitive and physiological effects of sleep issues was also generously researched and compared. Sleep hygiene awareness, comparatively, was understudied but still saw new authoritative studies each year and collectively found that sleep hygiene education alone was not indicative of better sleep habits among those educated on the topic. The review identified a 'hole' in existing literature with a relatively scarcely-studied subtopic of reasoning for a lack of proactivity in improving one's sleep.

The primary research methods used in this report were a survey and interviews with the target demographics. The survey collected 25 respondents and data was represented as bar graphs. A combination of univariate and multivariate analysis compared and contrasted the data confirming that in a local context (SE QLD), literature remained relevant and reflective of sleep issues among the target demographic. Additionally, 3 interviews were held and the transcripts were recorded and coded using a thematic analysis table. Findings from the collated data of the survey and interviews determined 2 key opportunities/problems unique to the data set. Effort, awareness and urgency were key factors in a lack of action among participants to better their sleep quality despite the high frequency of sleep issues among the same participant and interviewee group. Awareness as an inadequate driver of proactivity was made clear by the literature review but when combined with effort and urgency, added more context to why it was so. These 3 factors, collectively, were insights into the reasoning behind the discordance between sleep hygiene awareness and sleep hygiene where awareness was even available. Another key finding that corresponded with the existing literature was that sleep hygiene awareness was low despite the severity of poor sleep and its effects on general day-to-day life.

The outcome of the analysis and findings was compared to existing literature in the discussion and synthesised into key opportunities and problems that could help inform a design solution in the next part of this assignment.

SECTION 1

1.1 INTRODUCTION

The purpose of this research report is to better understand the causal connection between action/inaction towards better sleep habits, existing sleep education and sleep issues among adults (age range between 18-50) who are consistently within a work/study environment.

The global working age population currently falls within 15-65 year olds as according to **OECD (2022).** This study identifies adults that fall into the mentioned demographic of 18-50 year olds whereby the younger portion are likely to be either in University (or equivalent) or working while the older range of the population cuts off before age becomes a significant factor in sleep health.

Sleep issues are considered a health crisis as according to a study by **Hailey, et al., (2020).** A significant portion of the sleep deprived population can be found in demographics such as working/studying adults. The cause of sleep issues among the target demographic can be attributed to lifestyle, habits, understanding, accessibility, underlying disorders, etc. The result are a target demographic, young - middle-aged adults, who are typically unaware or inactive with regards to their sleep hygiene which creates a cyclical feedback system where poor sleep causes and is met with inaction and/or a lack of knowledge which continues with more poor sleep. The effects of sleep issues then translate into holistic negatives in a person's life such as social withdrawal, moodiness, reduced productivity **(Ben & Walker, 2018)** as well as generally reduced cognitive and physiological functions **(Steven, Kimberly, 2016).** Sleep issues affect as much as 45% of adults in certain sample groups **(Robert, et al., 2016)** and lay typically in the range of 4.7% and 73% as according to some collated studies (**Nadorff, et al.,2011; Sweileh, et al., 2011; Moo-Estrella, et al., 2005; Buboltz, et al., Preisegolaviciute, et al., 2010; Medeiros, et al., 2001).** These statistics along with global recognition of the severity of poor sleep hygiene give light to one of the most overlooked and underestimated factors in health among the general population. Despite people recognising poor sleep as an issue, inaction and a lack of self-education are indicative of a lack of understanding of the effects, both short term and long, of sleep deprivation.

This research report is visually represented in **figure 1** and will conduct a literature review on the relevant topics surround sleep hygiene in the target demographic. Said review and collation of data will inform the research conducted. The research will involve a data analysis on survey results given out to the target demographic as well as detailed insights from 3 interviews of the same user group. The results will then be discussed and design implications will be extracted from the conducted research. The report's findings will then characterise the brief's contents and inform the design direction.

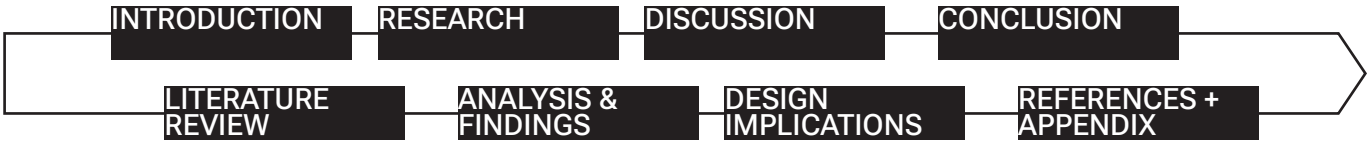


Figure 1 - Report Structure Visualisation

1.2 LITERATURE REVIEW

Existing literature has extensive research in the frequency and causal connection between habits and sleep issues among university students as well as working adults. There is, however, less literature regarding said demographic's understanding and knowledge on sleep hygiene. As a result, it is fair to assume that this subtopic is insufficiently studied relative to other topics relevant to sleep hygiene within academic research.

1.2.1 - Sleep Issue Frequency in 18-50 yr olds

The frequency of sleep issues in young - middle-aged adults is heavily studied with a multitude of relevant, authoritative research papers on the topic being conducted globally every year. As such, data is plentiful and constantly updated. On paper that holistically looks at sleep deficiency in Australian adults, the data from a sample size of 1011 stated between 33% and 45% of Australian adults experience some level of inadequate sleep **(Robert, et al., 2016).** Another study with a conducted similar research on purely university students across 2 Australian universities found that among a sample size 601 students, 33.3% have less than 6.4 hours of sleep on a nightly basis **(Batten, et al., 2020).** As 7-8 hours is the recommended amount of healthy sleep as according to **Chaput, et al. (2018),** this raises concern as to how work and study environments effect the target demographics. Expanding to international studies, a German study on another university student group found that in a sample size of 2196 students, 30% of respondents needed 30 minutes in bed to fall asleep, 7.7% suffered from insomnia, 25.9% reported fragment sleep and 14.9% of students reported difficulty sleeping **(Schlarb, et al.,2017).** Said study also referenced multiple studies giving rates of between 4.7% and 73% of respondents having sleep issues **(Nadorff, et al.,2011; Sweileh, et al., 2011; Moo-Estrella, et al., 2005; Buboltz, et al., Preisegolaviciute, et al., 2010; Medeiros, et al., 2001).** Although many of the referenced sources in the collated data pool fall outside of a relevant time period, they collate well to give a broad idea of the severity of sleep issues among university students with many of the statistics holding relevance when compared to recent studies such as a previously referenced source by **Batten, et al., (2020).** Resulting numbers from referenced sources average double digit percentages of sleep issues among the target demographic/s suggesting a sustained issue. The extensive research in the frequency of sleep issues is also abundant but maintains itself as a relevant topic to cover in future research due to its variability and definite relevance.

1.2.2 - Causal Connections between Habits, Practices and Sleep Issues

Studies on causal connections between habits, behaviours and other issues and sleep issues are another extensively studied topic with consistent, authoritative studies being published annually. Existing disorders and health issues such as sleep apnoea are common causes of sleep issues and can stem from genetic dispositions as well as lifestyle choices while other identified causes come from mental health related issues, i.e. stress, anxiety and depression with said issues being cyclical in nature **(Hanson J.A., Huecker M.R., 2019).** Habit related causes can include a lack of sleep scheduling, inconsistent sleep hours, blue light exposure close to bed time, etc **(Guarana, et al., 2021).** Blue light has seen extensive attention in the past decade with studies from as early as **John, et al., (2009)** and **Mirjam, et al., (2006)** beginning to recognise the unnatural blue light exposure from screened devices as possible factors in sleep issues. The result has been substantial research in habits pertaining particularly to blue light and sleep correlation. However, in recent years, most research in the broader part of sleep-affecting habits are slowing down leading to more referencing of outdated sources such as a study by **Franklin, et al., (2002)** that touches on relations between sleep hygiene awareness, habits and sleep quality. Although much of the material maintains relevance, it pertains to an outdated context and therefore opens up another large subtopic under general sleep hygiene that could use more research. It is also worth noting that, similar to studies on frequency of sleep issues, it is worth continuing to collect data regarding to sleep-affecting habits due to the sheer variability and unique consequences each user has.

1.2 LITERATURE REVIEW

1.2.3 - Cognitive and Physiological Effects of Sleep Issues

How sleep issues physically and mentally effect people is one topic consistently studied with a plethora of authoritative studies being updated and published annually. A study by **Steven, Kimberly, (2016)** describes sleep issues as effecting physiological and cognitive functions holistically. Studies such as ;Neurocognitive consequences of sleep deprivation by **Durmer & Dinges, (2005)** remain relevant and authoritative sources with their contents being revised and reviewed next to newer sources consistently and still maintaining relevance and accuracy. This source discusses sleep deprivation taking a toll on overall cognitive functions. Sources such as a study by **Alhola & Polo (2007)** and **Lim, Dinges, (2010)** expand upon and talk of increased reaction times, more frequent errors in tasks, worse attention span and so on as largely affecting the people of all demographics. **Harrison & Horne (1998)** research concludes a negative impact from sleep deprivation on the ability to inhibit compulsive and impulsive behaviour which remains relevant and accurate according to 'Effects of threat and sleep deprivation on action tendencies and response inhibition' **(van Peer, et al., 2019).** The notable effects of sleep deprivation and issues are well-documented however, the majority of existing literature doesn't extend much into how such cognitive and physiological effects reflect themselves in more context-based and social settings where unique experiences could provide better insight.

1.2.4 - Sleep Hygiene Awareness among Target Demographics

Sleep education and understanding among all demographics is well-studied with a multitude of authoritative sources but not relative to all other aspects of sleep hygiene. This leads to an opportunity for finding useful data in this field where there is less abundance of existing information comparatively. An article by **Perry, Patil & (2013)** dissects and discusses the importance of sleep as a critical part of health that is not given enough awareness too and labels the lack of education around sleep a 'public health issue'. A later article by **Hailey M., et al., (2020)** claims both New Zealand and Australia recognise sleep issues as a current health crisis however healthcare providers aren't given sufficient training on the subject and therefore cannot extend their knowledge and help regarding it to clients and the general population in an effective manner. Recent conducted research by **Elaine, et al., (2019)** found that despite educating students, results showing no improvement in sleep quality despite some students trying to apply the given knowledge to their routines. Another, more recent article by **Daniel, MD, et al. (2021)** conducted similar research using medical students as the basis of the study with results showing a basic education on sleep hygiene and healthy sleep practice creating little to no tangible positive improvement on sleep quality among the sample group suggesting that just informing is inadequate. These 2 articles were well-received and reflected among further studies of a similar vain. Despite this, it is fair to assume that if sleep education was better deployed, there would be some level of benefit regardless of the size of change and so further understanding existing sleep education levels is beneficial.

Much of the immediately inconsistent data is typically tied to the same type of research in various contexts, i.e. different geographical locations, work/study settings and time periods which suggests social and physical environment as additive and subtractive to the issues as opposed to suggesting poorly conducted or incoherent data. There is reason to believe that sleep education and understanding among the target audience benefits the most from further research while all other topics are still worth collecting data on as they can provide nuanced data and insights not found in more formal literature.

SECTION 2

2.1 RESEARCH

The research conducted in this report consisted of 2 Primary Research Methods (Survey and Interviews) and Secondary Research (Desktop Research) as seen in **figure 2.** Desktop research consisted of primarily grey/academic literature that contained collated and original data. Along side this, market research was conducted in a secondary nature. Primary research was conducted iteratively and there were a total of 28 participants with 25 respondents for the survey and 3 interviewees for the interview.

Figure 2 - Research Methodology Visualisation

After establishing a general direction for the research report, an informal literature review was done to gain an understanding of the topic and to identify potential points of interest. A formal literature review was then conducted, gathering sources restricted to authoritative, academic literature. Collected data and insights from these sources was then compared among other similar articles for the purpose of finding conflicting information and data. Identified conflicts were taken into consideration. From this, a target audience and context was identified to become the main topic of further research. The target audience was defined as young to middle-aged adults (18-50yrs) who had an occupation in a study or work environment, i.e. university students and working adults. The context was identified as those within the target audience who suffered from any level of sleep issues, i.e. poor sleep practice, disorders, etc.

Market research was done to find and understand the existing products and methods that would be used to counteract sleep issues and also implemented into the primary research to understand their usage in applicable settings.

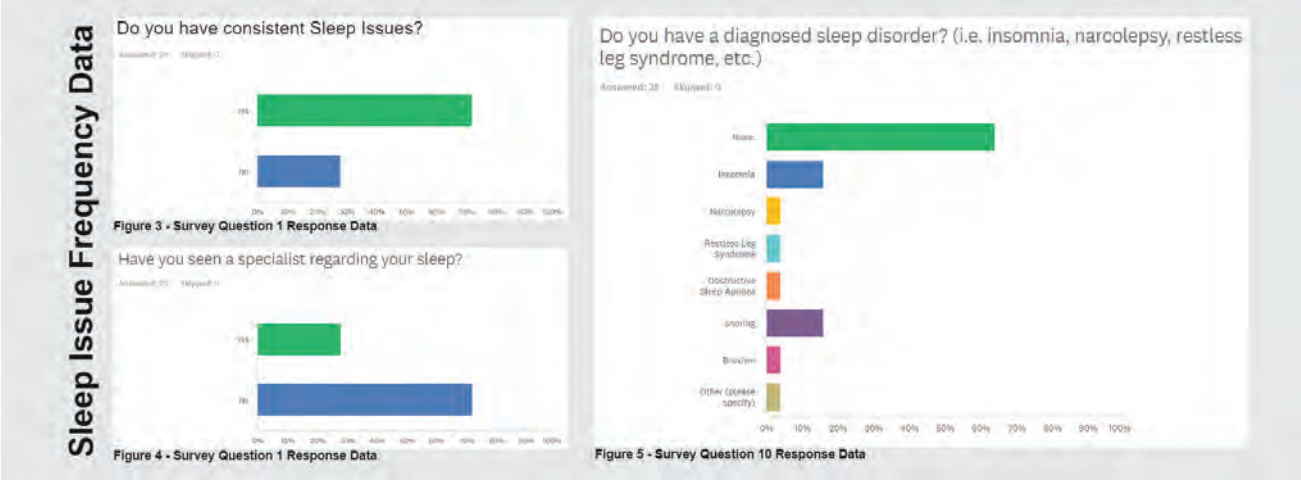
Primary research was conducted in an iterative manner with draft interviews and surveys being created and testing to refine and finalise the material within each respective method. During this process, respondents were made aware of the purpose of draft deployment in order gather insight into question and flow improvement for each method. Once refined, the finalised surveys and interviews were deployed. The survey collected a total of 25 respondents.
3 finalised, semi-structured interviews were held with the transcripts being recorded.
For the surveys, Survey Monkey was used. During the iterative process, issues arose with using a free account which limited the types of questions and quantity of questions that were able to be asked in a single interview. See **Appendix 1.** As a result, the survey was deployed as a 2 part piece and 'if yes' and 'if no' questions were restructured to make up for a lack of options. These surveys (22 Questions) were then deployed view group chats, email and direct contact with mutual connections from a relatively even spread across the target demographics, age-wise to ensure variability and data applicable to the entire target audience. Interviews were conducted in-person, using transcription apps and were then condensed as previously mentioned. See **Appendix 2.** Interviewees were mutual connections and made aware of the purpose of the interview beforehand. Permission was collected through physical signatures.

2.2 ANALYSIS & FINDINGS

2.2.1 - Survey Data Analysis

From the collected data, the questions that provided the most insightful and useful data were analysed. For full tables including spread of respondents (demographic-wise), see **Appendix 3.** Using survey monkey, bar graphs and percentages for each response were automatically formatted as univariate analyses. Further analysis will give reference to these bar graphs and pull multivariate data from the given figures.

Figures 3-5 show the univariate analyses of survey questions that best fell under the topic of sleep issue frequency and general sleep details in the respondent group. Through this data set, 72% of respondents have sleep issues despite the survey having been handed out indiscriminately with the only determining factors in who being primarily those (18+) who are consistently in a work or study environment. 64% of respondents had no diagnosed disorder however only 28% have seen a specialist implying a possibility of many respondents having undiagnosed sleep disorders. The other implication drawn from this data is that sleep issues are not typically seen as serious enough to seek out a professional opinion on despite **figures 6-9** showing disproportionate data suggesting the majority of respondents reporting noticeable worse cognitive and physiological performance the day after a poor nights sleep (sleep deprived).

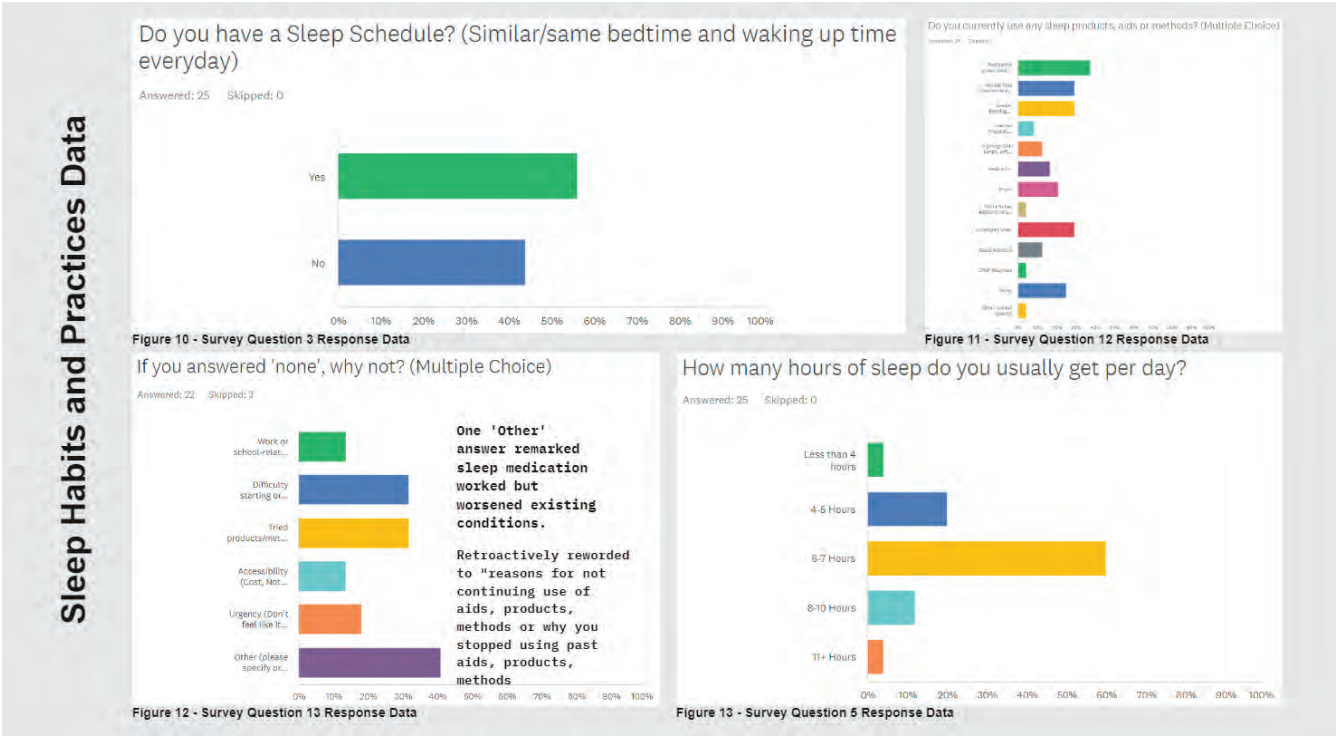


Figures 6-9 show the data analyses of the final 4 questions of the survey that asked respondents to recall how a poor nights sleep made them feel the following day with regards to each listed category. The answer types were interval and on a scale of 1-5. To analyse the results, the scale will be collapsed into two categories arbitrarily defined by how the ratings reflect the perceived effect. Answers 1-2 on the scale will be reflected as unnoticeable or negligible to the effects of sleep deprivation while 3-5 are noticeable effects.

Among the respondents, 56% noted poor sleep creating a notably worsened mood the following day. However, 28.6% of the 56% noted mood being severely affected as per **figure 6** being proportionately the highest with regards to respondents feeling severe impact among those who felt a noticeable difference. 64% of respondents felt poor sleep noticeably affected their sociability. Likely tied to energy levels and somewhat to mood levels. 75% of respondents, comparatively, felt poor sleep noticeably affected there productivity. The largest affected factor was energy levels with 83.3% of respondents reporting a notable affect to overall energy from poor sleep. Given the nature of this factor, it makes sense as energy is factor in all of the other categories but not vice versa.

2.2 ANALYSIS & FINDINGS

It is also interesting to note that despite **figure 10** identifying 56% of respondents having a sleep schedule, 72% of respondents still suffer from sleep issues. Only 25% of the sample group uses no sleep aids, products or methods. When looking at **figure 12,** reasoning for a lack of preventative measures against sleep deprivation and issues are shown. As seen in this graph, the 2 largest factors in a lack of use of for sleep assistance are related to starting and maintaining a healthy habit and products, aids and methods having not worked for the user. One respondent was noted saying that sleep medication was effective but provoked and worsened another underlying condition of theirs leaving sleep medication an invalid option for them. Among all products, sleep medication was the most commonly utilised at 38% among respondents. Scheduled sleep and special bedding were marked at 29% respectively as the 2nd most used. Despite the limited sample size, there was at least one respondent recording the use of each option.



Figures 14 and 15 analyse sleep knowledge-related questions. 60% of respondents knew of habits in their daily lives that actively affected their sleep quality. 64% of respondents identified with having 'somewhat good' or better sleep. Relating **figure 15** to **figure 11**, this seems like a discrepancy in the data. An implication of this anomaly in the data set could be that the sleep issues are infrequent among some respondents but are perceived as often enough to be considered 'consistent'. When omitted from a question however, this perception may change. Regardless, 36% of respondents recalled consistently or relatively poor sleep which falls more in line with existing research on similar/identical topics i.e. **Batten, et al., 2020; Robert, et al., 2016).**

2.2 ANALYSIS & FINDINGS

2.2.2 - Interview Data Analysis

3 user interviews were conducted. As seen in **Appendix 4,** each interviewee covers a different portion of the age range of the target user group. This was an intentional way of approaching the interviews to get a more varied and holistic collection of insights.

The interviews were 8 question interviews with disclosure of demographic details being done outside of recording due to their stagnant nature and irrelevance to the recording. Interview coding was done using 6 'themes' identified through review of the transcripts. Once themes were identified, the transcripts were re-analysed and quotes and phrases were highlighted and assigned to one the 6 noted themes. **Figure 16** depicts the spread of these recurring themes across all 3 interviews as percentages. As **figure 16** depicts, issues with sleep and the effects these issues had on the users constituted 44.8% of the interview conversations.

It is evident that users were, overall, acutely aware of the issues they had and its effects on their day-to-day life despite an evidently low level of knowledge on the topic across the board.

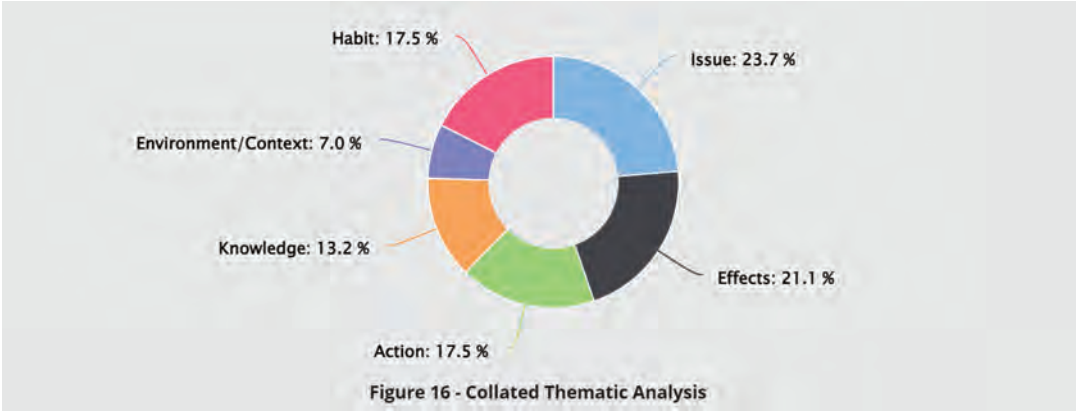


Figure 16 - Collated Thematic Analysis

From the thematic analysis of the interviews, further analysis occurred with an identification of the subtopics that were discussed under each theme. An example includes subtopics of caffeine consumption, screen use and daytime naps under the theme of habits. From this identification, the transcripts were analysed once more and each highlighted quote and phrase was assigned a subtopic in which they fell under. These were recorded on a table as seen in **figure 17.** The most commonly occurring subtopics and themes were identified in bold text on the table. The table helps to decode and display the interview as a figure that can be easily read and helps to show the most commonly discussed portions of said interviews. Combined with quotes from the interview itself, insights can be found that are lacking from the survey portion of this research report.

2.2 ANALYSIS & FINDINGS

CODE	Interviewee 1	Interviewee 2	Interviewee 3	Total	CODE	MEANING
Issue	14	9	3	27		
IN	1	2	0	3	IN	Inconsistent
SQ	1	1	0	2	SQ	Overall Sleep Quality
FR	0	2	0	2	FR	Fragmented Sleep
NS	1	0	0	1	NS	No Schedule
AW	2	2	0	4	AW	Awareness/Urgency
EF	7	0	0	7	EF	Effort
NWR	0	0	2	2	NWR	Not Well Rested
CS	1	1	1	3	CS	Can't Sleep
SH	1	1	0	2	SH	Suboptimal Hours
AC	1	0	0	1	AC	Accessibility
Effects	9	9	6	24		
EN	1	1	3	5	EN	Energy
MO	3	1	0	4	MO	Mood
SO	0	3	0	3	SO	Sociability
PR	1	1	1	3	PR	Productivity
BS	1	2	1	4	BS	Better Sleep
WS	2	0	0	2	WS	Worse Sleep
NE	1	1	1	3	NE	Neutral/No Effect
Action	5	5	10	20		
GPM	2	1	2	5	GPM	General Preventative Measures
SR	2	0	0	2	SR	Screen-related
ME	0	2	0	2	ME	Medication
FD	1	0	0	1	FD	Food/Drink
MT	0	1	7	8	MT	Methods
AP	0	1	0	1	AP	App-related
PR	0	0	1	1	PR	Product
Habit	2	2	3	7		
CC	1	1	0	2	CC	Caffeine-consumption
SC	1	1	1	3	SC	Screens before bed
NA	0	2	0	2	NA	Napping
Environment/ Context	2	3	3	8		
CRC	1	0	0	1	CRC	Current Circumstances
WP	1	2	0	3	WP	Workplace
EM	0	1	1	2	EM	Early Morning
AG	0	0	2	2	AG	Age
Knowledge	4	6	4	15		
NK	1	1	1	3	NK	No Knowledge
LK	0	4	1	5	LK	Little Knowledge
SK	3	1	2	6	SK	Some Knowledge
HK	1	0	0	1	HK	High Knowledge

Figure 17 - Coded Interview Themes & Subtopics

2.2 ANALYSIS & FINDINGS

Figure 17 helps to identify nuanced data and insights into the interviews that are not apparent from transcripts alone. Issues were the most referenced theme during the interviews, likely a result of the structure of the questions at 27 relevant phrases across all 3 interviews. During the interviews, the kinds of sleep 'issues' that were discussed show skewed data where the user who rated their personal understanding of sleep the highest at '7/10' made the most remarks regarding sleep issues and irregularities at 14 phrases and quotes referring to sleep issues as opposed to 9 by interviewee 2 and only 3 mentions by interviewee 3. Interviewee 1 referred to 'effort' as an issue 7 times during the interview when it came to taking proactive measures for bettering their sleep.

"... lack of motivation and drive to fix it (sleep)"

"... evidently doesn't feel like something extremely urgent to me."

- Interviewee 1, Transcript 1

The quotes referenced above come from highlighted phrases that fell under 'effort' in **figure 17**. It should be noted that neither interviewee 2 nor 3 made any mention of effort as an issue during their interviews. This highlights the individualised experiences each participant had. 2 interviewees cited awareness and urgency of sleep deprivation as a limiting factor.

The 'effects' of poor sleep on the participants was the 2nd most frequented theme. The highlighted subtopics saw a lot more balanced and well-distributed discussion with effects of overall energy being the most notable subtopic. It should be noted that 'NE" refers to preventative measures such as sleep aids having no tangible benefit for the user. Each interviewee recalled 1 experience of an ineffective product, method, aid. A notable parallel between the survey data and coded interview data is that there is a close resemblance in **figure 6-9's** data and their relevant subtopics under 'effects' with energy leading as the most-effected part of the user's day-to-day lives.

'Action' in **figure 17** refers to precautions and proactivity in preventing poor sleep. Most notably, ambiguous or niche measures were collated under 'GPM' arbitrarily for their infrequency and near-irrelevance. 'Methods', typically scheduled sleep, were the most common measures taken to prevent poor sleep by each interviewee and saw substantial conversation time. Despite being the most common net-negative habit, screen usage before bed saw the least preventative measures taken against despite being a shared habit among all interviewees with only interviewee 1 using blue-light filtration and lower screen brightness late at night. Considering its accessibility, these functions were evidently under-utilised. This likely is correlated with a lack of sleep-education, awareness and potentially urgency. Medication usage among interviewees was not reflective of the survey findings with only one participant noting usage. Their insight revealed an unenthused, disquieted nature where they where evidently worried of using medication more often as revealed in the quotes below.

"... I use it on really rough nights (sleep pills) since I don't want to become dependent on it..."

"... too scared to use them more often."

- Interviewee 2, Transcript 2

'Habits' despite being cited few times, showed large, collectively similar habits in participants with caffeine consumption and screen usage close to bedtime being the most notable. Shared reasoning was typically an indifference or ignorance to these habits as limiting factors in bettering sleep hinting again at insufficient sleep knowledge and education.

Environmental and contextual factors were not touched on often during the interviews, likely due to the substance of the questions but workplace and in particular, a lack of scheduled work hours (i.e. shift work and work from home) were mentioned most under the relevant theme.

Knowledge saw 15 thematically relevant phrases. Subtopics for this theme were split into level of knowledge on the addressed topic during the interviews. 'Some knowledge' was exhibited the most when talking on sleep issue awareness with 'little knowledge' (i.e. assumptions or personal interpretations) taking a close second. It was evident when touching on sleep knowledge that the substance of the participants understanding on sleep was all very rudimentary and surface-level. The result of a lack of understanding is evident in many of the participants habits and lack of variability in action.

SECTION 3

3.1 DISCUSSION

The survey findings and interviews were generally well-supported by existing literature. The frequency of participants with sleep issues fell into the higher end of sleep issue frequency in existing studies however this is likely due to the title of the survey attracting more attention among the target user group as opposed to being truly representative of frequency. Literature related to causal connections between habits and poor sleep also supported patterns in the number of survey participants who had poor habits or a lack of preventative measures with the frequency of sleep issues. Similarly, there was notable awareness of cognitive and physiological effects of poor sleep among participants in both the survey and interview which was well-aligned with the studied effects of poor sleep in more authoritative pieces.

Where this research report starts to stray from existing literature were the nuanced insights gained from one on one interviews with users that are more sparse in the space of authoritative literature on the topic.

Having interviewees talk on their knowledge and understanding of sleep hygiene revealed inadequate teachings of both the benefits of quality sleep and the potential severity of consistently poor sleep. All interviewees as well as a good portion of survey respondents evidently were under-educated on how day-to-day habits affected their sleep hygiene. Many participants had an idea of which habits could affect their sleep but this was also revealed to have no correlation with proactive measures in preventing poor sleep. This pattern is supported by the literature however said research does not detail the emotional connections and reasoning for said pattern.

Effort, awareness and urgency to change were consistently cited as reasons for not taking more action to better sleep in the 3 interviews as well as by 4 respondents in the survey. These 3 factors collated as recurring factors in the findings of this research report provide a new angle of approach for the literature to address going forward.

3.1.3 - Limitations

Throughout the research process, there were many limitations that ultimately affected the efficacy and reliability of the data in its findings. One such limitation was that I was unable to get a hold of an industry professional to have an authoritative figure reflect on the findings of my survey results. This means that there is no corroboration of data with an external figure to regulate interpretations of the data and literature.

Another limitation was the sample size of the 'quantitative data'. The survey had a total of 25 respondents. This, when taken into mind the limited geographical setting of participants, created a very nuanced and unique data set that cannot be considered truly 'quantitative' nor reliable for citation from future research.

3.2 DESIGN IMPLICATIONS

These findings primarily indicate that 2 primary findings that drastically effect the potential design outcome. Of the 2, neither are as abundant in market options as other existing methods of bettering sleep hygiene. A potential design problem to address is how to regulate habits and activities as to ensure they do not overlap with and impact the sleep of the user. Another issue that was evident through one particular interview is to address effort, awareness and urgency as preventative factors in bettering ones sleep. **Figure 18** graphically displays the identified problems and opportunities with relevant subtopics that could be focused on.

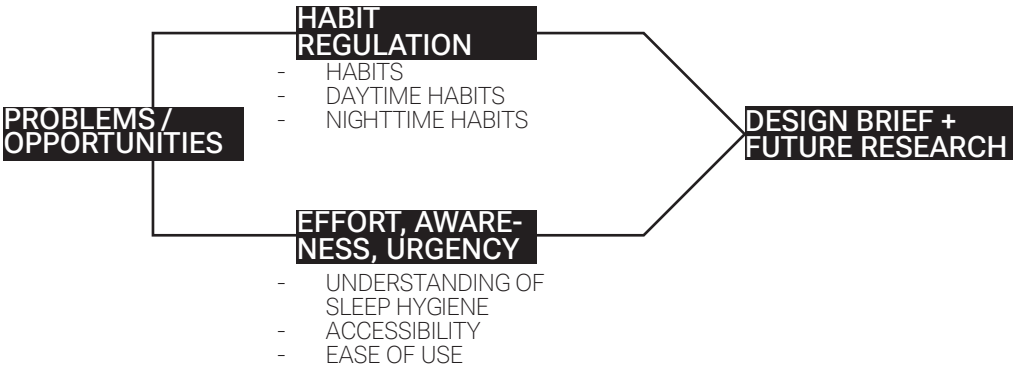


Figure 18 - Identified Problems & Opportunities

Regulating of habits would ideally also address awareness as on a conceptual level, the design outcome would help the user identify and regulate habits that are detrimental to their health, educating the user in the process. Night-time habits were the largest habitual issue among the participants of the survey and interviews and so addressing this factor would be beneficial to a large portion of the target user group. Day-time habits were less touched on but provide greater potential for innovation if an appropriate design solution is found with most products addressing sleep directly or the immediate environment and context of sleep. Alternatively, a design that holistically tracks and regulates all sleep-affecting habits is another direction but has a much greater scope and room for conceptualising.

Effort, awareness and urgency are factors that were addressed among a smaller portion of the participants but likely serve a greater portion of the user group than what the findings indicated as much of the substance of the questions did not greatly address these factors. One option that has seen popularity in multiple design fields is the 'gamifying' of habits and tasks. This could help address effort by essentially created a sort of game that the user could play where the goal is to better their sleep hygiene or to maintain it. Evidently, as indicated by both existing authoritative literature and the findings of this research report, understanding and education on sleep issues are not an adequate solution alone but as an accompanying factor in a design, they are likely to benefit the user.

Another potential design direction not directly addressed by the visual above is create a multi-faceted design that can help solve for the identified issues above as well as all other common issues, essentially creating a hub item of some sorts that has a plethora of sleep-hygiene related features. The issue such a direction would address is accessibility and effort. Accessibility was a noted issue in **figure 12** as a limiting factor for the efficacy/usage of products for 14% of respondents. Similarly in **figure 12**, having tested products that did not work for the user was another limiting factor for 31% of respondents.

3.3 CONCLUSION

In conclusion, the literature review summarised findings regarding topics on sleep issues frequency, causal connections between habits/practice and sleep issues, effects of poor sleep and sleep hygiene awareness. Through this review, frequency of sleep issues was found to be high among the target audience (18-50yr olds in work/study environments) through collated data. Causal habits and practices were well documented as were the effects of poor sleep. Sleep hygiene awareness had considerable authoritative data as well but focused more so on whether it affected sleep habits or not as opposed to more nuanced and personalised understandings of why it may or may not have affected a persons sleep habits.

This reports primary research consisted of a survey to collect data of a similar vain to existing literature but within a local context to see if existing research was applicable in the local setting. 3 Interviews were then held that question interviewees on their personalised relationship and experiences with sleep issues, looking at both what their issues were and how they dealt/didn't deal with it along with reasoning and insights.

The findings from 25 survey respondents were collated in bar graphs and were articulated using both univariate and multivariate analysis. Findings from the local survey were relatively in line with expectations as according to literature review. 3 Interviews were held where transcripts were recorded and coded in a thematic analysis table. Topics that were recurring and relevant to the research were categorised. Quotes of particularly interesting insight were also pulled from the transcript and referred to. Findings from these interviews helped to provide data not abundant in existing articles and reports.

The discussion justified the findings and analysis by comparing and contrasting findings with existing literature. The majority of findings corroborated with existing literature and were consistent. Unique findings that were identified in this report revolved around effort, awareness and urgency as driving factors in a lack of uptake and proactive action towards bettering sleep hygiene among the target demographics.

These findings were articulated into design implications that will help inform a design brief and subsequent design process. The primary opportunities and problems identified for the design were habit regulation and the above-mentioned 'effort, awareness and urgency'. The implications portion of the report also touched on how said opportunities could materialise (product-wise).

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APPENDIX

Survey Questions:

SLEEP DETAILS IN RESPONDENTS

1- Do you have sleep issues?
() Yes
() No

2- Do you have a diagnosed sleep disorder? (i.e. insomnia, narcolepsy, restless leg syndrome, etc.)
() None
() Insomnia
() Narcolepsy
() Restless Leg Syndrome
() Obstructive Sleep Apnoea
() Snoring
() Bruxism
() Other (Please Specify)

3- Do you have a Sleep Schedule (Wake Up and Sleep around the same/similar time everyday?)
() Yes
() No

4- How many hours of sleep do you usually get per day?
() Less than 4 hours
() 4-5 Hours
() 6-7 Hours
() 8-10 Hours
() 11+ Hours

5- Do you sleep with any lights on?
() Yes
() No

HABITS

1- How many caffeinated drinks (coffee, coca cola's or equivalent, tea's, etc) do you drink daily?
() 0
() 1-2
() 3-4
() 5 or more

2- Do you consume any caffeinated drinks within 6 hours of your bed time?
() Yes
() No

3- Do you use your phone or any other screen devices close to bed time (within 30 minutes before bed)?
() Yes (but not in bed)
() Yes (while in bed)
() No

4- Do you use any sleep-related functions? (select multiple if applicable)
() Blue light filter
() Sleep Reminder
() Low Brightness
() Other (Please Specify)

PREVENTATIVE MEASURES

1- Have you seen a specialist regarding your sleep?
() Yes
() No

If you use an Alarm to wake up, what do you usually do when it rings in the morning? (Multiple Choice)
() Get Up
() Hit Snooze
() Sleep through it
() Wake up but stay in bed (e.g. scroll through phone)
() Other (Please Specify)

4- Do you currently use any sleep products, aids or methods? (Multiple Choice)
() Medication (prescribed or off-the-shelf)
() Herbal Teas (chamomile or other)
() Bedding, Blankets & Pillows (Conforming Pillows, Weighted Blankets, etc.)
() Scented Products (Sprays, diffusers, etc)
() Lighting (Soft Glow Lamps, Lights that mimic natural day/night cycles)
() Meditation
() Music
() White noise, ambient noises, or other
() Scheduled Sleep
() Other (Please Specify)

If No, why not? (select multiple if applicable):
() Work or school related (indefinite or inconsistent work/study hours)
() Difficulty starting or maintaining good sleep habits
() Tried products/methods and they didn't work
() Accessibility (Cost, Not Usable, Availability)
() Urgency (Don't feel like its too important/ it doesn't negatively affect me)
() Other (Please Specify)

CURRENT KNOWLEDGE OF SLEEP HEALTH

1- Do you know if and how any of your daily habits are negatively affecting your sleep quality?
() Yes
() No

2- How do you rate your current average sleep quality?
() 1-5 scale

If, hypothetically, you were on the market for a new sleep product, is there anything you would want to see be available in a sleep-aid product? (Could be a specific feature, function, aesthetic you haven't seen at all/much of)
() No
() Yes, Please Specify:

DEMOGRAPHIC DETAILS

1- What age range do you fall under?
() 18-25
() 26-35
() 36-50
() 51+
() Do not wish to specify

2- What is your current occupation/s? (select more than 1 if needed)
() University/TAFE Student
() 9-5 Worker
() Shift Worker
() Other (Please Specify)

PERCEIVED EFFECTS OF SLEEP DEPRIVATION

1- How badly does sleep deprivation affect your mood?
() 1 (not at all)
() 2
() 3 (somewhat bad)
() 4
() 5 (severely)

2- How badly does sleep deprivation affect your sociability?
() 1 (not at all)
() 2
() 3 (somewhat bad)
() 4
() 5 (severely)

3- How badly does sleep deprivation affect your productivity?
() 1 (not at all)
() 2
() 3 (somewhat bad)
() 4
() 5 (severely)

2- How badly does sleep deprivation affect your overall energy?
() 1 (not at all)
() 2
() 3 (somewhat bad)
() 4
() 5 (severely)

Survey Notes:

Before Deployment:
- Survey Monkey has limitations for non-premium users and so the above questions are adjusted to not involve 'if yes/if no' questions that would expand upon certain responses

Trial Deployment:
- Questions that were meant to be multiple choice where only singular and vice versa.
  - created issues with consent form and every other single question.

Final Trial:
- Everything started working well and positive reception as well as no more feedback meant that this final trials' data is eligible to become part of the collected and assessed data pool.

https://www.surveymonkey.com/r/55KTDXY
https://www.surveymonkey.com/r/ZHRHJT9
https://www.surveymonkey.com/r/J5DQPC5

APPENDIX

Interview Questions:

What are your primary issues with your sleep as it currently is? (Pain

How does it affect your day-to-day life?

Do you have any habits that directly affect the quality of your sleep? (Look at a screen right before bed, sleeping in the early morning, inconsistent bed time hours, not getting enough hours of sleep, etc)

How knowledgeable are you when it comes to sleep hygiene?

If you are somewhat knowledgeable, do you apply any of your knowledge about sleep hygiene (sleep in general) to get better sleep?

What do you currently do to better your sleep quality? (Products, Methods, etc.)

If yes, is it working?

Is there anything you'd want to see in a sleep product that you haven't really seen much of so far?

Interview Notes:

Survey:
Before starting this survey, please read the following:
- This survey is being run as part of research for sleep deprivation in young - middle-aged adults.

- The survey will ask questions about the details of your sleep patterns (to your knowledge), habits in your daily life that could be affecting your sleep, any measures you are taking to better your sleep, your pre-existing knowledge on the effects of sleep deprivation and some basic demographic clarification.

- The data gathered from this survey will only be used for **the relevant assignment** in QUT's design unit, ID Studio 7: Capstone DNB311 and will inform the resulting design outcome.

- Any response/involvement will not impact your relationship with QUT.

- You are able to withdraw from the survey at anytime without question.

- Personal Information will be kept confidential and anonymised.

If you have read and understand all of the above and agree with the terms, please sign the permission form to continue.

DEMOGRAPHIC DETAILS

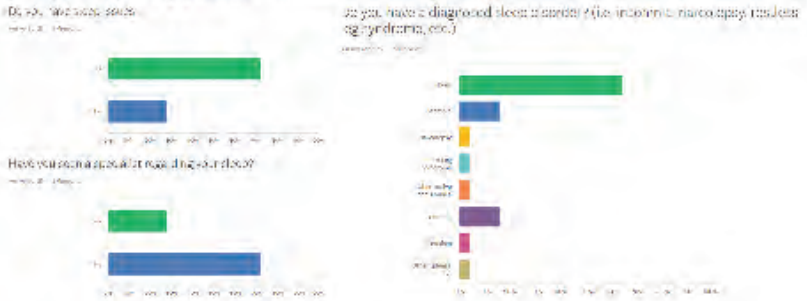
1- What age range do you fall under?
() 18-25
() 26-35
() 36-50
() 51+
() Do not wish to Specify

2- What is your current occupation/s? (select more than 1 if needed)
() University/TAFE Student
() 9-5 Worker
() Shift Worker
() Other
Specify (if desired)
_____

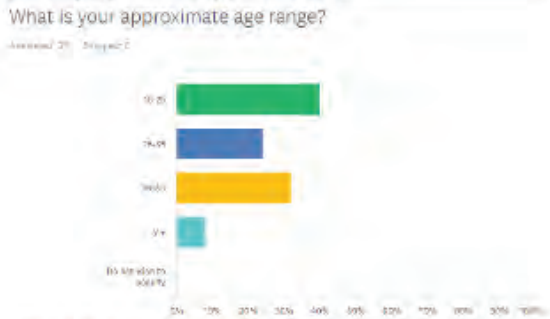
APPENDIX

Survey Response Data:

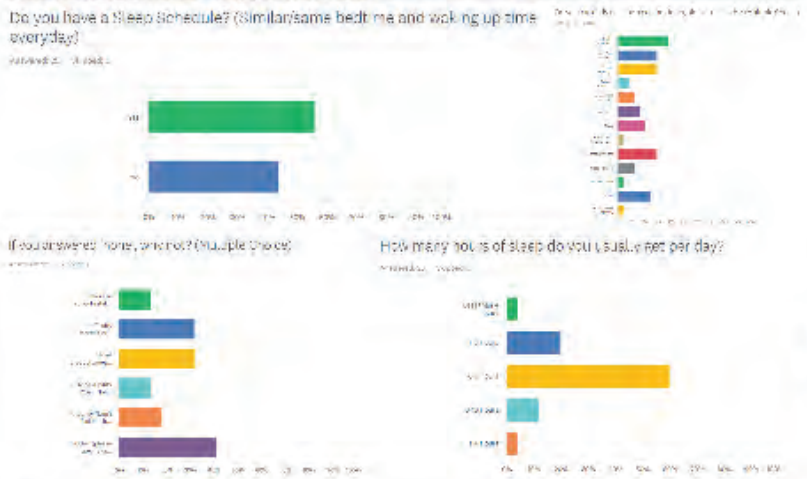
Frequency - Appendix 3.1

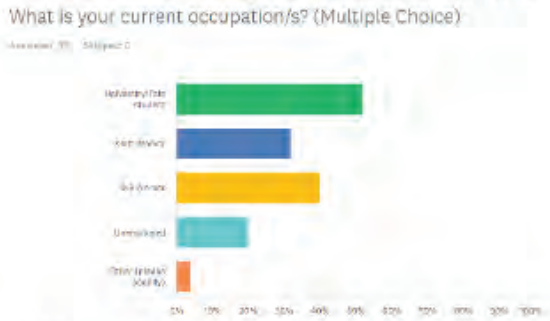


Demographics - Appendix 3.2

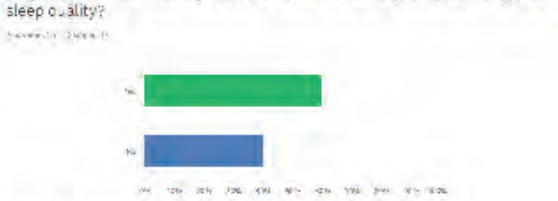


Habits/Practices - Appendix 3.3

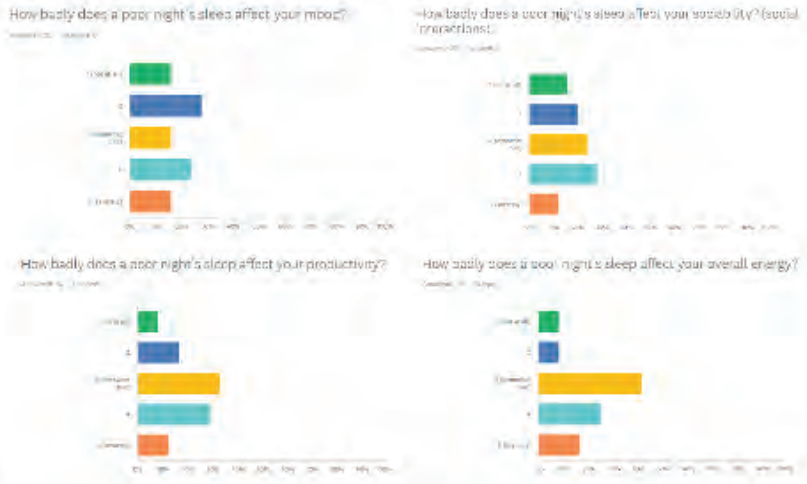


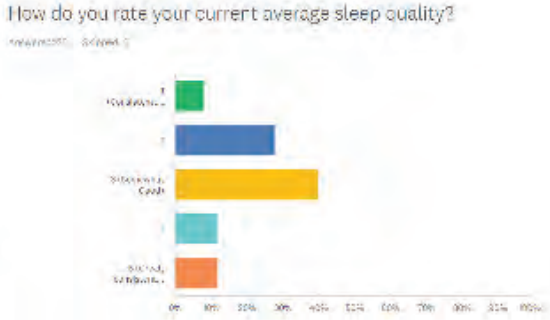


Sleep Education/Knowledge - Appendix 3.5



Perceived Effects of Sleep Deprivation - Appendix 3.4





Hand-picked Survey Data that was most relevant, i.e. A lot of the questions gave data that was redundant or off-topic.

APPENDIX

Interview Response Data:

CODE	Interviewee 1	Interviewee 2	Interviewee 3	Total	CODE	MEANING
Issue	14	9	3	27		
IN	1	2	0	3	IN	Inconsistent
SQ	1	1	0	2	SQ	Overall Sleep Quality
FR	0	2	0	2	FR	Fragmented Sleep
NS	1	0	0	1	NS	No Schedule
AW	2	2	0	4	AW	Awareness/Urgency
EF	7	0	0	6	EF	Effort
NWR	0	0	2	2	NWR	Not Well Rested
CS	1	1	1	3	CS	Can't Sleep
SH	1	1	0	2	SH	Suboptimal Hours
AC	1				AC	Accessibility
Effects	9	9	6	24		
EN	1	1	3	5	EN	Energy
MO	3	1	0	4	MO	Mood
SO	0	3	0	3	SO	Sociability
PR	1	1	1	3	PR	Productivity
BS	1	2	1	4	BS	Better Sleep
WS	2	0	0	2	WS	Worse Sleep
NE	1	1	1	3	NE	Neutral/No Effect
Action	5	5	10	20		
GPM	2	1	2	5	GPM	General Preventative Measures
SR	2	0	0	2	SR	Screen-related
ME	0	2	0	2	ME	Medication
FD	1	0	0	1	FD	Food/Drink
MT	0	1	7	8	MT	Methods
AP	0	1	0	1	AP	App-related
PR	0	0	1	1	PR	Product
Habit	2	2	3	7		
CC	1	1	0	2	CC	Caffeine-consumption
SC	1	1	1	3	SC	Screens before bed
NA	0	2	0	2	NA	Napping
Environment/ Context	2	3	3	8		
CRC	1	0	0	1	CRC	Current Circumstances
WP	1	2	0	3	WP	Workplace
EM	0	1	1	2	EM	Early Morning
AG	0	0	2	2	AG	Age
Knowledge	4	6	4	15		
NK	1	1	1	3	NK	No Knowledge
LK	0	4	1	5	LK	Little Knowledge
SK	3	1	2	6	SK	Some Knowledge
HK	1	0	0	1	HK	High Knowledge

DEMOGRAPHIC DETAILS

Interviewee 1
Age Range: 18-25
Occupation: University/Tafe Student, Shift Worker

Interviewee 2
Age Range: 26-35
Occupation: University/Tafe Student, Shift Worker

Interviewee 3
Age Range: 36-50
Occupation: 9-5 Worker