

Does Sleep Disturbances and Sleep Duration Have an Affect on Depression Symptomology
in College Students?

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Abstract

The current study sought to investigate how sleep disturbances and sleep duration affects depressive symptomology in college students, while also examining the gender differences within sleep disturbances and additionally depressive symptomology. An online questionnaire was publicised to participants (n = 102) through different modes of social media sites and consisted of the following scales: The Beck Depression Scale (BDI), The Munich Chronotype Scale (MCTQ), The Epworth Sleepiness Scale (ESS) and the Pittsburgh Quality Index Scale (PSQI). Findings from a spearman's correlation revealed that there is a correlation between sleep disturbances (sleep disturbance scores and daytime sleepiness scores) and depression symptoms. Furthermore, the multiple regressions revealed that sleep disturbances significantly predict depression symptoms, however, sleep duration did not predict depression symptoms. Lastly, Mann-Whitney U tests showed that females have significantly higher depressive symptomology and sleep disturbance scores in comparison to males. Findings provide an interesting understanding of how sleep disturbances and sleep duration affect depression symptomology in college students. And furthermore, the findings present possible gender differences within sleep disturbances and depression symptomology. Further implications are important on a practical level.

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Introduction

Depression is a mental disorder in which the rates have been increasing over the last few decades and is now one of the most common mental disorders in the world, with an estimated 5% of adults suffering from the disorder (World Health Organization, 2020). The World Health Organization (2020) defines depression as being characterized by a “persistent sadness and a lack of interest or pleasure in previously rewarding or enjoyable activities. It can also disturb sleep and appetite,” and also cause one to feel tired and experience poor concentration. If gone untreated or unnoticed, it could lead to suicidal thoughts and in extreme cases, an individual taking their own life. Two common symptoms of depression, disturbed sleep (insomnia) and excessive sleepiness, fall under this partial definition of sleep disturbances; encompasses “disorders of excessive somnolence and dysfunctions associated with sleep, sleep stages and partial arousals (parasomnia)”, (Comier, 1990, p. 398). Over the years, there have been many studies carried out to investigate the complex relationship between sleep and depression (Kronfeld-Schor & Einat, 2012). Based on the findings from these studies, it is generally agreed that sleep disturbances are a core feature of depression (Kronfeld-Schor & Einat, 2012). Other studies have focused on the affect sleep duration and the possible association it has with depression (Dong, Xie & Zou, 2022; Kronfeld-Schor & Einat, 2012; Perlman, Johnson & Mellman, 2006;). It has been found that sleep duration is a significantly associated risk of depression and not only short sleep, but long sleep durations are possible risks to developing and worsening an individual’s depression too (Dong, Xie & Zou, 2022). Research findings, involving the topic of depression, have consistently reported that females are more affected by depression than males (World Health Organization, 2020), with Schuch, Roest, Nolen, Pennix and De Jonge (2014) research results showcasing that women are twice more likely to develop depression than males. While there are not many studies reporting gender differences in relation to reporting sleep disturbances, the studies

that are available have given contradictory results (Armitage, 2007; Lovell, Nash, Sharman & Lane, 2015) and further research needs to be carried out on the possible gender divide. A recent statistic reports that 54% of individuals in Ireland are attending third level education (Government of Ireland, 2022). Current college students are the future of this country, and their well-being is important. However, studies showing the relationships between college students and sleep disturbances and depression, have reported that there are severe implications this can have on young adults' education and future careers (Taylor, et al., 2011; Hershner & Chervin, 2014). The aim of this review is to examine the possible affect that sleep disturbances and sleep duration have on depression in college students. The secondary aim of this study is to investigate whether there are gender differences when reporting depression and sleep disturbances.

There are numerous studies that have examined whether there is a relationship between depression and disturbances in sleep. Armitage (2007) reviewed approximately 1500 studies looking at sleep abnormalities and depression. The paper reported that subjective sleep complaints were reported in more than 80% of depressed patients (Armitage, 2007; Reynolds III & Kupfer, 1987). A slightly different study, carried out by Hershner and Chervin (2014) looked at inadequate sleep and daytime sleepiness, in college students, and what the cause of this may be. The results revealed that participants suffering from chronic sleep deprivation, a factor that falls under sleep disturbances, was possibly associated with the impairment of academic performances, as well as mood disorders (includes depression). While Short, Gradisar, Lack and Wrights (2013) sample population was adolescents, and not college students, the results found are still similar to previous findings for young adults and older populations and the implications behind the findings do apply to college students. The study found that poorer sleep quality was significantly associated with poor outcomes, and reported less sleep, diminished alertness during the day, and experienced a more depressed

mood (Short, Gradisar, Lack & Wrights, 2013). The same study found results that poorer sleep quality was associated with poorer grades and academic performances through an association with depression (Short, Gradisar, Lack and Wrights 2013). In the beginning of the investigation of sleep disturbances and depression, it was believed that sleep disturbances were a symptom of depression (Kronfeld-Schor & Einat, 2012). However, later studies have found significant results to support that sleep disturbances might be a “risk factor for depression but also a marker that can predict depression,” (Kronfeld-Schor & Einat, 2012; Riemann et al., 2001; Roberts et al., 2000).

One of the most commonly mentioned sleep disturbances, that appears in numerous studies is insomnia (inadequate sleep, poor sleep quality, sleep deficits) (Armitage, 2007; Kronfeld-Schor & Einat, 2012; Perlman, Johnson & Mellman, 2006) and is also a diagnostic criterion for depression (Sadock & Kaplan, 2002). Additionally Kronfeld-Schor and Einat’s (2012) exploration on sleep disturbance papers, found results for sleep disturbances preceding the recurrence of depression in patients in remission.

Sleep duration is another factor associated with depression in numerous studies. In Kronfeld-Schor and Einat (2012) paper, it reported that sleep duration, specifically sleeping less hours, is significantly associated with depression. Perlman, Johnson and Mellman (2006) reported similar findings on sleep duration and depression; that a sleep deficit (less than 6 hours of sleep) predicted depressive symptoms in the participants, over a 6 month period. However, while examining the previous literature on sleep duration and depression, while there seems to be some sort of interaction between the two factors, how significant the association is, can be conflicting. While the above studies stated results for less sleep being associated with depression, more recent studies have confirmed this finding, but found that both insufficient sleep and excessive sleep (sleep durations) increased the risk of individuals developing depression (Dong, Xie & Zou, 2022).

There are more studies that look at adults than adolescents, which may be due to ethical issues that can occur when trying to get ethical approval for a study interacting with participants under 18. Individuals under 18 are a vulnerable population, and when investigating topics as severe as depression, may cause more harm and risk. According to the study carried out by Armitage (2007), data in the previous literature had shown that sleep disturbances in patients and controls, were seen more predominantly in younger adults and diminish with increasing age, even though literature before had suggested that it was more predominant in middle aged patients.

Certain studies have shown gender differences to have a significant correlation with depression and the results show that women are twice as likely to develop clinical depression than men (Schuch, Roest, Nolen, Pennix & De Jonge, 2014). Not many of these studies have looked at the gender divide in relation to disturbances in sleep and depression; however, Armitage's (2007) study did briefly look into it. The study found that women who had depression had low temporal coherence in sleep may and that it may be a risk factor for females, before the onset of their first depressive episode (Armitage, 2007). Where men show reduced slow-wave activity in non-rapid eye movement sleep and impaired homeostatic response to sleep challenge (Armitage, 2007). However, there are studies that contradict these results. Supporting evidence has shown that while females may more commonly report depressive symptomology than men (Dinis & Bragança, 2018) there is a study where results showed supporting evidence that males with high depressive symptomology are more likely to suffer from sleep disturbances than women, who were found to suffer depressive symptoms more with anxiety (Lovell, Nash, Sharman & Lane, 2015). Therefore, due to the inconsistencies in gender differences in the literature, further research needs to be carried out on if there is a relationship between gender differences and depressive symptomology, and the implications this may have on interventions for depression, and preventions for health

concerns. Lastly while there are studies looking at the high reports of depressive symptomology in females over males (Schuch, Roest, Nolen, Pennix & De Jonge, 2014) sleep disturbances are not always factored in and in some studies, it has been found that males who report higher levels of depression are more likely to suffer with sleep disturbances than females (Lovell, Nash, Sharman & Lane, 2015).

Overview of the Research Findings

The prior research has been mostly focused on a wide variety of sleep-based factors such as sleep quality, sleep duration, sleep deprivation, sleep disturbances and sleep disorders, and what affect they have on depression symptomology (Armitage, 2007; Kronfeld-Schor & Einat, 2012; Short, Gradisar, Lack & Wrights, 2013) . Research is required to further investigate the possible effect sleep disturbances and sleep duration have on depressive symptomology in college students. While there is research on the effect depression has on college students, or research looking into what sleep-based factors predict depression in college students, there is a gap in the literature when it comes to investigating how sleep disturbances and sleep duration affect depression in college students specifically. Sleep disturbances have vastly less research on possible gender differences compared to depression. Females are more likely to report symptoms of depression than males (Schuch, Roest, Nolen, Pennix & De Jonge, 2014), however if this is the case, and in the prior research higher reports of sleep disturbances are associated depression, than females should be more likely to report sleep disturbances than males. Due to the literature gap of gender differences in sleep disturbances, more research is required to investigate the possible outcome.

The Current Study

The aim of the current study is to investigate if sleep disturbances and sleep durations have an affect on depression in college students, along with investigating the gender

differences among the factors, depression and sleep disturbances. There was not a specific sample age, except for being 18 and older, since most research shows that depression can affect individuals at any age (Armitage, 2007). This study is important as it will help to identify whether sleep duration and sleep disturbances are predictors of depression in college students, as well as how highly they may predict depression. These factors have been linked to negative outcomes such as worse psychological health, poorer quality of life, tension, and fatigue as well as diminished academic functioning which could have a severe impact on college students' future careers (Meijer, Habekothé & Van Den Wittenboer, 2001; Moore, Adler, Williams & Jackson, 2002; Pilcher, Ginter & Sadowsky, 1997). This study will also be important to determine if there is a gender difference in sleep disturbances. The same gender differences will be looked at with depression symptomology. The following research questions and hypotheses stem from the aims previously mentioned;

Research Question 1: Does sleep disturbances and sleep duration predict depressive symptomology in college students? Hypothesis 1: Sleep disturbances and sleep duration will significantly predict levels of depressive symptomology in college students.

Research Question 2: Do males and females differ in reports depressive symptomology and reports of sleep disturbances? Hypothesis 2: Females will report more sleep disturbances and more depression symptomology.

Methods

Participants

Participants were recruited using convenience sampling with a snowball sampling effect, as participants were recruited online, and their participation was relied on their willingness to partake and share the study. A description of the study and a link to the online survey was distributed through the following social media sites: Facebook, Instagram, Tik Tok, Survey Monkey and Snapchat. Participants were asked to share the link with anyone they thought would be eligible to participate.

The initial sample consisted of 105 participants. The participants had to be at least 18 years old, there was no maximum age limit. Additionally, participants had to be currently attending college, in County Dublin (referred to as the Dublin area), Ireland. 3 participants (3 females) were excluded from the analyses as they reported their age as 17, and in line with ethical considerations, participants were required to be at least 18 years old. Therefore, the final sample was comprised of 102 individuals (78 females and 25 males) with a mean age of 22.05 years ($SD = 5.045$) ranging from 18 to 43.

Materials

Demographics: Participants were asked to input their gender (male or female) and provide their age.

Beck Depression Inventory Scale (BDI): The Beck Depression Inventory Scale (Beck, Ward, Mendelson, Mock & Erbaugh, 1961) is a 21 item, self-scored, standardised scale designed to measure an individuals' symptoms of depression. Each item on the scale is measured using a 4-point Likert scale ranging from 0 "no depression symptoms" to 3 "severe depression symptoms". The final score can be computed by adding up the answers to the 21 items. The highest possible score on the scale is 63 and the lowest is 0, with higher scores

indicating more severe levels of depression (see Appendix A). The Cronbach alpha is $\alpha = 0.86$ and $\alpha = 0.81$ (Beck, Steer & Carbin, 1998).

Munich Chronotype Questionnaire (MCTQ): The Munich Chronotype Questionnaire (Roenneberg, Wirz-Justice & Mellow, 2003) is a, 17 item, self-rated scale which is used to measure chronotypes and other sleep behaviours during a typical week and assessing both work and work free days. Furthermore, it reports bed and wake up times for both work and work free days, as well as reporting on other time points during an individual's day (See Appendix B). For the purpose of this study, only the bed and wake up times for participants work and free days (sleep duration), will be examined.

Epworth Sleepiness Scale (ESS): The Epworth Sleepiness Scale (Johns, 1991) measures how much daytime sleepiness an individual experiences. This scale contains 8 statements or situations, and each statement/situation is measured using a 4-point Likert scale ranging from 0 "would never doze" to 3 "high chance of dozing. The final score is computed by adding the answers to all 8 statements/situations. Higher scores on the scale, indicates more abnormal levels of daytime sleepiness (see Appendix C). The Cronbach alpha is $\alpha = 0.75$ (Baumgartel, Terhorst, Conley & Roberts, 2013).

Pittsburgh Sleep Quality Index Scale (PSQ): The Pittsburgh Sleep Quality Index Scaley (Buysse, Reynolds, Monk, Berman & Kupfer, 1989) measures the quality of sleep participants are getting over the past month. It is a self-report questionnaire, that contains 9 questions. There are 7 different components that can be computed from this questionnaire and is done so by following the table of scoring provided in the researchers copy of the scale. The component that pertains to the research is component 5; sleep disturbances. The component is computed by adding up the scores from questions 5b to 5j, whose items were measured using

a 4-point Likert scale ranging from 0 “Not during past month” to 3 “Three of more times a week”. Higher scores indicate more disturbances while sleeping and therefore worse sleep quality (see Appendix D). The Cronbach alpha for it is $\alpha=.69$ (Spira, Beaudreau, Stone, Kezirian, Lui, Redline, Ancoli-Israel, Ensrud & Stewart, 2012).

Design

The study used a quantitative approach with a cross-sectional design, as all the data was taken from a particular point in time from a sample taken from a specified population. A spearman’s correlation was computed to assess the first hypothesis which examined the possible associations between depression, sleep disturbances and daytime sleepiness. To further investigate the first hypothesis, two standard multiple regressions were conducted. This was done due to one of the predictors, sleep duration, having two different sets of data responses. The first set of data contained participants responses to sleep duration on their workdays, and the second set of data responses contained participants responses to sleep duration on their free days. The first standard multiple regression contained four predictor variables (PV’s), sleep disturbances, daytime sleepiness, work-day bedtime and workday wake up time, and one criterion variable (CV), depression. The second standard multiple regression contained four predictor variables (PV’s), sleep disturbances, daytime sleepiness, free day bedtime and free day wake up time, and one criterion variable (CV), depression. For the second hypothesis, a between-subjects design was conducted to compare gender (males and females) on their scores for sleep disturbances, daytime sleepiness, and depression.

Procedure

Data was collected through an online questionnaire created on google forms. The questionnaire was completely anonymous and took 10-15 minutes to complete. The link to the questionnaire was uploaded to the researcher’s social media platforms; Tik Tok,

Facebook, Instagram, Snapchat and Survey Monkey. Participants were encouraged to share the link to other individuals who fit the criteria to take part in the study. When participants decided to take part in the questionnaire, they were provided with a participant information leaflet (see Appendix E), which detailed what the current study is about, all the information to do with participating and what that would involve, as well as any possible harm or risks that may cause the participants' distress. A consent form (see Appendix F) was provided after the information leaflet, to obtain informed consent from the participants. The consent form repeated details that were in the information leaflet as well as informing participants that they could withdraw from the questionnaire at any time without penalty, however once they submitted, they're response, it could not be removed, since all the data was anonymous. The participants were asked to click the "yes" box confirming that they had carefully read through both forms and agreed to participate in the questionnaire. They also had to click "yes" confirming that they currently attended college in the Dublin area and that they were over 18 years old. Participants were then able to proceed to the questionnaire. They were required to complete the BDI scale, then the MCTQ scale, followed by the ESS and lastly the PSQI scale. Once all four sections were completed a debrief form (see Appendix G) was presented to the participants containing my contact details, my supervisor's contact details along with providing helpline numbers should the questionnaire have caused them any distress and they need to speak to a professional.

Results

Descriptive Statistics

The data was collected from a sample of 102 participants. This sample consists of 24.5% males ($n = 25$) and 75.5% females ($n = 77$) that are currently attending college in the Dublin area.

Descriptive Statistics were performed on all continuous variables including age, the workday bedtime (MCTQ 4) and wake up time (MCTQ 6), the free-day bedtime (MCTQ 11) and wake up time (MCTQ 13), levels of depression (BDI), sleep disturbances (PSQI) and daytime sleepiness (ESS). The Means (M), Medians (MD), Standard Deviations (SD) and Range (R) were obtained, and the results for all the variables are presented below, in table 2. Preliminary analyses were performed on the data set, and the results indicated that all the variables were non normally distributed (Kolmogorov-Smirnov statistic $p < 0.5$), and a further inspection of the histograms confirm this, and are positively skewed.

Table 1

Descriptive Statistics for all continuous variables (N=102).

Variable	<i>M</i> [95% CI]	Median	<i>SD</i>	Range
Age	22.05 [21.06- 23.04]	20	5.05	18-43
Workday Bedtime (hh:mm) (MCTQ 4)	8:49 [7:08-10:31]	4:00	8:35	0:00-23:30
Workday Wake up time (hh:mm) (MCTQ 6)	8:26 [8:02-8:50]	8:00	2:00	4:30-20:00

Free-Day Bedtime (hh:mm) (MCTQ 11)	5:17 [3:54-6:40]	2:00	6:53	0:00-23:45
Free-Day Wake up time (hh:mm) (MCTQ 13)	9:57 [9:32-10:21]	10:00	2:01	2:00-15:00
Depression Scores (BDI)	14.56 [12.57- 16.54]	12.5	10.10	.00-54.00
Sleep Disturbances Scores (PSQI)	6.94 [6.01-7.87]	6.00	4.72	.00-22.00
Daytime Sleepiness Scores (ESS)	7.1 [6.23-7.97]	7	4.44	.00-18.00

Inferential Statistics

A preliminary analysis was conducted to ensure there no violation of the assumptions of normality; all the variables were non-normally distributed, as detailed above (Appendix). Therefore, a non-parametric Spearman's correlation coefficient was carried out to assess the relationship between depression, sleep disturbances and daytime sleepiness. There was a significant, moderate, positive correlation between sleep disturbances and depression ($\rho=.44$, $n=102$, $p<.001$). This indicates that the two variables share 19.71% variance. The results indicate that higher levels of sleep disturbances are associated with higher levels of depression (See Table 2). There was a significant, moderate, positive correlation between daytime sleepiness and depression ($\rho=.37$, $n=102$, $p<.001$). This indicates that the two variables share 13.62% variance. The results indicate that higher levels of daytime sleepiness are associated with higher levels of depression (See Table 2). There was a non-significant, positive correlation between sleep disturbances and daytime sleepiness ($\rho=.14$, $n=102$,

$p=.150$). The results indicate there is no association between sleep disturbances and daytime sleepiness (See Table 2).

Table 2

Spearman's correlation between continuous variables and gender

Variables	1.	2.	3.
1. Depression Scores (BDI)	1		
2. Daytime Sleepiness Scores (ESS)	.37**	1	
3. Sleep Disturbances Scores (PSQI)	.44**	.14	1

Note: Statistical significance: * $p < .05$; ** $p < .01$; *** $p < .001$.

Two standard multiple regressions were performed. This analysis was necessary, due to the MCTQ having two sets of results on participants bedtime and wake up time, the first set of responses related their workdays and the second set of responses related to their free days.

The first standard multiple regression was performed to determine how well depression could be predicted by the four predictor variables which includes participants bedtime and wake up time on their workdays, sleep disturbances and daytime sleepiness. Tests for multicollinearity indicated that all Tolerance and VIF values were in an acceptable range and that there was no violation of the assumption of multicollinearity and that the data set was suitable for examination through multiple linear regression analysis. Since no a priori hypotheses had been made to determine the order of entry of the predictor variables, a direct method was used for the analysis. The results show that, overall, the predictors in the model explained 34.7% of variance in depression scores ($F(4, 96) = 12.760, p < .001$). Out of the

four predictor variables, sleep disturbance scores and daytime sleepiness scores were found to uniquely predict depression scores (See table 3).

Table 3

Standard multiple regression model predicting levels of depression. Sleep data based on responses related to participants workdays.

Variable	R ²	B	SE	β	<i>t</i>	<i>p</i>
Model	.347					
Workday Bedtime (MCTQ 4)		3.665E-6	.000	.011	.129	.898
Workday Wake up time (MCTQ 6)		9.344E-6	.000	.007	.077	.939
Sleep Disturbances Scores (PSQI)		1.077	.182	.503	5.911	<.001
Daytime Sleepiness Scores (ESS)		.617	.199	.271	3.096	.003

Note: R2 = R-squared; β = standardized beta value; B = unstandardized beta value; SE = Standard errors of B; N=102

The second standard multiple regression was performed to determine how well depression could be predicted by the four predictor variables which includes participants bedtime and wake up time on their free days, sleep disturbances and daytime sleepiness. Tests for multicollinearity indicated that all Tolerance and VIF values were in an acceptable range and that there was no violation of the assumption of multicollinearity and that the data set was suitable for examination through multiple linear regression analysis. Since no a priori hypotheses had been made to determine the order of entry of the predictor variables, a direct

method was used for the analysis. The results, seen in table 4, show that overall, the predictors in the model explained 36.9% of variance in depression scores ($F(4, 92) = 13.470$, $p < .001$). Out of the four predictor variables, sleep disturbance scores and daytime sleepiness scores were found to uniquely predict depression scores (See table 4)

Table 4

Standard multiple regression model predicting levels of depression. Sleep data based on responses related to participants free-days.

Variable	R ²	B	SE	β	t	p
Model	.369					
Free-Day Bedtime (MCTQ 11)		-6.156E-5	.000	-.151	-1.776	.079
Free-Day Wake up time (MCTQ 13)		-7.970E-6	.000	-.006	-.060	.947
Sleep Disturbances (PSQI)		1.055	.184	.493	5.748	<.001
Daytime Sleepiness (ESS)		.597	.189	.262	3.154	.002

Note: R² = R-squared; β = standardized beta value; B = unstandardized beta value; SE = Standard errors of B; N=102

Preliminary analyses detailed at the beginning of the results section, revealed that sleep disturbances, daytime sleepiness and depression were all non-normally distributed. Therefore, to investigate my second hypothesis, a non-parametric Mann-Whitney U test was conducted to compare depression symptomology between males and females. The results revealed there was a significant difference in the scores, with females ($M = 55.41$, $n = 77$)

scoring significantly higher in comparison to males ($M = 39.46$, $n = 25$), $U = 1263.500$, $z = 2.344$, $p = .019$ (See Appendix I for Histogram comparison). The effect size was small ($r = 0.2$).

An additional Mann-Whitney U test was conducted to compare sleep disturbance scores between males and females. The results revealed there was a significant difference in the scores, with females ($M = 56.64$, $n = 77$) scoring significantly higher than males ($M = 35.68$, $n = 25$), $U = 1358$, $z = 3.091$, $p = .002$ (See Appendix J for Histogram comparison). The effect size was moderate ($r = 0.3$).

The last Mann-Whitney U test was conducted to compare daytime sleepiness scores between males and females. The results revealed there was no significant difference in daytime sleepiness scores of females ($M = 53.51$, $n = 77$) and males ($M = 45.30$, $n = 25$), $U = 1117.500$, $z = 1.210$, $p = .226$, $r = 0.1$ (See Appendix K for Histogram comparison).

Discussion

At the beginning of this study, the possible affect sleep disturbances and sleep duration had on depression symptoms in college students, was thoroughly explored in the literature. The current study aimed to provide a more thorough understanding of sleep disturbances and sleep duration affect on depressive symptomology inn college students. It also aimed to investigate the gender differences within reporting sleep disturbances and depression symptoms.

From exploring prior research and the aims of this study, the first hypothesis stated that sleep disturbances and sleep duration will significantly predict levels of depressive symptomology in college students. The variables, sleep disturbance scores and daytime sleepiness scores, in the results section, are both variables for the sleep disturbances factor. Firstly, a spearman's correlation was used; the results revealed that there was a significant positive relationship between sleep disturbances (sleep disturbance scores and daytime sleepiness scores) and depression symptoms. This result suggests that higher levels of both sleep disturbance variables are associated with higher levels of depression symptoms. Two standard regression models were also computed. This needed to be done twice due to the MCTQ having two different sets of data from participants; bedtime and wake up time on workdays and bedtime and wake up time on free days (sleep duration variables). The results from these models found that both models were overall significant. However, the sleep duration variables (Bedtime and wakeup time on both workdays and free days) did not predict depression symptomology, but both sleep disturbance variables (sleep disturbances and daytime sleepiness) did uniquely predict depression symptomology, to a statistically significant degree. Sleep disturbances were associated with depression symptoms; however, sleep duration was not, part of the hypothesis, that of sleep disturbances and depression, was

supported by the results, but the second part of the hypothesis, sleep duration, is not supported by the results, and therefore the first hypothesis is not supported.

From exploring prior research and the aims of this study, the second hypothesis stated that females will report more sleep disturbances and more depression symptoms. Gender differences were investigated in relation to the two sleep disturbance variables (sleep disturbances and daytime sleepiness). Three Mann-Whitney U tests were carried out; the results revealed that females scored higher in sleep disturbances, in comparison to males. Additionally, females scored higher in depression scores, in comparison to males too. However, the other sleep disturbance variable, daytime sleepiness, was found to have no difference in scoring between males and females. Even though daytime sleepiness (one variable for sleep disturbances) was found to have no gender differences, both depression and the other sleep disturbance variable (sleep disturbances) were both found to have females scoring higher in both, in comparison to males, and therefore the results support the second hypothesis.

Certain findings in the results to both hypotheses, are consistent with previous findings; sleep disturbances are a predictor for depression (Kronfeld-Schor & Einat, 2012; Riemann et al., 2001; Roberts et al., 2000) and there is a relationship between the two (Armitage, 2007; Kronfeld-Schor & Einat, 2012). Another consistent finding is that females will report suffering from depression symptomology, in comparison to males (Schuch, Roest, Nolen, Pennix & De Jonge, 2014; World Health Organization, 2020). However, inconsistent with the previous literature, is that sleep duration has no association with depression symptomology, as most research report that sleep duration, both excessive (Dong, Xie & Zou, 2022) and insufficient, do have a significant effect on depression (Kronfeld-Schor & Einat, 2012; Perlman, Johnson & Mellman, 2006;). While there was not much literature done on gender differences in sleep disturbances, the few that were done indicated that men were

reporting more sleep disturbances than women, which initially seems to contradict the findings from this study (Lovell, Nash, Sharman & Lane, 2015). However, while Lovell, Nash, Sharman and Lane (2015) were one of the very few papers that looked into gender differences in sleep disturbances, their results specified that men who were reporting higher levels of depression, were also more likely to be reporting sleep disturbances. Which makes sense, if sleep disturbances significantly predict depression, and research shows that females are more likely to suffer from depression, than they would also be more likely to report sleep disturbances in comparison to males. And the males in the Lovell, Nash, Sharman and Lane (2015) study are reporting higher levels of depression, so of course it would make sense that the specific study found that males were also reportedly suffering from sleep disturbances in comparison to females in said study.

Overall certain findings contribute to previous literature such as, sleep disturbances being a predictor of depression, and females reporting higher levels of depressive symptomology in comparison to males. Other findings contradict previous literature, such as sleep duration, both excessive and insufficient, had no association with depressive symptoms, whereas shown above, the literature consistently showed that sleep duration did have an association with depression (Dong, Xie & Zou, 2022; Kronfeld-Schor & Einat, 2012; Perlman, Johnson & Mellman, 2006;). Therefore, investigating the implications of sleep disturbances effect on depression symptomology in college students, is important as it could provide a future understanding of how to spot the deterioration of a college students well-being as well as how implement interventions to help college students deal with such issues in a healthy and productive way.

Implications

The findings discovered within this study may have important practical implications. The current study has shown that sleep disturbances and depression are very real detriments to college students mental health (Meijer, Habekothe & Van Den Wittenboer, 2001; Moore, Adler, Williams & Jackson, 2002; Pilcher, Ginter & Sadowsky, 1997). In fact, previous literature has not only laid out the negative outcomes, such as, worse psychological health, poorer quality of life, tension, and fatigue (Meijer, Habekothe & Van Den Wittenboer, 2001; Moore, Adler, Williams & Jackson, 2002; Pilcher, Ginter & Sadowsky, 1997), but studies have repetitively found that academic performance suffers as a result of depression and sleep disturbances (Short, Gradisar, Lack & Wright, 2013). A bad academic performance can really have a negative effect on one's future job aspirations, since reportedly 54% of people are attaining their third level education in Ireland (Government of Ireland, 2022), and a poor academic performance could stop them from getting jobs, as the current competition in the job sector is very competitive. Perhaps, more funding by the government, into mental health workshops in colleges may be a good idea, as a way to teach the negative outcomes of depression and sleep disturbances, and promote and provide assistance on how to seek help should individuals think they are suffering from both mental illnesses. Another idea to think about is that maybe just investing in ways to help college students cope with, if not prevent, sleep disturbances and depression, is not enough. Short, Gradisar, Lack and Wright (2013) looked at how sleep and depression affected adolescents. Maybe interventions and workshops, teaching how to recognise sleep disturbances and depression, as well as how to get help and who to go to, need to start during adolescence and while students are in secondary school.

Limitations and strengths

When recruiting the sample for this study, only 25 males to 77 females, were recruited. While this ratio was satisfactory, enough to continue with research, the difficulty in

recruiting enough men to participate, especially in a research study that wants to look at gender differences, was staggering. There needs to be better ways to encourage and recruit men to participate, however, on the other hand, the number of males recruited was possibly perfect, as it is possible that less men than women participated due this study investigating sleep disturbances and depression.

Since all of the questionnaires used were subjective, self-reported scales, the possibility of recall bias must be taken into account. The measures used are not equivalent to a diagnosis and the results should not be considered a confirmation or rejection of a diagnosis. However, all of the questionnaires are standardized scales, that have been used in numerous studies, consistently for years and all of them have good validity and reliability.

In relation to the results, while a significant, positive relationship was established between sleep disturbances and depression, and sleep disturbances were a predictor of depression, the true nature behind this relationship needs to be investigated more in future research, in which this study just did not have the means too.

In future replications of this research, maybe more than two variables measuring sleep disturbances should be used and taken into account for the possible effects they may have on depression. The researcher thinks that while the MCTQ scale is a decent scale that works, a better scale could be used to calculate sleep duration of participants, in future studies.

Conclusion

The current study expanded on the understanding on whether sleep disturbances and sleep duration affects depression symptomology in college students, and whether there are gender differences within sleep disturbances and depression. In relation to the affect sleep disturbances and sleep duration had on depression symptomology, the current study supported the previous literature, that sleep disturbances is a significant predictor of

depression symptoms, however previous literature did not support that sleep duration had no significant association with depression symptoms. Furthermore, the study supported previous research that found that females are more likely to report higher levels of depressive symptomology, in comparison to males. Due to this, further implications should focus on government funded workshops and interventions in secondary schools and colleges, in hopes of helping identify the symptoms of depression and sleep disturbances, and have students informed on where to get help, to prevent academic suffering and possible negative impacts on their future careers. While this study was an expansion on previous research, future studies could benefit from using more objective scales, and better recruitment tactics to entice males to participate.

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Appendices

Appendix A

Beck Depression Index Scale (BDI)

This depression inventory can be self-scored. The scoring scale is at the end of the questionnaire.

1.

0 I do not feel sad.

1 I feel sad.

2 I am sad all the time and I can't snap out of it.

3 I am so sad and unhappy that I can't stand it.

2.

0 I am not particularly discouraged about the future.

1 I feel discouraged about the future.

2 I feel I have nothing to look forward to.

3 I feel the future is hopeless and that things cannot improve.

3.

0 I do not feel like a failure.

1 I feel I have failed more than the average person.

2 As I look back on my life, all I can see is a lot of failures.

3 I feel I am a complete failure as a person.

4.

0 I get as much satisfaction out of things as I used to.

1 I don't enjoy things the way I used to.

2 I don't get real satisfaction out of anything anymore.

3 I am dissatisfied or bored with everything.

5.

0 I don't feel particularly guilty.

1 I feel guilty a good part of the time.

- 2 I feel quite guilty most of the time.
3 I feel guilty all of the time.
6.
0 I don't feel I am being punished.
1 I feel I may be punished.
2 I expect to be punished.
3 I feel I am being punished.
7.
0 I don't feel disappointed in myself.
1 I am disappointed in myself.
2 I am disgusted with myself.
3 I hate myself.
8.
0 I don't feel I am any worse than anybody else.
1 I am critical of myself for my weaknesses or mistakes.
2 I blame myself all the time for my faults.
3 I blame myself for everything bad that happens.
9.
0 I don't have any thoughts of killing myself.
1 I have thoughts of killing myself, but I would not carry them out.
2 I would like to kill myself.
3 I would kill myself if I had the chance.
10.
0 I don't cry any more than usual.
1 I cry more now than I used to.
2 I cry all the time now.
3 I used to be able to cry, but now I can't cry even though I want to.
11.
0 I am no more irritated by things than I ever was.

- 1 I am slightly more irritated now than usual.
- 2 I am quite annoyed or irritated a good deal of the time.
- 3 I feel irritated all the time.

12.

- 0 I have not lost interest in other people.
- 1 I am less interested in other people than I used to be.
- 2 I have lost most of my interest in other people.
- 3 I have lost all of my interest in other people.

13.

- 0 I make decisions about as well as I ever could.
- 1 I put off making decisions more than I used to.
- 2 I have greater difficulty in making decisions more than I used to.
- 3 I can't make decisions at all anymore.

14.

- 0 I don't feel that I look any worse than I used to.
- 1 I am worried that I am looking old or unattractive.
- 2 I feel there are permanent changes in my appearance that make me look unattractive.
- 3 I believe that I look ugly.

15.

- 0 I can work about as well as before.
- 1 It takes an extra effort to get started at doing something.
- 2 I have to push myself very hard to do anything.
- 3 I can't do any work at all.

16.

- 0 I can sleep as well as usual.
- 1 I don't sleep as well as I used to.
- 2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
- 3 I wake up several hours earlier than I used to and cannot get back to sleep.

17.

- 0 I don't get more tired than usual.
- 1 I get tired more easily than I used to.
- 2 I get tired from doing almost anything.
- 3 I am too tired to do anything.

18.

- 0 My appetite is no worse than usual.
- 1 My appetite is not as good as it used to be.
- 2 My appetite is much worse now.
- 3 I have no appetite at all anymore.

19.

- 0 I haven't lost much weight, if any, lately.
- 1 I have lost more than five pounds.
- 2 I have lost more than ten pounds.
- 3 I have lost more than fifteen pounds.

20.

- 0 I am no more worried about my health than usual.
- 1 I am worried about physical problems like aches, pains, upset stomach, or constipation.
- 2 I am very worried about physical problems and it's hard to think of much else.
- 3 I am so worried about my physical problems that I cannot think of anything else.

21.

- 0 I have not noticed any recent change in my interest in sex.
- 1 I am less interested in sex than I used to be.
- 2 I have almost no interest in sex.
- 3 I have lost interest in sex completely.

INTERPRETING THE BECK DEPRESSION INVENTORY

Now that you have completed the questionnaire, add up the score for each of the twentyone questions by counting the number to the right of each question you marked. The highest

possible total for the whole test would be sixty-three. This would mean you circled number three on all twenty-one questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question.

You can evaluate your depression according to the Table below.

Total Score _____ Levels of Depression

1-10 _____ These ups and downs are considered normal

11-16 _____ Mild mood disturbance

17-20 _____ Borderline clinical depression

21-30 _____ Moderate depression

31-40 _____ Severe depression over

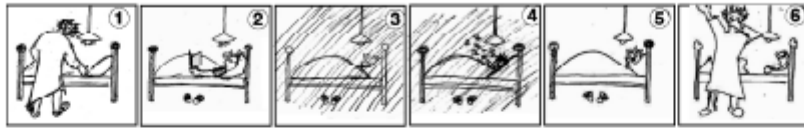
40 _____ Extreme depression

Appendix B

Munich Chronotype Questionnaire (MCTQ)

In this questionnaire, you report on your typical sleep behaviour over the past 4 weeks. We ask about workdays and work-free days separately. Please respond to the questions according to your perception of a standard week that includes your usual workdays and work-free days.

I have a regular work schedule (this includes being, for example, a housewife or househusband):
 Yes I work on 1 2 3 4 5 6 7 days per week.
 No
 Is your answer "Yes, on 7 days" or "No", please consider if your sleep times may nonetheless differ between regular 'workdays' and 'weekend days' and fill out the MCTQ in this respect.



Please use 24-hour time scale (e.g. 23:00 instead of 11:00 pm)!

Workdays

Image 1: I go to bed at _____ o'clock.
 Image 2: Note that some people stay awake for some time when in bed!
 Image 3: I actually get ready to fall asleep at _____ o'clock.
 Image 4: I need _____ minutes to fall asleep.
 Image 5: I wake up at _____ o'clock.
 Image 6: After _____ minutes I get up.
 I use an alarm clock on workdays: Yes No
 If "Yes": I regularly wake up BEFORE the alarm rings: Yes No

Free Days

Image 1: I go to bed at _____ o'clock.
 Image 2: Note that some people stay awake for some time when in bed!
 Image 3: I actually get ready to fall asleep at _____ o'clock.
 Image 4: I need _____ minutes to fall asleep.
 Image 5: I wake up at _____ o'clock.
 Image 6: After _____ minutes I get up.
 My wake-up time (Image 5) is due to the use of an alarm clock: Yes No
 There are particular reasons why I cannot freely choose my sleep times on free days:
 Yes If "Yes": Child(ren)/pet(s) Hobbies Others , for example: _____
 No

MCTQ variables

- for chronotype (MFSsc) computation see page 2 -

Name	Statement	Format	Workdays		Work-free days	
			Abbreviation	Computation	Abbreviation	Computation
Basic variables						
Local time of going to bed	I go to bed at ... o'clock.	hh:mm	BT _w	-	BT _f	-
Local time of preparing to sleep	I actually get ready to fall asleep at ... o'clock.	hh:mm	SPrep _w	-	SPrep _f	-
Sleep latency	I need ... minutes to fall asleep.	mm	SLat _w	-	SLat _f	-
Sleep end	I wake up at ... o'clock.	hh:mm	SE _w	-	SE _f	-
Alarm clock use	with an alarm clock/without an alarm clock	y/n	Alarm _w	-	Alarm _f	-
Sleep inertia	After ... minutes, I get up.	mm	SI _w	-	SI _f	-
Number of work-/work-free days per week	I have a regular work schedule and work ... days per week.	n	WD	-	FD	7-WD
Light exposure	On average, I spend the following amount of time outdoors in daylight (without a roof above my head)	hh:mm	LE _w	-	LE _f	-
Computed variables						
Sleep onset	-	hh:mm	SO _w	SPrep _w + SLat _w	SO _f	SPrep _f + SLat _f
Local time of getting out of bed	-	hh:mm	GU _w	SE _w + SI _w	GU _f	SE _f + SI _f
Sleep duration	-	hh:mm	SD _w	SE _w - SO _w	SD _f	SE _f - SO _f
Total time in bed	-	hh:mm	TBT _w	GU _w - BT _w	TBT _f	GU _f - BT _f
Mid-Sleep	-	hh:mm	MSW	SO _w + SD _w /2	MSF	SO _f + SD _f /2

Appendix C

Epworth Sleepiness Scale (ESS)

This questionnaire was developed to determine the level of daytime sleepiness in individuals. It has become one of the most frequently used methods for determining a person's average level of daytime sleepiness.

Please rate how likely you are to doze or fall asleep in the following situations by selecting the response that best applies. If you have not done some of these activities recently, select what would most likely happen if you were in that situation.

Use the following scale to choose the **most appropriate number** for each situation:

0 = would **never** doze

1 = **slight chance** of dozing

2 = **moderate chance** of dozing

3 = **high chance** of dozing

It is important that you answer each question as best you can.

Situation	Chance of Dozing (0-3)
Sitting and reading _____	_____
Watching TV _____	_____
Sitting, inactive in a public place (e.g. a theatre or a meeting) ____	_____
As a passenger in a car for an hour without a break _____	_____
Lying down to rest in the afternoon when circumstances permit _	_____
Sitting and talking to someone _____	_____
Sitting quietly after a lunch without alcohol _____	_____
In a car, while stopped for a few minutes in the traffic _____	_____

Interpreting Epworth Sleepiness Scale Scores		
Normal	EDS*	High Levels of EDS*
0-10	>10	>16

*Excessive Daytime Sleepiness

Appendix D

Pittsburgh Sleep Quality Index Scale (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions. During the past month,

1. When have you usually gone to bed? _____
2. How long (in minutes) has it taken you to fall asleep each night? _____
3. When have you usually gotten up in the morning? _____
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed) _____

5. During the past month, how often have you had trouble sleeping because you...	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times week (3)
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe, including how often you have had trouble sleeping because of this				

reason(s):				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
	Very Good (0)	Fairly Good (1)	Fairly Bad (2)	Very Bad (3)
9. During the past month, how would you rate your sleep quality overall?				

Scoring the PSQI

The order of the PSQI items has been modified from the original order in order to fit the first 9 items (which are the only items that contribute to the total score) on a single page. Item 10, which is the second page of the scale, does not contribute to the PSQI score.

In scoring the PSQI, seven component scores are derived, each scored 0 (no difficulty) to 3 (severe difficulty). The component scores are summed to produce a global score (range 0 to 21). Higher scores indicate worse sleep quality.

Component 1: Subjective sleep quality—question 9

Response to Q9	Component 1 score
Very good	0
Fairly good	1
Fairly bad	2
Very bad	3

Component 1 score: _____

Component 2: Sleep latency—questions 2 and 5a

Response to Q2	Component 2/Q2 subscore
< 15 minutes	0
16-30 minutes	1
31-60 minutes	2
> 60 minutes	3

Response to Q5a	Component 2/Q5a subscore
Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Sum of Q2 and Q5a subscores	Component 2 score
0	0
1-2	1
3-4	2
5-6	3

Component 2 score: _____

Component 3: Sleep duration—question 4

Response to Q4	Component 3 score
> 7 hours	0
6-7 hours	1
5-6 hours	2
< 5 hours	3

Component 3 score: _____

Component 4: Sleep efficiency—questions 1, 3, and 4

Sleep efficiency = (# hours slept/# hours in bed) X 100%

hours slept—question 4

hours in bed—calculated from responses to questions 1 and 3

Sleep efficiency	Component 4 score
> 85%	0
75-84%	1
65-74%	2
< 65%	3

Component 4 score: _____

Component 5: Sleep disturbance—questions 5b-5j

Questions 5b to 5j should be scored as follows:

Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Sum of 5b to 5j scores	Component 5 score
0	0
1-9	1
10-18	2
19-27	3

Component 5 score: _____

Component 6: Use of sleep medication—question 6

Response to Q6	Component 6 score
Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Component 6 score: _____

Component 7: Daytime dysfunction—questions 7 and 8

Response to Q7	Component 7/Q7 subscore
Not during past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Response to Q8	Component 7/Q8 subscore
No problem at all	0
Only a very slight problem	1
Somewhat of a problem	2
A very big problem	3

Sum of Q7 and Q8 subscores	Component 7 score
0	0
1-2	1
3-4	2
5-6	3

Component 7 score: _____

Global PSQI Score: Sum of seven component scores: _____

Appendix E

Participant Information Leaflet

Sleep Disturbances affect Depressive Symptomology in College Students? Do Gender and Circadian Phases Play A Role?

Hello, thank you for taking the time out of your day. You are being invited to take part in a research study, that I am conducting. Before deciding on whether you would like to take part, please take the time to read this document, which will explain why the research is being done and what it would involve for you. If you have any questions about any of the following information provided, do not hesitate to contact me using the details at the end of this sheet.

What is this study about?

I am a final year student in the BA for the Psychology Course at the National College of Ireland. As part of our degree, we are required to carry out an independent research project.

For my independent research project, I am aiming to investigate if disturbances in sleep and circadian rhythms predicts depressive symptomology in college students and is there a specific circadian phase that more commonly predicts depressive symptomology. The secondary hypothesis that will also be looked at is whether males or females report higher levels of depressive symptomology, and do they also report higher disturbances with sleep.

The secondary aim of the study will look at whether males or females are more likely to report higher levels of depressive symptomology in relation to having more sleep disturbances.

This project is being supervised by _____, who is the _____ in the National College of Ireland.

What will taking part in the study involve?

If you decide that you would like to take part in this research, you will be asked to read the following documents after this one, which are the consent form and the debriefing sheet. If after reading these documents you still wish to participate, you will be then asked to complete the online questionnaire.

The questionnaire will ask you to answer questions on your demographics, such as your age and gender (A.4). The next part of the study will ask you to answer questions on the Beck Depression Inventory Scale (A.5), which will measure levels of depressive symptomology. The Morningness/Eveningness Scale (A.6) will follow and measure the time-

of-day participants feel most awake, and whether it is a normal sleep-wake cycle or not, (circadian rhythms). After, will be the Epworth Sleepiness Scale (A.7), which will measure how much daytime sleepiness one experiences. And the last scale participants will be required to answer will be the Pittsburgh Sleep Quality Index Scale (A.8) will be used to measure the quality of sleep participants are getting. The questionnaire should take you about 30 minutes to complete.

Who can take part?

You can take part in this study if you are over 18 years old and are currently attending college in the Dublin area.

You cannot take part in this study if you are under 18 years of age and are not attending college in Dublin and at the present time.

You have come across this study and may be able to take part in it if you fit the above inclusion criteria, are currently attending a college in the Dublin area and may have come across this on your college social media page.

Do I have to take part?

Participating in this research project is completely voluntary; you do not have to take part, and there will be no consequences if you decide not to participate.

Due to this being an online questionnaire, it is required that you answer all the questions, but if there is a question that makes you uncomfortable, you are not required to answer it or continue with the questionnaire. However, all the questionnaires and what they are looking at will be detailed (Here/debriefing sheet) and should you feel uncomfortable with the material/subject or come across a question that makes you feel uncomfortable, you do not have to answer it and can withdraw without completing if you wish to do so, there will be no penalties for this. As stated above, this is an online questionnaire, and because of that, once the questionnaire has been submitted, we will not be able to withdraw your data from the study, as the questionnaire is designed to be anonymous, and individuals' data cannot be identified. You should consider this before proceeding with taking part. If you have further questions on this the details of the researcher and the supervisor are below.

What are the possible risks and benefits of taking part?

There are no direct benefits to you for taking part in this research. However, the information gathered will contribute to research that helps us to understand, how disturbances in sleep affect or predict depressive symptomology, if both are prevalent among college students and if circadian phases not only affect or predict depressive symptomology, but if a certain phase is more likely to predict this. It will also help us understand if gender may have an effect of both depressive symptomology and disturbances in sleep and circadian rhythms.

There is a small risk that some of the questions contained within this survey may cause minor distress for some participants. If you experience this, you are free to discontinue participation and exit the questionnaire. Contact information for relevant support services are also provided at the end of the questionnaire in the debriefing page.

Will taking part be confidential and what will happen to my data?

The questionnaire is anonymous, it is not possible to identify a participant based on their responses to the questionnaire. All data collected for the study will be treated in the strictest confidence. And even though the data will remain anonymous, IP addresses will not be recorded, and only the researcher and the supervisor of this research project will have access to the data. There will be no identifiable data collected.

However, in the unlikely event that the researcher or academic supervisor believes that there is a significant risk of harm or danger to the participant or another individual, or a law has been broken, they would then be required to share this information with the relevant authorities. In this very unlikely event, the researcher would discuss this with you first, but they may be required to breach confidentiality with or without your permission.

The data will be analysed and will be examined to look at whether this data has provided evidence that either supports or rejects the researchers research question, and secondary hypotheses. Responses to the questionnaire will be stored securely in a password protected/encrypted file on the researcher's computer. Only the researcher and their supervisor will have access to the data. Data will be retained for 5 years in accordance with the NCI data retention policy.

What will happen to the results of the study?

The results of this study will be presented in my final dissertation, which will be submitted to National College of Ireland. In the possible future, the results of the research project may be presented at conferences and/or submitted to an academic journal for publication, however at the present, this will not be the case.

Who should you contact for further information?

Should you have any questions with regards to this study my contact details are as follows:

The researcher: Chloe Roche

Email Address: x18472056@student.ncirl.ie

The contact details for the supervisor of this study, are detailed below:

The supervisor: _____

Title: _____

Email Address: _____

Appendix F

Consent Form

Sleep Disturbances affect Depressive Symptomology in College Students? Do Gender and Circadian Phases Play A Role?

Date: __/__/____

You are being invited to participate in a research study that will investigate if disturbances in sleep and circadian rhythms predicts depressive symptomology in college students and do is there a specific circadian phase that more commonly predicts depressive symptomology. The secondary hypothesis that will be looked at is whether males or females report higher levels of depressive symptomology, and do they also report higher disturbances with sleep.

The secondary hypothesis will be looking at investigating whether females or males report higher levels of depressive symptomology and/or disturbances in sleep and circadian rhythms, and if this difference is significant. This research project is being conducted by Chloe Roche, from the National College of Ireland. My sponsor for this research project is _____ who is from the _____ and is the _____ at the National college of Ireland. This research project is being conducted as part of my final year in the BA undergraduate Psychology course at the National College of Ireland.

There are no known risks if you decide to participate in this research study. There are no costs to you for participating in the study. The information you provide will be analysed and examined, to see if the data collected provides evidence, supporting or rejecting the research question, which was stated above, as well as the minor hypotheses. The questionnaire will take about 30 minutes to complete. The information collected may not benefit you directly, but the information learned in this study should provide more general benefits.

This survey is anonymous. Do not write your name on the survey. This is an online questionnaire, therefore, to ensure anonymity, as well as not providing your name, IP addresses will not be collected or stored as data. The questionnaire will be uploaded to a secure server to ensure data can only be collected by the researcher. No one will be able to identify you or your answers, and no one will know whether or not you participated in the study. Individuals from the Institutional Review Board may inspect these records. Should the data be published, no individual information will be disclosed.

Your participation in this study is voluntary. By completing and submitting the online questionnaire when you have completed it, you are voluntarily agreeing to participate. You are free to decline to answer any particular question you do not wish to answer for any reason. However, due to this being an online questionnaire, you will be unable to withdraw your data from the research project once you have submitted it, therefore you should carefully consider this before proceeding. This is due to all individual's data being anonymous, therefore it cannot be identified.

If you have any questions about the study, please contact Chloe Roche at my email address; x18472056@student.ncirl.ie, or my supervisors email address; _____

The National College of Ireland Review Board has reviewed my request to conduct this project. If you have any concerns about your rights in this study, please contact the researcher or supervisor of this study, whose details have been listed above.

Appendix G

Debrief Form

Title of project: Sleep Disturbances affect Depressive Symptomology in College Students? Do Gender and Circadian Phases Play A Role?

Name of Researcher: Chloe Roche

Name of Supervisor: _____

Thank you for taking part in this study. This sheet will provide you will the full details of the research project in which you are participating in.

The purpose of the study was to investigate if disturbances in sleep and circadian rhythms predicts depressive symptomology in college students, and do is there a specific circadian phase that more commonly predicts depressive symptomology.

The secondary hypothesis that can also be looked at is whether males or females report higher levels of depressive symptomology, and do they also report higher disturbances with sleep. The secondary hypothesis will be looking whether males or females report higher levels of depressive symptomology and/or disturbances in sleep and circadian rhythms. In order to investigate these statements, an online questionnaire was put together to gather data from the target sample. The details of this questionnaire are provided below.

You were asked to take part in an experimental online questionnaire. The first part required you to answer questions about your demographics. The second part was answering questions/statements on the Beck Depression Inventory scale, which at the end, calculates your possible levels of depressive symptomology. The third part required you to answer questions on the Morningness/Eveningness Scale, which measured which time of the day you feel most alert at, at was measuring circadian rhythm phases. The fourth part required you to answer the Epworth Sleepiness Scale, which calculates the amount of excessive daytime sleepiness you may be experiencing. The last part of the questionnaire required you to answer the Pittsburgh Sleep Quality Index Scale, which measured the quality of sleep you are experiencing. This online questionnaire was the same for all participants. We expected that participants would report higher levels of depressive symptomology if they experienced more sleep disturbances. We also expected that circadian phase eveningness was more likely to be seen with higher levels of depressive symptomology. This is because in previous research there has been evidence supporting disturbances in sleep and circadian rhythms being associated with depression, and it occurring in college students. There has also been inconclusive evidence to show that certain circadian rhythm phases are present with those who have high depressive symptomology, some showing evidence for and against eveningness phase being more common among depression. For this reason, we ask that you do not discuss the study with anyone else until its conclusion (dd/mm/yyyy).

Thank you again for taking part. If there is anything you would like to discuss in relation to this study, please feel free to do so by contacting the researchers. Unfortunately, you will be unable to withdraw your data after your submission, due to the fact that it is an anonymous online questionnaire, therefore your data will not be identifiable. However, you should carefully consider this before finally submitting this questionnaire. If you wish to leave the questionnaire before finally submitting, your data will not be collected and there are no penalties for doing so. If anything in this study has caused you any distress or harm, do not hesitate to contact the researcher, the supervisor, or the following helplines provided below.

Name of Researcher: Chloe Roche

E-mail: x18472056@student.ncirl.ie

Name of Supervisor: _____

E-mail: _____

Aware

Depression Service

Website: www.aware.ie

Email: supportmail@aware.ie

Freephone: 1800 80 48 48

Available Monday – Sunday

10am to 10pm

Pieta

Depression Service

Website: www.pieta.ie

Email: On website, in contact info area, several, email to which one you are currently seeking help

Phone: 1800 247 247

Text: 51444

Available Monday – Sunday

24-hour service

Niteline

Service run by students, listening to any problems may be experiencing

Website: niteline.ie

Email (for inquiries): info@niteline.org

Phone: 1800 793 793

During College Term Times Only

9:00pm – 2:30 am

Appendix H

Evidence of SPSS Data and Output (Full Data file and Output can be made available upon request).

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Gender	Numeric	6	0		{1, Male}...	None	11	Right	Nominal	Input
2	Age_Years	Numeric	3	0	Age in Years	None	None	12	Right	Scale	Input
3	BDI_1	Numeric	40	0		{0, I do not f...	None	20	Right	Ordinal	Input
4	BDI_2	Numeric	40	0		{0, I am not ...	None	29	Right	Ordinal	Input
5	BDI_3	Numeric	40	0		{0, I do not f...	None	20	Right	Ordinal	Input
6	BDI_4	Numeric	40	0		{0, I get as ...	None	22	Right	Ordinal	Input
7	BDI_5	Numeric	37	0		{0, I don't fe...	None	19	Right	Ordinal	Input
8	BDI_6	Numeric	32	0		{0, I don't fe...	None	20	Right	Ordinal	Input
9	BDI_7	Numeric	35	0		{0, I don't fe...	None	22	Right	Ordinal	Input
10	BDI_8	Numeric	40	0		{0, I don't fe...	None	50	Right	Ordinal	Input
11	BDI_9	Numeric	40	0		{0, I don't ha...	None	50	Right	Ordinal	Input
12	BDI_10	Numeric	40	0		{0, I don't cr...	None	50	Right	Ordinal	Input
13	BDI_11	Numeric	40	0		{0, I am no ...	None	50	Right	Ordinal	Input
14	BDI_12	Numeric	40	0		{0, I have no...	None	50	Right	Ordinal	Input
15	BDI_13	Numeric	40	0		{0, I make d...	None	50	Right	Ordinal	Input
16	BDI_14	Numeric	40	0		{0, I don't fe...	None	50	Right	Ordinal	Input
17	BDI_15	Numeric	40	0		{0, I can wor...	None	50	Right	Ordinal	Input
18	BDI_16	Numeric	40	0		{0, I can sle...	None	26	Right	Ordinal	Input
19	BDI_17	Numeric	38	0		{0, I don't ge...	None	38	Right	Ordinal	Input
20	BDI_18	Numeric	40	0		{0, My appet...	None	18	Right	Scale	Input
21	BDI_19	Numeric	40	0		{0, I haven't...	None	15	Right	Scale	Input
22	BDI_20	Numeric	40	0		{0, I am no ...	None	15	Right	Ordinal	Input
23	BDI_21	Numeric	40	0		{0, I have no...	None	16	Right	Ordinal	Input
24	MCTQ1_Re...	Numeric	40	0		{1, Yes}...	None	50	Right	Nominal	Input
25	MCTQ2_If_y...	Numeric	31	0		None	None	12	Right	Nominal	Input
26	MCTQ3_W...	Date	5	0		None	None	11	Right	Scale	Input
27	MCTQ4_W...	Date	5	0		None	None	11	Right	Scale	Input

Descriptive Statistics

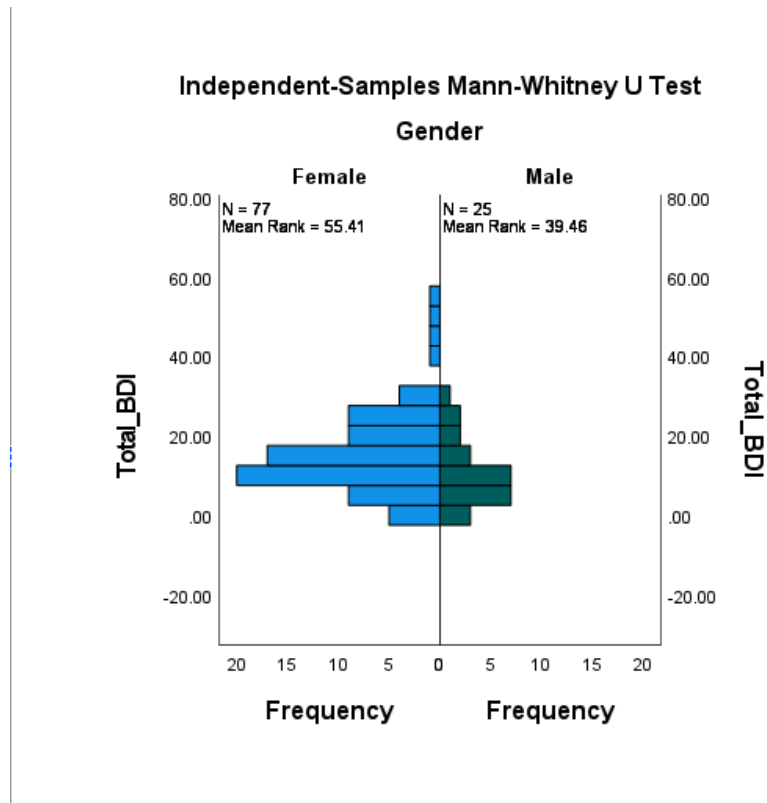
	Mean	Std. Deviation	N
Total_BDI	14.5588	10.10301	102
MCTQ4_WD_Get_ready_g o_sleep	8.49	8.35	101
MCTQ6_WD_Wake_up	8.26	2.00	101
PSQI_Disturbances_Total	6.9412	4.71741	102
Total_ESS	7.0980	4.44217	102

Correlations

	Total_BDI	MCTQ4_WD_G et_ready_g_o_s leep	MCTQ6_WD_ Wake_up	PSQI_Disturba nces_Total	Total_ESS
Pearson Correlation	Total_BDI	1.000	-.088	-.054	.524
	MCTQ4_WD_Get_ready_g o_sleep	-.088	1.000	-.173	-.034
	MCTQ6_WD_Wake_up	-.054	-.173	1.000	-.209
	PSQI_Disturbances_Total	.524	-.034	-.209	1.000
	Total_ESS	.312	-.298	.171	.086
Sig. (1-tailed)	Total_BDI		.191	.296	<.001
	MCTQ4_WD_Get_ready_g o_sleep	.191		.042	.367
	MCTQ6_WD_Wake_up	.296	.042		.018
	PSQI_Disturbances_Total	.000	.367	.018	
	Total_ESS	.001	.001	.043	.196
N	Total_BDI	102	101	101	102
	MCTQ4_WD_Get_ready_g o_sleep	101	101	101	101

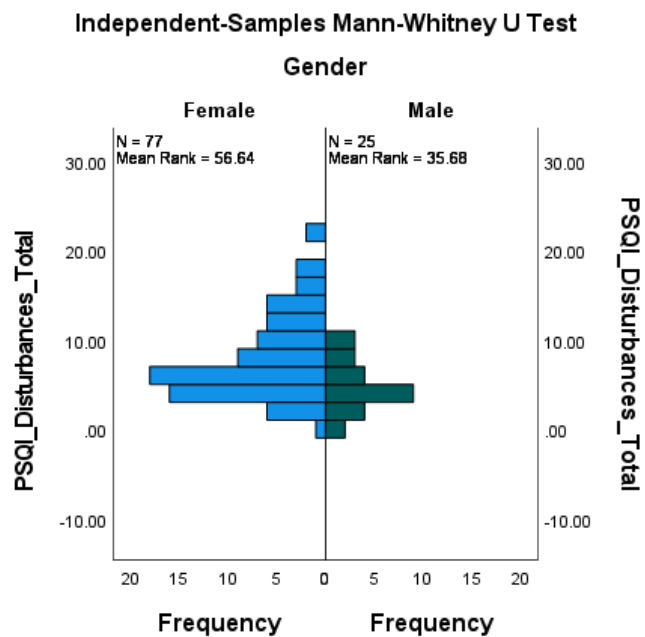
Appendix I

Mann-Whitney U Histogram showing the comparison of depression scores between males and females (Significant).



Appendix J

Mann-Whitney U Histogram showing the comparison of sleep disturbance scores between males and females (Significant).



Appendix K

Mann-Whitney U Histogram showing the comparison of daytime sleepiness scores between males and females (Not Significant).

