Investigating the Relationships Between Fatigue, Mood and Subjective Cognitive Decline in Long Covid

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Abstract

People around the world have reported experiencing symptoms after the acute phase of COVID-19, now termed "long Covid". Long Covid is generally defined as the experience of symptoms after the acute phase of a COVID-19 infection that is not caused by other illnesses. This study aimed to investigate the correlations of fatigue, depression, and anxiety with subjective cognitive decline, concerns for multicollinearity, and predictive power using regression. Participants were recruited using two separate online surveys, in a quantitative and quasi-experimental design. 73 participants' data from the Fatigue Severity Scale (FSS), Modified Fatigue Impact Scale (MFIS), Cognitive Failures Questionnaire (CFQ), Beck Depression Inventory-II (BDI-II), and Beck Anxiety Inventory (BAI) were used in the study. Low to moderate correlations were found in the long Covid group for fatigue, depression, and anxiety with subjective cognitive decline. Only anxiety was significantly positively correlated with subjective cognitive decline in the control group. There were no concerns for multicollinearity. Regression models made to predict subjective cognitive decline in the long Covid group found that only MFIS scores produced significant models. No variables for regression were significant in the control group. The study concluded that, in the long Covid group, there were substantial correlations between all variables, no concerns for multicollinearity, and MFIS scores could potentially be used to predict subjective cognitive decline in long Covid. Future studies should consider including more participants, using objective measures of cognition, and controlling for environmental variables with in-person testing.

Keywords: Anxiety, Depression, Fatigue, Long Covid, Subjective Cognitive Decline

Many people across the globe who have progressed beyond the typical recovery period of COVID-19 (Kingstone et al., 2020) are reporting symptoms of a post-viral syndrome affecting activities of daily living (Graham et al., 2021; Kamal et al., 2020; Ortelli et al., 2021). This experience has been termed "long Covid" (Ladds et al., 2020; Taribagil et al., 2021) and the literature estimates a prevalence of 10% to 87% (Kingstone et al., 2020; Ladds et al., 2020; Nature Medicine, 2020). A wide range of long Covid symptoms have been reported, such as headaches, depression, numbness, anosmia, myalgia, fatigue, sleep difficulties, and anxiety, to name a few (Graham et al., 2021; Huang et al., 2021; Kingstone et al., 2020). Physical and neuropsychological aspects are reported to persist beyond the four-week acute phase of the COVID-19 infection but there is variation in how patients are experiencing these persistent symptoms (Ladds et al., 2020; Nalbandian et al., 2021; Taribagil et al., 2021). Differences in presentation lie in the duration, type of symptoms experienced by patients and severity (Graham et al., 2021; Ladds et al., 2020; Mendelson et al., 2020).

Nevertheless, several studies suggest that there does not seem to be a straightforward link between the severity of COVID-19 infection and likelihood to develop long Covid (Graham et al., 2021; Huang et al., 2021; Kingstone et al., 2020; Ladds et al., 2020). Furthermore, these symptoms have been reported at a variety of time periods after the post-acute phase of COVID-19, up to 12 months later (Graham et al., 2021; Huang et al., 2021; Kingstone et al., 2020). Despite these vagaries, a cluster of symptoms that are neuropsychological in nature, including fatigue, depression, anxiety, and cognitive decline, are a reoccurring theme in reports of long Covid (Graham et al., 2021; Huang et al., 2021; Kingstone et al., 2020). The recurrence of these symptoms raises an interesting question about their relationship to long Covid, and with each other. However, some of these

symptoms are subjective, and have not yet been thoroughly investigated to determine their objective neuropsychological basis.

Neuropsychological Symptoms in Long Covid

Fatigue, depression, and anxiety are being reported most frequently in long Covid (Graham et al., 2021; Huang et al., 2021; Kingstone et al., 2020). No clear, underlying physiological basis of these neuropsychological aspects has been identified, whether symptoms arise from distinct neuropathological mechanisms or whether they derive from a singular cause. A predominant theory is that in more severe COVID-19 cases, neuroinflammation because of a "cytokine storm" produces neurological disturbances which may account for lasting neuropsychological aspects of long Covid (Kamal et al., 2020; Ladds et al., 2020; Rudroff et al., 2020; Versace et al., 2021). Impairment in GABAergic neural activity could further underlie the symptoms that are being observed in long Covid sufferers (Rudroff et al., 2020; Versace et al., 2021). Evidence has shown that GABAergic abnormalities are associated with neuropsychological aspects such as depression and cognitive decline (Sanacora et al., 2000; Xu & Wong, 2018). However, this theory does not account for long Covid sufferers who did not experience a severe COVID-19 infection, as shown by inconsistent long Covid prevalence compared to COVID-19 severity (Graham et al., 2021; Kingstone et al., 2020; Negrini et al., 2021; Townsend et al., 2020).

One major issue that might hamper efforts to uncover the etiological basis of neuropsychological symptoms is that many symptoms remain poorly characterised (Gaber, 2021; Graham et al., 2021; Huang et al., 2021; Kingstone et al., 2020; Wilson et al., 2020). For example, the term "fatigue" has been applied heterogeneously and as an umbrella term, making it difficult to ascertain if they are linked to affective or cognitive factors, or issues related to physical or mental energy (Ortelli et al., 2021).

Another factor that further complicates our understanding of the neuropsychological profile of long Covid are references to 'brain fog' as a discrete symptom. Long Covid sufferers frequently report cognitive deficits as "brain fog" (Boldrini et al., 2021; Nordvig & Noble, 2021; Theoharides et al., 2021). The term "brain fog" encapsulates fatigue, depression, and cognitive decline, particularly in terms of the experience of confusion and decreased concentration (Boldrini et al., 2021; Stefano et al., 2021). This presents similarly to the cognitive deficits reported in other post-viral conditions (Theoharides et al., 2021). Brain fog is theorised to be related to neuroinflammation, but this does not account for patients who experienced mild COVID-19 infections (Negrini et al., 2021; Townsend et al., 2020).

Although brain fog is frequently reported, it remains poorly understood in terms of the established medical and neuropsychological nomenclature. It may be the case that "brain fog" is synonymous with cognitive decline, and describes the same or similar set of symptoms. Further investigation into the neuropsychological aspects of "brain fog" in long Covid will allow better understanding of the use of the term in long Covid sufferers.

Thus, despite the increasing literature, it remains unclear how neuropsychological symptoms in long Covid overlap and interact with one another. For instance, based on prior research (Palmer, 2013) it is possible that long Covid symptoms of increased negative affect and fatigue are facilitating an experience of cognitive decline in some individuals. Existing studies from the depression literature show that depression and cognition are neurologically linked, and that cognition is negatively affected by high levels of depression (McDermott & Ebmeier, 2009; Papazacharias & Nardini, 2012). In fact, the term 'pseudo-dementia' is used to describe severely depressed patients who are manifesting memory and attention problems (Brown, 2005). Similarly, many studies show that high levels of anxiety are detrimental to working memory (Maloney et al., 2014).

While these links between neuropsychological symptoms have been investigated in other literature, the etiology of long Covid is further complicated by the current context: it is not entirely understood how the pandemic environment interacts with and exacerbates neuropsychological aspects of long Covid (Adams-Prassl et al., 2020; Gaber, 2021). Reports have indicated a decline in psychological domains of fatigue, affect (in relation to depression), and cognition, throughout the population as a result of the pandemic (Troyer et al., 2020). Concerns such as fear of death and illness, and the effects of social isolation have been reported to impact mental health outcomes such as fatigue, depression, and anxiety in people regardless of their long Covid status (Carvalho et al., 2020; Troyer et al., 2020). The neuropsychological aspects of long Covid may therefore result as a function of both environmental and physiological factors. Furthermore, people without long Covid may experience neuropsychological symptoms as a result of the environment too (Gaber, 2021; Troyer et al., 2020). However, growing evidence suggests that COVID-19 infection both triggers and worsens these neuropsychological aspects (Mendelson et al., 2020; Sher, 2021).

Thus, the question of whether subjective cognitive decline can be explained by interactions between other neuropsychological long Covid symptoms or whether it arises independently is particularly concerning as the latter may imply a degree of long neurological damage. Furthermore, a decline in cognition is likely to substantially impact long Covid sufferers' ability to return to full occupational functioning. Another key gap in our understanding of long Covid is whether or not neuropsychological symptoms of long Covid exacerbate one another or whether disturbances in mood are able to predict reports of subjective cognitive decline. Since fatigue, depression, and anxiety have been reported to negatively impact cognition in other illnesses (Small et al., 2019; Vearncombe et al., 2009), it is important to investigate how they contribute to cognitive decline in long Covid sufferers, as the literature has not sufficiently investigated this.

In better understanding the cause of - and relationships between - the neuropsychological aspects of long Covid and cognitive decline, we may facilitate the development of effective treatment measures, deepen our understanding of long Covid, and direct future research.

Rationale and Objective

There is uncertainty surrounding how or why the neuropsychological aspects arise, and whether or not they constitute distinct or overlapping phenomena. Furthermore, it remains unclear how the neuropsychological aspects of long Covid interact and overlap with subjective cognitive decline. The study aimed at investigating if fatigue, depression, and anxiety scores are predictive of scores on subjective cognitive decline measures in a long Covid sample. It is important to ascertain whether or not cognitive deficits are secondary to fatigue, depression, and anxiety, or whether they represent a distinct category of symptoms in their own right. To determine this, a correlational study was conducted.

Methods

Aims, Research Questions, and Hypotheses

This study aimed to investigate correlations between the neuropsychological aspects of long Covid, and to investigate whether fatigue, depression, or anxiety predicted subjective cognitive decline. There were four research questions. Does fatigue, depression, and/or anxiety have a significant correlation with subjective cognitive decline? Are there concerns of multicollinearity between fatigue, depression, and anxiety? Can the neuropsychological aspects of long Covid be used to predict cognitive decline using regression? Lastly, are findings in long Covid participants significantly different from findings from the control data?

There are four hypotheses proposed for these four research questions. All neuropsychological aspects will be substantially correlated with subjective cognitive decline.

There will not be any concerns for multicollinearity between fatigue, depression, and anxiety. The control data will show that the correlation between fatigue, depression, anxiety, and subjective cognitive decline is not substantial in control participants, and that they cannot be used to make an effective regression model. A satisfactory prediction model for subjective cognitive decline using regression can be created from at least one of the neuropsychological aspects of long Covid as the predictor variable.

A substantial correlation will constitute a correlation coefficient of 0.2 or higher, signalling a possible relationship and warranting further investigation. In relation to multicollinearity, although there is some overlap in these neuropsychological aspects, the measures used gauge completely separate neuropsychological aspects.

Design

This study adopted a quantitative approach with a mixed-methods design. Utilising a control group, it employed both quasi-experimental and correlational statistical analyses.

Scores were correlated with one another to investigate whether there is a relationship between fatigue, depression, anxiety, and subjective cognitive decline. The study conducted the same analysis on the control data and compared the results.

This study is quasi-experimental, with a long Covid group and a control group without random assignment. The labelling of participants as "control" participants is not to identify that these participants are not exposed to an intervention, but rather to signal that they do not report symptoms of long Covid. Results from the long Covid participant group were compared to results from the control group to determine whether or not symptoms are a result of COVID-19 sequelae. Data collection took place between June 2021 and December 2021 and was administered online to South Africans, using purposive sampling.

Participants

Participants were purposively sampled. The study was advertised (Appendix A) on several online platforms likely to be frequented by people with long Covid. This included COVID-19 support forums, social media channels and the UCT Vula portal. Additionally, the study was advertised in post-COVID clinics at Groote Schuur Hospital (Cape Town, South Africa) and Alberlito Hospital (Durban, South Africa).

According to a power analysis with power = 0.8, alpha = 0.05, and a hypothesised effect size of 0.5, 64 participants per group was projected for this study. A medium effect size was adopted as it assumes a null hypothesis: that long Covid participants and control participants will perform similarly on the measures administered (Cohen, 1998). Male, female and non-binary participants were recruited for this study. Participants were between the ages of 18 and 60 and were included on the basis that they are physically stable. The study aimed to establish a high degree of diversity within participants in terms of race, socioeconomic status and other demographic characteristics. As COVID-19 (and subsequently long Covid) has affected the entire population, it is important to strive for participants representing the population at large. This would allow for results to have greater generalisability.

There are three exclusion criteria for this study. First, participants needed to be between the ages of 18 and 60 years. Taking ethical considerations into account, only adults are included in the study. Additionally, those over the age of 60 were excluded to avoid confounding results with age-related cognitive decline (Barnes, 2015). Second, participants who are currently infected with COVID-19 were excluded. Since this study focuses on post-COVID-19 outcomes, it is not relevant to include those who are currently infected. Third, participants were excluded if they have a history of neuropathological damage (such as from a stroke, aneurysm or haemorrhage) or cognitive and developmental impairment (such as

autism or fetal alcohol spectrum disorder). Long Covid refers to symptoms that are a consequence of damage that cannot be clearly attributed to an already existing condition.

Long Covid Group

Participants who have had a COVID-19 infection answered an online questionnaire (Appendix I). The questionnaire asked participants to confirm they have had a confirmed COVID-19 diagnosis, the method of testing, time period of infection, and if they were hospitalised. The questionnaire also contained a question asking participants if they believe they are currently experiencing long Covid. Those who indicated no were excluded from the study, and their data was not used in the data analysis. This is because there is no way to definitively diagnose long Covid using self-report measures.

Control Group

Participants who have not had a confirmed COVID-19 diagnosis answered an online questionnaire (Appendix J). The questionnaire was largely the same, except the questions regarding a COVID-19 infection. Notably, while control participants had not been infected with COVID-19, they have still been exposed to the strenuous conditions of the COVID-19 pandemic.

Procedure

Data collection was conducted by Madeleine Ashton (MA) and Arjun Maharaj (AM) under the supervision of Donné Minné (DM), Mark Solms (MS) and Altay Yüce Turan (AYT). The data for this study is sourced from AYT's online data collection procedure that gathers self-report and psychometric data on people who potentially have long Covid. Data was collected using an online software called "SoGoSurvey".

The link to an online questionnaire was built into the advertisements for the study, as well as distributed by those working on the study. The questionnaire screened participants elibigle for the study and collected demographic data. An adapted informed consent form was

built into this questionnaire. Additionally, this questionnaire asked participants to indicate symptoms relevant to the neuropsychological aspects of long Covid and cognition by adapting measures of fatigue and mental health.

Instruments

The measures used in this study were adapted from existing measures of subjective cognitive performance, fatigue, depression, and anxiety.

Cognitive Assessment

Subjective cognitive decline was assessed in this study using the Cognitive Failures Questionnaire (CFQ) (Appendix G) (Broadbent et al., 1982). The measure includes 25 questions rated on a 5-point scale from 0 to 4. Questions include mistakes that may be caused by failings in cognition, such as forgetting tasks, confusing directions, and losing concentration (Broadbent et al., 1982). The maximum possible score on the CFQ is 100 (Broadbent et al., 1982). In the CFQ, Rast et al. (2009) found three factors measuring forgetfulness, distractibility, and false triggering. Many researchers have agreed that the CFQ has reliable and valid factors (Wallace, 2004).

Fatigue Assessment

Both the Modified Fatigue Impact Scale (MFIS, Appendix D) (Larson, 2013; Learmonth et al., 2013; Ritvo et al., 1997) and the Fatigue Severity Scale (FSS, Appendix C) (Krupp et al., 1989; Learmonth et al., 2013) were included in the questionnaire. Both have been used to measure fatigue in long Covid and have been recommended for further research (Friedberg & Jason, 1998; LaChapelle & Finlayson, 1998; Ortelli et al., 2021). In the MFIS, participants answer 21 questions, scoring each on a 5-point scale, rated 0 to 4 (Larson, 2013; Learmonth et al., 2013). MFIS scores can range from 0 to 84 (Larson, 2013; Learmonth et al., 2013). In the FSS, participants answer 7 questions, scoring each on a 7-point scale, rates 1 to 7. FSS scores can range from 9 to 63 (Learmonth et al., 2013).

Depression Assessment

The Beck Depression Inventory II (BDI-II, Appendix E) was utilised (Beck et al., 1996). The BDI-II contains 21 questions on a four-point scale for most questions, each rated 0 to 3 (Beck et al., 1996). Two questions further differentiate between "a" and "b" options for scoring options of 1, 2, and 3 (Beck et al., 1996). However, the weighting of each option remains the same, with "a" and "b" only indicating if the symptom is an increase or reduction of a specific behaviour (Beck et al., 1996). BDI-II scores can range from 0 to 63 (Beck et al., 1996). In this study, scores on the BDI-II are simply referred to as "BDI score". An advantage of using this is that the BDI has been validated for use in the South African context (Makhubela & Mashegoane, 2015).

Anxiety Assessment

This study used the Beck Anxiety Inventory (BAI, Appendix F) (Beck et al., 1988; Viljoen et al., 2020). The BAI consists of 21 questions listing common symptoms of anxiety, rated on a 4-point scale, ranging from 0 to 3 (Beck et al., 1988). BAI scores can range from 0 to 63 (Beck et al., 1988). Scores of 21 and below are considered to indicate low anxiety, between 22 and 35 indicate moderate anxiety, and 36 and above indicate concerning levels of anxiety (Beck et al., 1988).

Data Analysis

Data collected from the study was analysed using correlation and regression in RStudio. Once data was collected it was stored digitally in a password protected folder. Data was saved in such a way that the participant's identity remained protected. An online software called "SoGoSurvey" was used to collect data, and the data was then exported electronically into an excel format and loaded into RStudio. Once the data was prepared, it was read into RStudio, "cleaned" and sorted in a way most conducive to data analysis (Wickham & Grolemund, 2017).

The data analysis report includes a table outlining participant demographics (Table 1). Thereafter, a "skim" function was run on the data to provide a concise overview of the format of the data (Wickham & Grolemund, 2017). No missing values were detected, and thus imputation was not necessary.

Descriptive statistics were calculated and presented in a table (Table 2). The data was transformed in such a way that it fits the four assumptions of multiple regression: linearity, homoscedasticity, independence, and normality, without compromising the integrity of the data (Tredoux & Durrheim, 2002). Correlations were investigated by transforming the data into a correlation matrix using the "cor()" function, and then representing the correlations between each relevant variable in a correlation heat map using the "cor.plot()" function (Tredoux & Durrheim, 2002; Wickham & Grolemund, 2017).

A linear model was then run for the long Covid group using FSS scores, MFIS scores, BDI scores, and BAI scores as predictors, and change in CFQ scores as the predicted value. Using a linear model allowed for an evaluation of predictive power of each variable, and to identify which were significant. The results then informed decisions on which predictor variables to include in subsequent models. Based on the results of the first model, adjustments were made, and another linear model was run, if necessary, until the most efficient model was reached (Tredoux & Durrheim, 2002). This analysis investigated whether or not fatigue, depression, and anxiety are predictive of subjective cognitive decline in long Covid.

A linear model of the neuropsychological aspects of long Covid participants was then be compared with a linear model of the neuropsychological aspects of participants that do not have long Covid. The same procedure was followed for the linear regression detailed above.

By comparing the output of each respective linear model, it was demonstrated how symptoms

fatigue, depression, anxiety, and subjective cognitive decline differed between participants with and without long Covid.

Ethical Considerations

Ethical approval was granted by the University of Cape Town and UCT's Health Sciences Ethics committee (REF 482/2021) (Appendix H). Participants were only included in the study once they had given consent through signing the informed consent form (Appendix B). This form serves several functions as outlined by Kazdin (1992). In addition to providing participants with an overview of the study and its purposes, the informed consent form described the procedures of the study, it discloses the potential risks and benefits of participating in the study and it informed participants of potential costs and economic considerations (such as time taken and transport costs). Additionally, the informed consent form detailed to the participants what information was kept confidential and how, what alternatives to participate in the study are, and that their participation is voluntary.

Risks and Benefits to Participants

Performance on the measures within this study did not constitute grounds for diagnosing participants, and so participants were reminded that participating in the study is not for the purposes of diagnosing them clinically. Results and recordings were stored in a password protected folder that requires two-factor authentication to be accessed. Data was be saved in such a way that participants' identities are protected.

Filling out the questionnaire does involve risks for the participants. The questionnaire asks questions about the participant's physical and mental state, as well as potentially difficult topics, such as suicidality, emotional strain, and stress. Furthermore, questions about difficulties experienced due to long Covid may lead to the participant recalling traumatic memories or reliving trauma. Lastly, the length of the questionnaire and the time it takes to fill out may have been taxing for the participant, especially those that are experiencing

fatigue due to long Covid. These risks were outlined in the informed consent form, and to lower the likelihood of potential harm arising from participation in the study, information concerning mental health resources and mental health advocacy groups were added to the informed consent form, as well as on the multiple "break pages" throughout the questionnaire.

Participants may benefit from this research in three ways. Firstly, this research has the potential to facilitate a deeper understanding of long Covid and, therefore, the development of more effective treatment solutions for people experiencing long Covid. As this study contributes to the research of long Covid, and may deepen our understanding of it and direct future research, participants are directly involved in this process. Therefore, participants have directly influenced the improvement of understanding towards, and effective treatment of, long Covid. Secondly, as long Covid has been difficult to characterise, the results of this study can provide participants with the opportunity to have their symptoms validated and recognised (Kingstone et al., 2020). Thirdly, participation in the study could provide some relief to participants as it informs participants that their symptoms are being investigated.

Results

84 participants were recruited from the post-covid infection survey. 2 (2.38%) participants were excluded as they had not had a confirmed diagnosis of COVID-19 and confirmed that they had never been infected with COVID-19. As such, they were not eligible for the long Covid group. A further 30 (35.71%) participants were excluded as they indicated they did not believe they were experiencing long Covid, and as such were not eligible for the long Covid group. The remaining 52 participants' data were used in the data analysis. No participants from the control group were excluded, and all 21 participants' data were used in the analysis. This resulted in 73 total participants. Neither group had enough participants to reach statistical power. Participants were sent a follow-up email after they completed the

survey, containing all relevant information about the study and details for resources available to them. There was no missing data for the relevant variables. As such, no participants were excluded based on missing data values.

Table 1 summarises the demographic data collected from participants. This includes age, gender, level of education, employment status, place of residence, monthly household income, and home language. The mean age for participants in the control group was 26.5 years, and 36.8 years in the long Covid group. The minimum and maximum age values of 18 years and 59 years illustrate that all participants were over the age of 18 years, and under the age of 60 years. The results show that the distribution of age is skewed towards younger participants, reflecting that most participants were from the University of Cape Town.

Table 1Sample Characteristics

	Control Group (N=21)	Long Covid Group (N=52)	Overall (N=73)
Age (Years)			
Mean (SD)	26.5 (10.1)	36.8 (14.2)	33.8 (13.9)
Median [Min, Max]	23.0 [18.0, 57.0]	40.0 [18.0, 59.0]	26.0 [18.0, 59.0]
Gender			
Female	12 (57.1%)	36 (69.2%)	48 (65.8%)
Male	8 (38.1%)	16 (30.8%)	24 (32.9%)
Non-Binary	1 (4.8%)	0 (0%)	1 (1.4%)
Education			
Completed or enrolled for a postgraduate degree	13 (61.9%)	19 (36.5%)	32 (43.8%)
Completed or enrolled for an undergraduate degree	4 (19.0%)	24 (46.2%)	28 (38.4%)
High School (Grades 8-12)	3 (14.3%)	6 (11.5%)	9 (12.3%)
Technical course or diploma equivalent	1 (4.8%)	3 (5.8%)	4 (5.5%)
Currently Employed			
No	13 (61.9%)	22 (42.3%)	35 (47.9%)
Yes	8 (38.1%)	30 (57.7%)	38 (52.1%)

	Control Group (N=21)	Long Covid Group (N=52)	Overall (N=73)
Place of Residence		·	
Cape Town	19 (90.5%)	35 (67.3%)	54 (74.0%)
Other	2 (9.5%)	17 (32.7%)	19 (26.0%)
Monthly Household Income			
R0 - R1600	2 (9.5%)	3 (5.8%)	5 (6.8%)
R1600 - R7500	3 (14.3%)	8 (15.4%)	11 (15.1%)
R7500 - R17000	1 (4.8%)	4 (7.7%)	5 (6.8%)
R17000 - R30000	3 (14.3%)	13 (25.0%)	16 (21.9%)
R30000 - R60000	7 (33.3%)	9 (17.3%)	16 (21.9%)
R60000+	5 (23.8%)	15 (28.8%)	20 (27.4%)
Home Language			
English	17 (81.0%)	42 (80.8%)	59 (80.8%)
isiXhosa	1 (4.8%)	1 (1.9%)	2 (2.7%)
Other (Please specify): Chinese	3 (14.3%)	0 (0%)	3 (4.1%)
Afrikaans	0 (0%)	2 (3.8%)	2 (2.7%)
isiZulu	0 (0%)	2 (3.8%)	2 (2.7%)
Other (Please specify): French	0 (0%)	1 (1.9%)	1 (1.4%)
Sotho	0 (0%)	2 (3.8%)	2 (2.7%)
Tswana	0 (0%)	2 (3.8%)	2 (2.7%)

Both groups show that majority of the participants were female. In the control group, the majority of participants were either enrolled in or had completed their postgraduate degrees (61.9%). However, in the long Covid group, majority of the participants were enrolled in or had completed their undergraduate degrees (46.2%). This further illustrated that most participants were university students. Employment status showed 52.1% of participants were employed, and 47.9% were not. However, this does not differentiate between full-time and part-time jobs. Majority of the participants indicated that they were living in cape town (74.0%). Monthly household income varied across all brackets, with the modal bracket being

R60000+ (27.4%). Lastly, the most spoken home language amongst participants was English (80.8%). The sample characteristics suggest that generalisability to the population is low, as data is skewed towards young, English speaking university students living in Cape town, with a medium to high monthly household income.

Table 2Descriptive Data

	Control Group (N=21)	Long Covid Group (N=52)	Overall (N=73)
FSS Score			•
Mean (SD)	33.6 (10.8)	45.8 (13.0)	42.3 (13.5)
Median [Min, Max]	33.0 [16.0, 60.0]	46.0 [16.0, 63.0]	42.0 [16.0, 63.0]
MFIS Score			
Mean (SD)	30.9 (13.5)	54.9 (15.8)	48.0 (18.6)
Median [Min, Max]	30.0 [7.00, 56.0]	56.5 [20.0, 81.0]	50.0 [7.00, 81.0]
BDI Score			
Mean (SD)	11.7 (10.3)	24.8 (11.3)	21.0 (12.5)
Median [Min, Max]	11.0 [0, 46.0]	24.5 [1.00, 54.0]	21.0 [0, 54.0]
BAI Score			
Mean (SD)	8.57 (8.70)	23.1 (13.5)	18.9 (13.9)
Median [Min, Max]	5.00 [0, 27.0]	23.0 [1.00, 53.0]	19.0 [0, 53.0]
Change in CFQ Score			
Mean (SD)	2.90 (11.1)	20.1 (20.0)	15.1 (19.5)
Median [Min, Max]	0 [-10.0, 40.0]	16.0 [-8.00, 74.0]	9.00 [-10.0, 74.0]

Note. FSS = Fatigue Severity Scale; MFIS = Modified Fatigue Impact Scale; BDI = Beck Depression Inventory; BAI = Beck Anxiety Inventory; CFQ = Cognitive Failures Questionnaire.

Fatigue severity scores had an overall mean of 42.3, which is considerably high with a maximum achievable score of 63 in the FSS measure. The long Covid group had an average score of 45.8, while the control group had an average of 33.6. The minimum FSS score across both groups was 16, maximum scores as high as 60 and 63 in the control group and long Covid group, respectively. MFIS scores show a similar trend, with an overall average of 48.0 on a measure with a maximum score of 84. The long Covid group had an average of 54.9,

while the control group had an average of 30.9, substantially lower. The long Covid group had a maximum score of 81. BDI scores had an overall mean of 21.0, which is considerably low with a maximum achievable score of 63 in the measure. The long Covid group had an average score of 24.8, while the control group had an average of 11.7. BAI scores had an overall mean of 18.9, which is considerably low with a maximum achievable score of 63 in the measure. The long Covid group had an average score of 23.1, while the control group had an average of 8.57, which is considerably lower. Change in CFQ scores had an overall mean of 15.1, which is considerably low with a maximum achievable score of 100 in the measure. The long Covid group had an average score of 20.1, while the control group had an average of 2.90, which is considerably lower. Interestingly, this is the only measure that has a minimum value that is negative, representing an increase in cognitive functioning after the participant's COVID-19 infection. The maximum score in the long Covid group is also concerningly high, at 74.0.

These findings show that the long Covid group had a higher mean, standard deviation, minimum value, and maximum value in every single measure. Thus, while the long Covid group had higher scores on average, were also more widely distributed. There is only one exception: a tie for the minimum value in FSS score (16). These findings are consistent with the findings of previous literature, showing it is likely that COVID-19 infections increase the severity of symptoms.

Analysis of Correlations

Five variables were used in data analysis for inferential statistics: FSS scores, MFIS scores, BDI scores, BAI scores, and change in CFQ scores. The change in CFQ scores was calculated as the CFQ score after a COVID-19 infection minus the estimated CFQ score before a COVID-19 infection. A correlation matrix was run in RStudio for all five variables,

specifically looking at the correlations that the first four variables had with change in CFQ score. Separate correlation matrixes were run for the long Covid group and the Control group.

Data from the long Covid group showed the following correlations: MFIS score to change in CFQ = 0.62; FSS score to change in CFQ = 0.38; BDI score to change in CFQ = 0.22; BAI score to change in CFQ = 0.26. All variables had a low or moderate positive correlation with change in CFQ, with the two highest correlations occurring from both fatigue measures. These findings suggest that an increase in each variable is likely to increase the change in CFQ score, implying a relationship between the variables. It also indicates that fatigue may have a particularly strong relationship with subjective cognitive decline. However, MFIS has a much higher correlation than FSS, implying that they measure different aspects of fatigue. All variables were investigated for multicollinearity using variance inflation factors (VIF), showing satisfactorily low VIF scores. Therefore, there is no concern that there is significant overlap in what each variable measures (Tredoux & Durrheim, 2002).

The control group correlations showed the following: FSS score to Change in CFQ = -0.28; MFIS score to change in CFQ = -0.03; BDI score to change in CFQ = 0.08; BAI score to change in CFQ = 0.23. Only the BAI score showed a low positive correlation with change in CFQ scores.

Overall, results from correlation analyses provide support that there are relationships present between fatigue, depression, anxiety, and subjective cognitive decline in the long Covid group. However, some of these relationships are weak, and bordering an indication of no relationship (correlation coefficient < 0.2). Both fatigue measures have especially high correlations to subjective cognitive decline when compared to depression and anxiety scores, showing a higher likelihood that a relationship exists. These findings are in line with the previous literature (Palmer, 2013).

Analysis Using Regression

Suitable regression models for both groups were made to further investigate the possible existence of relationships between variables, and the predictive powers of those variables for subjective cognitive decline. First, multiple regression was used for the long Covid group to predict change in CFQ scores using FSS scores, MFIS scores, BDI scores, and BAI scores as predictor variables. The model explained a total of 36.92% of variance within CFQ scores (R^2 = 0.4187; Adjusted R^2 = 0.3692). The p-value of the F-statistic was 3.152e-05, which is significant, meaning at least one predictor variable in the model is significant. These results suggest that an effective regression model is possible, but needs further refinement by removing ineffective variables. Further investigation into the p-values of each predictor variable showed the following: FSS score = 0.48; MFIS score = 5.56e-05; BDI score = 0.17; BAI score = 0.84. Only MFIS scores had a significant p-value (< 0.05), and therefore is the only predictor variable that is significant in the model.

Following this, a new regression model was created to predict change in CFQ scores using only MFIS scores. The model explained 37.48% of variance (R^2 = 0.3871; Adjusted R^2 = 0.3748). The p-value of the F-statistic also remained significant at 8.488e-07, as well as the p-value of MFIS scores at 8.49e-07. The estimate for MFIS scores is 0.79, CI [0.51, 1.07]. However, the model had a high error rate of 0.79, implying that the model may not be as competent as the R squared value suggests, as real values are quite far from the model's predicted scores. The results indicate that MFIS scores can be used to predict subjective cognitive decline with low to moderate accuracy. It is possible that, in the current sample of long Covid participants, fatigue may be driving the experience of subjective cognitive decline.

The same analysis was conducted for the control group, using all four variables as predictor variables to predict change in CFQ scores. The model explained less than 0.01% of

variance ($R^2 = 0.1323$; Adjusted $R^2 = -0.08467$). The p-value of the F-statistic was insignificant (0.66), meaning none of the predictor variables in the control group model were significant. Further investigation into the p-values of each predictor variable showed the following: FSS score = 0.38; MFIS score = 0.76; BDI score = 0.88; BAI score = 0.53. None of the predictor variables had a significant p-value (< 0.05), and therefore strengthens the above finding from the F-statistic. Due to this finding, no further analysis was conducted on the data from the control group.

In sum, findings from regression analyses suggested that there is a weak but significant relationship between MFIS scores, which can be used to predict subjective cognitive decline with low accuracy. Comparison between the regression models of the long Covid group and the control group are difficult due to the low sample size in both groups.

Discussion

The relationships between neuropsychological variables in long Covid are poorly understood, impeding our understanding of the etiology of long Covid. In order to address this issue, the current study aimed to investigate four research questions. The research questions aimed to investigate correlations between variables, concerns for multicollinearity, prediction of subjective cognitive decline using regression, and outcomes of control data using the same analyses. The study demonstrated that there are significant correlations between fatigue, depression, and anxiety with subjective cognitive decline in long Covid, with low correlation for FSS scores, BDI scores, and BAI scores, and a moderate correlation for MFIS scores. Therefore, the study demonstrates a substantial correlation (correlation coefficient > 0.2) between each neuropsychological aspect and subjective cognitive decline, implying the existence of relationships between the variables. The study also demonstrates that there are no concerns for multicollinearity between fatigue, depression, and anxiety, meaning the variables do not significantly overlap in what they measure. These findings are

consistent with previous literature, showing correlations between fatigue, depression, anxiety, and cognitive decline (Maloney et al., 2014; McDermott & Ebmeier, 2009; Palmer, 2013; Papazacharias & Nadrini, 2012).

Findings from the regression analyses suggests that a considerable amount of the variance in subjective cognitive decline can be explained by the contribution of fatigue, specifically MFIS scores. The final regression model to predict subjective cognitive decline was able to account for 37.48% of variance. However, the high error rate (0.79) is concerning, because there is high variability between actual results and predicted results (Tredoux & Durrheim, 2002). This is consistent with findings in the literature, which have established a relationship between fatigue and cognitive decline (Palmer, 2013). The regression model was significant with fatigue, depression, and anxiety present, but only MFIS scores were significant. With the removal of all variables except MFIS scores, the model fit increased, demonstrating the most efficient model exists when FSS scores, BDI scores, and BAI scores were absent. Thus, MFIS scores alone were the best measure to predict subjective cognitive decline. These results differ from the findings in the literature, which suggest a relationship between the variables (Maloney et al., 2014; McDermott & Ebmeier, 2009; Papazacharias & Nadrini, 2012). This may suggest a different relationship between variables exist in long Covid compared to previous literature. Further investigation is needed to fully understand why this is the case.

Lastly, the results indicate there is a substantial difference in the data between the long Covid group and the control group, as the control group data is shown to have sufficient differences from the long Covid group data. There is a substantial difference in means between the groups. The correlations across all neuropsychological aspects and subjective cognitive decline were much lower in the control group, and the control group data could not be used to make an effective regression model with any number of predictor variables.

However, this should be interpreted cautiously, as the sample size for the control group was not statistically significant.

The results of the study support all four hypotheses proposed in the study. The correlations between fatigue (on both measures), depression, and anxiety with subjective cognitive decline suggests that there is a specific relationship between each neuropsychological aspect and subjective cognitive decline. Furthermore, the lack of a matching substantial correlation between each neuropsychological aspect of long Covid and subjective cognitive decline in the control data could be interpreted as supporting the theory that there is an existing relationship. That in this study, multicollinearity was not found to be a cause for concern is an unusual finding, as previous literature speculated there may be overlap, particularly between fatigue and depression (Rudroff et al., 2020). The lack of significant correlations in the control group data, as well as the inability to create an effective regression model for predicting subjective cognitive decline using the control group data, both support the theory that the findings from the long Covid group data is due to long Covid, and not some other external variable. However, more rigorous research should be conducted as the study's control group was smaller than ideal. A qualitative study focusing on in-depth differences between long Covid participants and control participants may sufficiently investigate this. Notably, control group participants have been exposed to many strenuous conditions in the pandemic, yet even so, the control group data did not show substantial correlations. This may imply that the relationship between neuropsychological aspects of long Covid and subjective cognitive decline is a result of long Covid. Lastly, development of an effective regression model for predicting subjective cognitive decline shows the importance of further research into the relationships between neuropsychological symptoms of long Covid. This may be the first step in establishing a causal link between the two aspects, and directing future research towards a deeper understanding of long Covid.

The finding that FSS scores were not significant and MFIS scores were, while both measure fatigue levels, is highly interesting. Further investigation into this may improve our understanding of long Covid. It is perhaps possible that the two measures test different aspects of fatigue, or have varying levels of sensitivity. For example, a study by Amtmann et al. (2012) found that the FSS was equally as effective as the MFIS in measuring moderate levels of fatigue. However, the MFIS was more precise in the measurement of both low and high levels of fatigue, with the drawback of taking longer to complete (Amtmann et al., 2012). It is also suggested that the MFIS is better suited towards measuring cognitive fatigue than the FSS (Amtmann et al., 2012). This may explain the findings of this study, as it is reasonable to believe cognitive fatigue and cognitive decline will correlate more than physical fatigue and cognitive decline.

Limitations

The study had many limitations. All measures used were self-report measures. This raises concerns about the reliability of the data. Data may have been affected by individual response styles, which can cause some variation in self-report measures (Tempelaar et al., 2020). Second, testing was not in a controlled environment. As such, many uncontrolled external variables in the participant's environment may have affected their responses. Reduction of environmental factors may increase reliability. Third, data collection was heavily affected by the COVID-19 pandemic, which caused delays in data collection, and reduced the number of participants recruited for the study. Fourth, the low number of participants and low diversity in participant demographics is an issue. A power analysis indicated that at least 64 participants would be needed for each group. This was not reached for the long Covid group (N = 52), nor for the control group (N = 21). Thus, the total number of participants was too low, reducing generalisability to the population. The lack of diversity in place of residence and household languages (as shown in Table 1) also presents issues for

generalisability. Lastly, the study was unable to test cognition objectively, and therefore subjective data had to be relied upon. Since participants were excluded from the long Covid group if they indicated they did not believe they were experiencing long Covid, the use of objective data would eliminate this reason for exclusion, allowing for more participants.

Objective data would also allow for the elimination of participant bias, specifically response style, which would eliminate possible confounding variables (Tempelaar et al., 2020).

Despite these limitations, the study did manage to achieve many of its goals, finding substantial evidence for relationships between the neuropsychological aspects of long Covid and subjective cognitive decline. The long Covid group had enough participants to achieve statistical power, and the control group allowed for the limitation of the impact of some confounding variables. The study is also easily replicable in more favourable circumstances, allowing for more rigorous research.

Recommendations

Future research into this field should consider recruiting a larger number of participants to increase generalisability to the population, and using a blinded experimental design to infer causation instead of just causation. The measures used in this study are self-report by nature. The reliability of self-report measures in new pandemic conditions is not fully understood, and thus further investigation into the reliability of these data collection methods in pandemic conditions would help to strengthen the findings of future studies. Furthermore, in-person testing for participants would help reduce external factors affecting participant responses. A longer data collection period, and more safeguards against disruptions in data collection from the COVID-19 pandemic would also ensure a better quality of data collected.

Further investigation into the relationships between fatigue, mood, and cognitive decline is needed. This could be done by conducting an analysis of the three factors within

the CFQ: forgetfulness, distractibility, and false triggering (Broadbent et al., 1982), and how they correlate with the neuropsychological aspects of long Covid. Future studies could conduct more detailed analyses of MFIS scores by utilising its subscales of physical, cognitive, and psychosocial fatigue (Larson, 2013; Learmonth et al., 2013). While this study showed the significance of MFIS scores, it only used the overall MFIS score. Future studies could also conduct a qualitative analysis of the participants' subjective experience to investigate the relationships between neuropsychological symptoms that psychometric measures do not reflect. Lastly, as the study has shown, there was a significant difference between FSS scores and MFIS scores. This difference between the two measures of fatigue warrants further research into what causes the difference, and may be a path to deeper understanding of the relationship between fatigue and cognitive decline in long Covid.

Conclusion

This study aimed to investigate the relationships between the neuropsychological aspects of long Covid in a self-report long Covid sample. Based on a quantitative approach using quasi-experimental and correlational methods, analysis of the data from self-report measures shows that there are significant relationships between the neuropsychological aspects of long Covid. Fatigue, depression, and anxiety all have a substantial correlation with subjective cognitive decline. Furthermore, there were no concerns for multicollinearity, and only MFIS scores were significant in a regression model to predict subjective cognitive decline. Despite the control group's small sample size, the fact that similar correlations between fatigue and cognitive decline were not found emphasises that long Covid participants are experiencing something unique to them, and most likely due to long Covid. These results suggest that there may be a relationship between fatigue and subjective cognitive decline caused by long Covid.

The study was affected by many limitations, such as low number of participants, disruption from the COVID-19 pandemic, and reliance on self-report measures. The number of participants were not high enough to achieve statistical power, which weakens the strength of the study's results. Further research is needed to deepen our understanding of long Covid, and to increase our knowledge of the relationship between its neuropsychological aspects. Future studies would benefit from recruiting a larger number of participants, using objective, in-person measures, and collecting data over a longer period of time.

This study produced new knowledge on the relationships between the neuropsychological aspects of long Covid, and showed a significant relationship between fatigue and subjective cognitive decline using regression. While the study did not achieve statistical power, the results suggest a relationship exists, and this leads to further understanding of long Covid, and may direct future research. This study also provided a benefit to participants, by validating their experience of long Covid symptoms, and informing them that their symptoms are being investigated. Deepening our understanding of long Covid is key to developing therapeutic regimes for those experiencing long Covid, and this study has contributed to that process.

References

- Adams-Prassl, A., Boneva, T., Golin, M., & Rauh, C. (2020). The impact of the coronavirus lockdown on mental health: Evidence from the US. https://doi.org/10.17863/CAM.57997
- Amtmann, D., Bamer, A. M., Noonan, V., Lang, N., Kim, J., & Cook, K. F. (2012).

 Comparison of the psychometric properties of two fatigue scales in multiple sclerosis. *Rehabilitation psychology*, *57*(2), 159–166.

 https://doi.org/10.1037/a0027890
- Barnes, J. N. (2015). Exercise, cognitive function, and aging. *Advances in Physiology Education*, 39(2), 55–62. https://doi.org/10.1152/advan.00101.2014
- Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology*, *56*(6), 893-897. https://doi.org/10.1037//0022-006x.56.6.893
- Beck, A. T., Steer, R. A., & Brown, G. (1996). Beck depression inventory–II. *Psychological Assessment*.
- Boldrini, M., Canoll, P. D., & Klein, R. S. (2021). How COVID-19 affects the brain. *JAMA Psychiatry (Chicago, Ill.)*, 78(6), 682–683. https://doi.org/10.1001/jamapsychiatry.2021.050
- Broadbent, D. E., Cooper, P. F., FitzGerald, P., & Parkes, K. R. (1982). The Cognitive Failures Questionnaire (CFQ) and its correlates. *British Journal of Clinical Psychology*, 21, 1-16.
- Brown, W. A. (2005). Pseudodementia. Psychiatric Times, 22(13), 83.
- Carvalho, P. M. de M., Moreira, M. M., de Oliveira, M. N. A., Landim, J. M. M., & Neto, M. L. R. (2020). The psychiatric impact of the novel coronavirus outbreak. *Psychiatry Research*, 286, 112902–112902.

- Cohen, J. (1988). Statistical Power Analysis for the Behavioural Sciences. Academic Press:

 New York.
- Friedberg, F., & Jason, L.A. (1998). Fatigue rating scales. In Understanding chronic fatigue syndrome: An empirical guide to assessment and treatment. 65-77. American Psychological Association. https://doi.org/10.1007/s10608-020-10143-y
- Gaber, T. (2021). Assessment and management of post-COVID fatigue. *Progress in Neurology and Psychiatry*, 25(1), 36-39.
- Graham, E. L., Clark, J. R., Orban, Z. S., Lim, P. H., Szymanski, A. L., Taylor, C., DiBiase, R. M., Jia, D. T., Balabanov, R., Ho, S. U., Batra, A., Liotta, E. M., & Koralnik, I. J. (2021). Persistent neurologic symptoms and cognitive dysfunction in non-hospitalized Covid-19 "long haulers". *Annals of Clinical Translational Neurology*. https://doi.org/10.1002/acn3.51350
- Huang, C., Huang, L., Wang, Y., Li, X., Ren, L., Gu, X., Kang, L., Guo, L., Liu, M., Zhou, X., Luo, J., Huang, Z., Tu, S., Zhao, Y., Chen, L., Xu, D., Li, Y., Li, C., Peng, L., ...
 Cao, B. (2021). 6-month consequences of COVID-19 in patients discharged from hospital: A cohort study. *The Lancet*, 397(10270), 220-232.
 https://doi.org/10.1016/s0140-6736(20)32656-8
- Kamal, M., Abo Omirah, M., Hussein, A., & Saeed, H. (2020). Assessment and characterisation of post-COVID-19 manifestations. The *International Journal of Clinical Practice*, e13746. https://doi.org/10.1111/ijcp.13746
- Kazdin, A.E. (1992). Components of informed consent forms. In A.E. Kazdin, *Research Design in Clinical Psychology*. Needham Heights, MA: Allyn & Bacon.
- Kingstone, T., Taylor, A. K., O'Donnell, C. A., Atherton, H., Blane, D. N., & Chew-Graham, C. A. (2020). Finding the 'right' GP: A qualitative study of the experiences of people with long-COVID. *BJGP Open*, 4(5). https://doi.org/10.3399/bjgpopen20X101143

- Krupp, L. B., LaRocca, N. G., Muir-Nash, J., & Steinberg, A. D. (1989). The Fatigue Severity Scale: Application to patients with multiple sclerosis and systemic lupus erythematosus. *Archives of Neurology*, 46(10), 1121-1123. https://doi.org/10.1001/archneur.1989.00520460115022
- LaChapelle, D. L., & Finlayson, M. A. J. (1998). An evaluation of subjective and objective measures of fatigue in patients with brain injury and healthy controls. *Brain Injury*, 12(8), 649-659. https://doi.org/10.1080/026990598122214
- Ladds, E., Rushforth, A., Wieringa, S., Taylor, S., Rayner, C., Husain, L., & Greenhalgh, T. (2020). Persistent symptoms after Covid-19: Qualitative study of 114 "long Covid" patients and draft quality principles for services. *BMC Health Services Research*, 20(1), 1144. https://doi.org/10.1186/s12913-020-06001-y
- Larson, R. D. (2013, Spring). Psychometric properties of the modified fatigue impact scale. *International Journal of MS Care*, 15(1), 15-20. https://doi.org/10.7224/1537-2073.2012-019
- Learmonth Y. C., Dlugonski, D., Pilutti, L. A., Sandroff, B. M., Klaren, R. & Motl, R W. (2013). Psychometric properties of the Fatigue Severity Scale and the Modified Fatigue Impact Scale. *Journal of the Neurological Sciences* 331, 102–107
- Makhubela, M. S., & Mashegoane, S. (2015). Validation of the Beck Depression Inventory—
 II in South Africa: Factorial validity and longitudinal measurement invariance in
 university students. *South African Journal of Psychology*, 46(2), 203-217.
 https://doi.org/10.1177/0081246315611016
- Maloney, E. A., Sattizahn, J. R. & Beilock, S. L. (2014). Anxiety and Cognition. *WIREs COGNITIVE SCIENCE*, *5*(4), 403-411.
- McDermott, L. M. & Ebmeier, K. P. (2009). A meta-analysis of depression severity and cognitive function. *Journal of Affective Disorders*, 119(1-3), 1-8.

- Mendelson, M., Nel, J., Blumberg, L., Madhi, S. A., Dryden, M., Stevens, W., & Venter, F.
 W. D. (2020). Long-COVID: An evolving problem with an extensive impact. *S Afr Med J*, 111(1), 10-12. https://doi.org/10.7196/SAMJ.2020.v111i11.15433
- Nalbandian, A., Sehgal, K., Gupta, A., Madhavan, M. V., McGroder, C., Stevens, J. S., Cook,
 J. R., Nordvig, A. S., Shalev, D., Sehrawat, T. S., Ahluwalia, N., Bikdeli, B., Dietz,
 D., Der-Nigoghossian, C., Liyanage-Don, N., Rosner, G. F., Bernstein, E. J., Mohan,
 S., Beckley, A. A., ... Wan, E. Y. (2021, Mar 22). Post-acute COVID-19 syndrome.
 Nature Medicine. https://doi.org/10.1038/s41591-021-01283-z
- Nature Medicine. (2020). Meeting the challenge of long COVID. *Nature Medicine*, 26(12), 1803. https://doi.org/10.1038/s41591-020-01177-6
- Negrini, F., Ferrario, I., Mazziotti, D., Berchicci, M., Bonazzi, M., de Sire, A., Negrini, S., & Zapparoli, L. (2021). Neuropsychological features of severe hospitalized coronavirus disease 2019 patients at clinical stability and clues for postacute rehabilitation.
 Archives of Physical Medicine and Rehabilitation, 102(1), 155-158.
 https://doi.org/10.1016/j.apmr.2020.09.376
- Nordvig, A., & Noble, J. (2021). Post-COVID brain fog: A patient registry and cross-disciplinary approach to characterization, treatment, and etiology. *Neurology*, *96*(15).
- Ortelli, P., Ferrazzoli, D., Sebastianelli, L., Engl, M., Romanello, R., Nardone, R., Bonini, I., Koch, G., Saltuari, L., Quartarone, A., Oliviero, A., Kofler, M., & Versace, V. (2021). Neuropsychological and neurophysiological correlates of fatigue in post-acute patients with neurological manifestations of COVID-19: Insights into a challenging symptom. *Journal of the Neurological Sciences*, 420, 117271. https://doi.org/10.1016/j.jns.2020.117271
- Palmer, L. (2013). The relationship between stress, fatigue, and cognitive functioning.

 *College Student Journal, 47(2), 312-325.

- Papazacharias, A. & Nardini, M. (2012). The relationship between depression and cognitive deficits. *Psychiatria Danubina*, 24(1), 179–182.
- Rast P., Zimprich, D., Van Boxtel, M. & Jolles, J. (2009). Factor structure and measurement invariance of the cognitive failures questionnaire across the adult life span.

 *Assessment, 16(2),145-158. doi: 10.1177/1073191108324440.
- Ritvo, P. G., Fischer, J. S., Miller, D. M., Andrews, H., Paty, D., & LaRocca, N. (1997).

 Multiple sclerosis quality of life inventory: A user's manual. *New York: National Multiple Sclerosis Society*, 733.
- Rudroff, T., Fietsam, A. C., Deters, J. R., Bryant, A. D., & Kamholz, J. (2020). Post-COVID-19 fatigue: Potential contributing factors. *Brain Sciences*, *10*(12). https://doi.org/10.3390/brainsci10121012
- Sanacora, G., Mason, G. F., & Krystal, J. H. (2000). Impairment of GABAergic transmission in depression: New insights from neuroimaging studies. *Critical Reviews in Neurobiology*, *14*(1).
- Sher, L. (2021). Post-COVID syndrome and suicide risk. *QJM: monthly journal of the Association of Physicians*. https://doi.org.10.1093/qjmed/hcab007
- Small, B. J., Jim, H. S., Eisel, S. L., Jacobsen, P. B., & Scott, S. B. (2019). Cognitive performance of breast cancer survivors in daily life: Role of fatigue and depressed mood. *Psycho-oncology*, 28(11), 2174-2180.
- Stefano, G. B., Ptacek, R., Ptackova, H., Martin, A., & Kream, R. M. (2021). Selective neuronal mitochondrial targeting in SARS- CoV-2 infection affects cognitive processes to induce "brain fog" and results in behavioral changes that favor viral survival. *Medical Science Monitor*, 27.https://doi.org/10.12659/MSM.930886
- Taribagil, P., Creer, D., & Tahir, H. (2021). 'Long COVID' syndrome. *BMJ case reports*, *14*(4). https://doi.org/10.1136/bcr-2020-241485

- Tempelaar D., Rienties, B. & Nguyen, Q. (2020). Subjective data, objective data and the role of bias in predictive modelling: Lessons from a dispositional learning analytics application. *PLOS ONE*, *15*(6). https://doi.org/10.1371/journal.pone.0233977
- Theoharides, T. C., Cholevas, C., Polyzoidis, K., & Politis, A. (2021). Long-COVID syndrome-associated brain fog and chemofog: Luteolin to the rescue. *Biofactors*, 47(2), 232-241.
- Townsend, L., Dyer, A. H., Jones, K., Dunne, J., Mooney, A., Gaffney, F., O'Connor, L.,
 Leavy, D., O'Brien, K., Dowds, J., Sugrue, J. A., Hopkins, D., Martin-Loeches, I., Ni
 Cheallaigh, C., Nadarajan, P., McLaughlin, A. M., Bourke, N. M., Bergin, C.,
 O'Farrelly, ... Conlon, N. (2020). Persistent fatigue following SARS-CoV-2 infection
 is common and independent of severity of initial infection. *PLOS ONE*, *15*(11),
 e0240784. https://doi.org/10.1371/journal.pone.0240784
- Tredoux, C. & Durrheim, K. (2002). Numbers, Hypotheses & Conclusions: A Course in Statistics for the Social Sciences. UCT Press.
- Troyer, E. A., Kohn, J. N., & Hong, S. (2020). Are we facing a crashing wave of neuropsychiatric sequelae of COVID-19? Neuropsychiatric symptoms and potential immunologic mechanisms. *Brain, Behavior, and Immunity*, 87, 34–39.
- Vearncombe, K. J., Rolfe, M., Wright, M., Pachana, N. A., Andrew, B., & Beadle, G. (2009).

 Predictors of cognitive decline after chemotherapy in breast cancer patients. *Journal of the International Neuropsychological Society: JINS*, 15(6), 951.
- Versace, V., Sebastianelli, L., Ferrazzoli, D., Romanello, R., Ortelli, P., Saltuari, L., D'Acunto, A., Porrazzini, F., Ajello, V., Oliviero, A., Kofler, M., & Koch, G. (2021). Intracortical GABAergic dysfunction in patients with fatigue and dysexecutive syndrome after COVID-19. *Clinical Neurophysiology*, 132(5), 1138-1143. https://doi.org/10.1016/j.clinph.2021.03.001

- Viljoen, M., Benecke, R. M., Martin, L., Adams, R. C. M., Seedat, S., & Smith, C. (2020).
 Anxiety: An overlooked confounder in the characterisation of chronic stress-related conditions? *PLOS ONE*, 15(4), e0230053–e0230053.
 https://doi.org/10.1371/journal.pone.0230053
- Wallace, J. C. (2004). Confirmatory factor analysis of the cognitive failures questionnaire: evidence for dimensionality and construct validity. *Personality and Individual Differences*, *37*(2), 307-324. https://doi.org/10.1016/j.paid.2003.09.005
- Wickham, H., Grolemund, G. (2017). *R for Data Science: Import, Tidy, Transform, Visualize,* and Model Data (1st ed.). O'Reilly. https://r4ds.had.co.nz/
- Wilson, B. A., Betteridge, S., & Fish, J. (2020). Neuropsychological consequences of Covid-19. *Neuropsychological Rehabilitation*, *30*(9), 1625-1628. https://doi.org/10.1080/09602011.2020.1808483
- Xu, M. Y., & Wong, A. H. (2018). GABAergic inhibitory neurons as therapeutic targets for cognitive impairment in schizophrenia. *Acta Pharmacologica Sinica*, 39(5), 733-753.

Appendices

Appendix A

Recruitment Advertisement

DID YOU RECOVER FROM COVID? HAVE YOU STILL NOT RECOVERED FROM COVID?





Participants must:

- Be between 18 and 60 years of age
- Be living in South Africa
- NOT Be currently diagnosed with any cognitive or developmental impairment, central nervous system disease, neurological damage, or other neuropathy

Contact us at: longcoviduct@gmail.com

OR send a message to Altay (084 244 0044), Maddy, (072 044 9220), or Arjun (076 150 8206)

Appendix B

Informed Consent Form

Participant Information Sheet and Informed Consent Form

This Informed Consent Form is for those who are invited to participate in research on the psychological symptoms of long COVID

Name of Organization: University of Cape Town (UCT)

Names of Study leaders: M Ashton (UCT), A Maharaj (UCT), A Y Turan (UCT), Prof M Solms (UCT), Dr D

Minné (CPUT)

Name of Project proposal: A Study Investigating the Role of Fatigue and Depression in the Experience of

Cognitive Disturbances in Long Covid Sufferers

The Informed Consent Form has two sections:

- Information Sheet (to share information about the research with you)
- Certificate of Consent (for signatures if you agree to take part)

You will be given a copy of the full Informed Consent Form

Section I: Information Sheet

Introduction

We are a team of researchers studying the long-term effects of the COVID-19 Virus. This form gives you information about the study and what kinds of questions and activities you will be requested to respond to and perform. There may be some words that you do not understand. Please ask the researcher with you to stop as you go through the information and they will take time to explain it. If you have questions later, please ask any member of the study team present here today.

Purpose of the research

The purpose of this research is to characterise and investigate the psychological symptoms that long COVID patients present with. The data generated from this study will allow healthcare practitioners and family members to improve the rehabilitation, care, and support for those who still suffer from the effects of COVID long after the projected recovery period.

Type of Research Intervention

This research involves an electronic questionnaire recording your demographic information and severity of initial COVID infection. An administrator will then request you to complete a series of cognitive assessments, which will be a mixture of mental exercises and pen-and-paper tasks, which will need you to listen and respond to various questions. Finally, you will be requested to answer a series of questionnaires on how you are feeling. There will be a break between each of the aforementioned exercises

Participant selection

To participate in this study, we are inviting adults who meet the following criteria:

- are between 18 and 60 years of age
- had a confirmed diagnosis of COVID-19
- experiencing issues with fatigue, after recovery period of COVID
- have attended a post-COVID clinic or other professional medical institute due to fatigue issues
- have not been diagnosed with neuropathy, neurological disorders, central nervous system disorders, developmental disorders, or cognitive disorders.

Section II: Certificate of Consent

Declaration by study participant:

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions that I have asked to have been answered to my satisfaction. I consent voluntarily to participate as a participant in this research. I may choose to leave this study at any time and shall not be penalised or prejudiced in any way. I may be asked to leave the study before it has finished if the study doctor or study leader feels it is in my best interest or if I do not follow the study plan as agreed to.

Print Name of Participant	
Signature of Participant	
Date	Place
Signature of witness	_
Declaration by investigator:	
and took adequate time to answer them. I am satisfied th	iment to the study participants and encourage them to ask questions at he/she adequately understands all aspects of the research study interpreter is used the interpreter must sign the declaration below).
Print Name of InvestigatorSignature of Investigator	
Date	Place
Signature of witness	_
Declaration by interpreter:	
medium of Afrikaans/Xhosa. We encouraged him/her to	aformation in this document to the participant using the language ask questions and took adequate time to answer them. I conveyed satisfied that the participant fully understands the content of this lall his/her questions satisfactorily answered.
Print Name of InterpreterSignature of Interpreter	
Date	Place
Signature of witness	_
Thumb print of participant	

Appendix C

Fatigue Severity Scale (FSS) (adapted from Krupp et al., 1989)

Participant Number

Date:	Participant Number:
Read and Circle a Number	Strongly Disagree -> Strongly Agree
My motivation is lower when I am	1, 2, 3, 4, 5, 6, 7
fatigued.	
2. Exercise brings on my fatigue.	1, 2, 3, 4, 5, 6, 7
3. I am easily fatigued.	1, 2, 3, 4, 5, 6, 7
4. Fatigue interferes with my physical	1, 2, 3, 4, 5, 6, 7
functioning.	
5. Fatigue causes frequent problems for	1, 2, 3, 4, 5, 6, 7
me.	
6. My fatigue prevents sustained	1, 2, 3, 4, 5, 6, 7
physical functioning.	
7. Fatigue interferes with carrying out	1, 2, 3, 4, 5, 6, 7
certain duties and responsibilities.	
8. Fatigue is among my most disabling	1, 2, 3, 4, 5, 6, 7
symptoms.	
9. Fatigue interferes with my work,	1, 2, 3, 4, 5, 6, 7
family, or social life	

The FSS is a questionnaire that measures your fatigue levels. It consists of nine statements that refer to the experience you may have with fatigue. Please read each statement, consider if it applies to you, and then circle a number from 1 to 7 according to how accurately you believe it describes your fatigue over the past seven days, and the extent that you agree or disagree with the statement's description of your fatigue. A low value (for example, 1) reflects strong disagreement, whereas a high value (e.g., 7) reflects strong agreement. You must circle a number for every statement.

The Fatigue Severity Scale Key:

Date:

A Summated score lower than 36 suggests that the respondent may not suffer from fatigue.

A summated score of 36 and higher suggests that the respondent may require an evaluation by a physician.

Appendix D

Modified Fatigue Impact Scale (adapted from Ritvo et al., 1997, and

https://www.sralab.org/rehabilitation-measures/modified-fatigue-impact-scale)

The MFIS is a questionnaire designed to evaluate how your fatigue has affected your experience. Please read the statements, and then circle the number which best reflects how regularly fatigue has impacted you in this way, over the past four weeks. If you require assistance with writing your response, inform the administrator of the appropriate number. It is required to answer every question. If unsure of which answer to select, base your final choice of which one best describes your experience. Please inform the administrator if you do not understand any aspects of the statements.

Because of my fatigue during the past 4 weeks:

		Never	Rarely	Sometimes	Often	Almost	
18.	My thinking has been slowed down.	0	1	2	3	4	
19.		0	1	2	3	4	
20.	I have limited my physical activities.	0	1	2	3	4	
21.	I have needed to rest more often or for longer periods.	0	1	2	3	4	
٥.	I have been forgettur.	v	1	4	J	4	
6.	I have had to pace myself in my physical activities.	0	1	2	3	4	
7.	I have been less motivated to do anything that requires physical effort.	0	1	2	3	4	
8.	I have been less motivated to participate in social activities.	0	1	2	3	4	
9.	I have been limited in my ability to do things away from home.	0	1	2	3	4	
10.	I have trouble maintaining physical effort for long periods.	0	1	2	3	4	
11.	I have had difficulty making decisions.	0	1	2	3	4	
12.	I have been less motivated to do anything that requires thinking	0	1	2	3	4	
13.	My muscles have felt weak	0	1	2	3	4	
14.		0	1	2	3	4	
15.	I have had trouble finishing tasks that require thinking.	0	1	2	3	4	
16.	I have had difficulty organizing my thoughts when doing things at home or at work.	0	1	2	3	4	
17.	I have been less able to complete tasks that require physical effort.	0	1	2	3	4	

Instructions for Scoring the MFIS

Items on the MFIS can be aggregated into three subscales (physical, cognitive, and psychosocial), as well as into a total MFIS score. All items are scaled so that higher scores indicate a greater impact of fatigue on a person's activities.

Physical Subscale

This scale can range from 0 to 36. It is computed by adding raw scores on the following items: 4+6+7+10+13+14+17+20+21

Cognitive Subscale

This scale can range from 0 to 40. It is computed by adding raw scores on the following items: 1+2+3+5+11+12+15+16+18+19

Psychosocial Subscale

This scale can range from 0 to 8. It is computed by adding raw scores on the following items: 8+9

Total MFIS Score

The total MFIS score can range from 0 to 84. It is computed by adding scores on the physical, cognitive, and psychosocial subscales.

Appendix E

Beck Depression Inventory-II (adapted from Beck et al., 1996)

This questionnaire has 21 groups of statements. Please read each statement carefully, before selecting out the one statement in each group which most appropriately describes the way you've felt over the past two weeks, including today. If multiple statements apply to your experience, pick the one that has the highest number in the relevant group. Do not choose multiple answers for any group, including item 16 (sleep pattern changes), or item 18 (Changes in Appetite)

1. Sadness

- 0. I do not feel sad.
- 1. I feel sad much of the time.
- 2. I am sad all the time.
- 3. I am so sad or unhappy that I can't stand it.

2. Pessimism

- 0.I am not discouraged about my future.
- 1.I feel more discouraged about my future than I used to.
- 2. I do not expect things to work out for me.
- 3. I feel my future is hopeless and will only get work

3. Past Failure

- 0. I do not feel like a failure.
- 1. I have failed more than I should have.
- 2. As I look back, I see a lot of failures.
- 3. I feel I am a total failure as a person.

4. Loss of Pleasure

- 0. I get as much pleasure as I ever did from the things I enjoy.
- 1. I don't enjoy things as much as I used to.
- 2. I get very little pleasure from the things I used to enjoy.
- 3. I can't get any pleasure from the things I used to enjoy.

5. Guilty Feelings

- 0. I don't feel particularly guilty.
- 1. I feel guilty over many things I have done or should have done.

- 2. I feel quite guilty most of the time.
- 3.I feel guilty all of the time.

6. Punishment Feelings

- 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. Self-Dislike

- 0.I feel the same about myself as ever.
- 1.I have lost confidence in myself.
- 2.I am disappointed in myself.
- 3.I dislike myself.

8. Self-Criticalness

- 0. I don't criticize or blame myself more than usual.
- 1. I am more critical of myself than I used to be.
- 2. I criticize myself for all of my faults.
- 3.I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes

- 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. Crying

- 0.I don't cry anymore than I used to.
- 1.I cry more than I used to.
- 2.I cry over every little thing.
- 3.I feel like crying, but I can't.

11. Agitation

- 0.I am no more restless or wound up than usual
- 1.I feel more restless or wound up than usual.
- 2.I am so restless or agitated, it's hard to stay still.
- 3.I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest

- 0.I have not lost interest in other people or activities.
- 1. I am less interested in other people or things than before.

- 2. I have lost most of my interest in other people or things.
- 3. It's hard to get interested in anything.

13. Indecisiveness

- 0.I make decisions about as well as ever.
- 1.I find it more difficult to make decisions than usual.
- 2.I have much greater difficulty in making decisions than I used to.
- 3.I have trouble making any decisions.

14. Worthlessness

- 0.I do not feel I am worthless.
- 1. I don't consider myself as worthwhile and useful as I used to.
- 2.I feel more worthless as compared to others.
- 3.I feel utterly worthless.

15. Loss of Energy

- 0.I have as much energy as ever.
- 1.I have less energy than I used to have.
- 2.I don't have enough energy to do very much.
- 3.I don't have enough energy to do anything.

16. Changes in Sleeping Pattern

- 0.I have not experienced any change in my sleeping.
- 1a I sleep somewhat more than usual.
- 1b I sleep somewhat less than usual.
- 2a I sleep a lot more than usual.
- 2b I sleep a lot less than usual.
- 3a I sleep most of the day.
- 3b I wake up 1-2 hours early and can't get back to sleep.

17. Irritability

- 0.I am not more irritable than usual.
- 1.I am more irritable than usual.
- 2.I am much more irritable than usual.
- 3.I am irritable all the time.

18. Changes in Appetite

- 0.I have not experienced any change in my appetite.
- 1a My appetite is somewhat less than usual.
- 1b My appetite is somewhat greater than usual.
- 2a My appetite is much less than before.
- 2b My appetite is much greater than usual.

- 3a I have no appetite at all.
- 3b I crave food all the time.

19. Concentration Difficulty

- 0.I can concentrate as well as ever.
- 1.I can't concentrate as well as usual.
- 2.It's hard to keep my mind on anything for very long.
- 3. I find I can't concentrate on anything

20. Tiredness or Fatigue

- 0.I am no more tired or fatigued than usual.
- 1.I get more tired or fatigued more easily than usual.
- 2.I am too tired or fatigued to do a lot of the things I used to do.
- 3.I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex

- 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 am much less interested in sex now.
- 3.I have lost interest in sex completely.

Total	Score:
1 Otal	Score.

Appendix F

Beck Anxiety Inventory (adapted from Beck et al., 1988)

This questionnaire is designed to measure how you've been feeling over the past week, including today. Please rate how much you have been bothered by each symptom, on a 4-point scale where 0 represents *Not at all*, to 3 representing, *Severely -I could barely stand it*.

Item	Rating			
1.) Numbness or tingling	0	1	2	3
2.) Hands trembling	0	1	2	3
3.) Feeling hot	0	1	2	3
4.) Shaky	0	1	2	3
5.) Wobbliness in legs	0	1	2	3
6.) Fear of losing control7.) Unable to relax8.) Difficulty breathing	0	1	2	3
	0	1	2	3
	0	1	2	3
9.) Fear of the worst happening	0	1	2	3
10.) Fear of dying	0	1	2	3
11.) Dizzy or lightheaded	0	1	2	3
12.) Scared	0	1	2	3
13.) Heart pounding or racing	0	1	2	3

14.) Indigestion or discomfort in abdomen	0	1	2	3
15.) Unsteady	0	1	2	3
16.) Faint	0	1	2	3
17.) Terrified	0	1	2	3
18.) Flushed	0	1	2	3
19.) Nervous	0	1	2	3
20.) Sweating (not due to heat)	0	1	2	3
21.) Feelings of choking	0	1	2	3

Appendix G

Cognitive Failures Questionnaire (adapted from Broadbent et al., 1982)

The following questions are about minor mistakes which everyone makes from time to time, but some of which happen more often than others.

We want to know how often these things have happened to you *in the past 6 months*.

Please use the following scale:

0	1	2	3	4
Never	Very Rarely	Occasionally	Quite Often	Very Often

		Rating
1.	Do you read something and find you haven't been thinking about it and must read it again?	
2.	Do you find you forget why you went from one part of the house to the other?	
3.	Do you fail to notice signposts on the road?	
4.	Do you find you confuse right and left when giving directions?	
5.	Do you bump into people?	
6.	Do you find you forget whether you've turned off a light or a fire or locked the door?	
7.	Do you fail to listen to people's names when you are meeting them?	
8.	Do you say something and realize afterwards that it might be taken as insulting?	
9.	Do you fail to hear people speaking to you when you are doing something else?	
10.	Do you lose your temper and regret it?	
11.	Do you leave important letters unanswered for days?	

12.	Do you find you forget which way to turn on a road you know well but rarely use?	
13.	Do you fail to see what you want in a supermarket (although it's there)?	
14.	Do you find yourself suddenly wondering whether you've used a word correctly?	
15.	Do you have trouble making up your mind?	
16.	Do you find you forget appointments?	
17.	Do you forget where you put something like a newspaper or a book?	
18.	Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket?	
19.	Do you daydream when you ought to be listening to something?	
20.	Do you find you forget people's names?	
21.	Do you start doing one thing at home and get distracted into doing something else (unintentionally)?	
22.	Do you find you can't quite remember something although it's "on the tip of your tongue"?	
23.	Do you find you forget what you came to the shops to buy?	
24.	Do you drop things?	
25.	Do you find you can't think of anything to say?	

Scoring the Scale

The CFQ was developed by Broadbent et al. (1982) -- yes, the same Broadbent who proposed the filter theory of attention -- to assess the frequency with which people experienced cognitive failures, such as absent-mindedness, in everyday life -- slips and errors of perception, memory, and motor functioning. The most straightforward way to score the scale is simply to sum up the ratings of the 25 individual items, yielding a score from 0-100.

Scores on the scale predict episodes of absent-mindedness in both the laboratory and everyday life, including slow performance on focused attention tasks, traffic and work accidents, and forgetting to save one's data on the computer.

A study by Rast et al. (2008) indicates that the CFQ items load on three different factors. Summing scores across the relevant items will yield subscale scores representing these dimensions of forgetfulness:

- ◆Forgetfulness (Items 1, 2, 5, 7, 17, 20, 22, and 23): "a tendency to let go from one's mind something known or planned, for example, names, intentions, appointments, and words".
- ◆Distractibility (Items 8, 9, 10, 11, 14, 19, 21, and 25): "mainly in social situations or interactions with other people such as being absentminded or easily disturbed in one's focused attention".
- ◆ False Triggering (Items 2, 3, 5, 6, 12, 18, 23, and 24): "interrupted processing of sequences of cognitive and motor actions".

Appendix H

Ethics Approval Letter



UNIVERSITY OF CAPE TOWN Faculty of Health Sciences Human Research Ethics Committee



Room G50- Old Main Building Groote Schuur Hospital Observatory 7925 Telephone [021] 406 6492 Email: hrec-enquiries@uct.ac.za

Website: www.health.uct.ac.za/fhs/research/humanethics/forms

01 October 2021

HREC REF: 482/2021

Prof M Solms
Department of Psychology
PD Hahn BuildIng-UCT
Email: Mark.solms@uct.ac.za
Student: Trnalt001@myuct.ac.za

Dear Prof Solms

PROJECT TITLE: A MIXED METHODS INVESTIGATION OF THE MENTAL ASPECTS OF POST-COVID/LONG COVID FATIGUE (MASTER'S DEGREE - MR ALTAY TURAN)

Thank you for your response letter, addressing the Issues raised by the Faculty of Health Sciences Human Research Ethics Committee (HREC).

It is a pleasure to inform you that the HREC has formally approved the above-mentioned study.

This approval is subject to strict adherence to the HREC recommendations regarding research involving human participants during COVID -19, dated 17 March 2020: 06 July 2020 & 01 July 2021.

Approval is granted for one year until the 30 October 2022.

Please submit a progress form, using the standardised Annual Report Form if the study continues beyond the approval period. Please submit a Standard Closure form if the study is completed within the approval period.

(Forms can be found on our website: www.health.uct.ac.za/fhs/research/humanethics/forms)

The HREC acknowledge that the student: Mr Altay Turan will also be involved in this study.

Please quote the HREC REF 482/2021 in all your correspondence.

Please note that the ongoing ethical conduct of the study remains the responsibility of the principal investigator.

Please note that for all studies approved by the HREC, the principal investigator <u>must</u> obtain appropriate institutional approval, where necessary, before the research may occur.

Yours sincerely

PROFESSOR M BLOCKMAN

CHAIRPERSON, FACULTY OF HEALTH SCIENCES HUMAN RESEARCH ETHICS COMMITTEE

HREC/REF 482/2021sa

Federal Wide Assurance Number: FWA00001637.
Institutional Review Board (IRB) number: IRB00001938

NHREC-registration number: REC-210208-007

This serves to confirm that the University of Cape Town Human Research Ethics Committee compiles to the Ethics Standards for Clinical Research with a new drug in patients, based on the Medical Research Council (MRC-SA), Food and Drug Administration (FDA-USA), International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use: Good Clinical Practice (ICH GCP), South African Good Clinical Practice Guidelines (DoH 2006), based on the Association of the British Pharmaceutical Industry Guidelines (ABPI), and Declaration of Helsinki (2013) guidelines. The Human Research Ethics Committee granting this approval is in compilance with the ICH Harmonised Tripartite Guidelines E6: Note for Guidance on Good Clinical Practice (CPMP/ICH/135/95) and FDA Code Federal Regulation Part 50, 56 and 312.

Appendix I

Long Covid Group Questionnaire

* Required Information

Long Covid Online Questionnaire: Consent Form

We are a team of researchers studying the long-term effects of the COVID-19 Virus. The overall purpose of this research is to characterise the mental aspects of fatigue that those with Long Covid present with. This questionnaire seeks to collect important data about your fatigue, emotional state, cognitive levels and understand whether you may have Long Covid symptoms. All mandatory questions only require you to select an option or one-word answer. Additionally, this survey will assess your eligibility for a second phase of research. It should take a maximum of 35 minutes to complete and it is likely you will finish far sooner. We have inserted break pages between sections for your convenience. You may use these break pages as an opportunity to take a break, or take a break at any point during the survey; as long as you keep the browser tab open, and return to the survey within an hour your data will be retained.

There are risks involved with the questionnaire, as there are questions on mental health that will ask about suicidality, emotional strain, and stress. There are also questions on your overall physical and mental state. Additionally, there are optional open-ended questions where we ask about your Long Covid experience, which may lead to recalling traumatic memories. We have left our email contact at the bottom of this consent form; please email us if you experience distress while answering this questionnaire. We have also inserted links and contacts for mental health advocacy groups that can provide counselling at the end of this form and throughout the questionnaire.

This questionnaire will record some important data for this study, including your demographic information. Additionally, we will need your contact details to send you a de-briefing email, and so that we can recruit you for the second phase of the study if eligible. None of this information will be disclosed to any person outside of this study. At study completion, records shall also be stored in a two-factor authenticated drive, only accessible to researchers.

In the next few days after you complete the survey, you will receive a de-briefing email thanking you for your participation, with a list of support contacts and a reiteration of the rationale of the study, and an invite to participate in the next phase of research if eligible. If you do submit a response on this survey, you will also receive an aggregation of the research findings early next year once the findings have been analysed. After this point, your contact information shall be removed from our database.

To start the survey, please give your consent below, and confirm that you meet the eligibility criteria. This is not binding - you may choose to stop the questionnaire at any time. The next section will then record biographic and demographic information before beginning the questionnaire. If any of this is unclear, please contact us at the email addresses listed below. Thank you for your time.

Best Altay Yuce Turan Donné Minné Madeleine Ashton Arjun Maharaj

Email Contacts:

donneminne.za@gmail.com - Dr Donné Minné

trnalt001@myuct.ac.za - Altay Yuce Turan

Mental Health Referrals:

If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadag.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline 0800 70 80 90

ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline 0800 12 13 14 SMS 32312

Suicide Crisis Line 0800 567 567 SADAG Mental Health Line
011 234 4837

Akeso Psychiatric Response Unit 24 Hour
0861 435 787

Cipla Whatsapp Chat Line
(9am-4pm, 7 days a week)
076 882 2775

24 hour Healthcare Workers Care Network Helpline
0800 21 21 21
SMS 43001

NPOWERSA Helpline

0800 515 515 SMS 43010

* 1. I confirm that I... (Select all that apply)

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

The integral integral control for shadepeak. The file may been been moved, makened, or shadepeak. Or shadepeak.	Am between the age of 18 and 60 years old	
The treat of stage of the stage	Had a confirmed diagnosis of COVID-19	
The street in the street of th	Am not currently diagnosed with neuropathy, neurological disorders, central ne	ervous

* 2. I am not currently diagnosed with neuropathy, neurological disorders, central nervous system disorders, developmental disorders or cognitive disorders. Examples of such diagnoses include but are not limited to a diagnosis of: Alzheimer's disease, dementia, brain damage (caused either by a stroke or a traumatic head injury), intellectual disabilities, autism, a recent diagnosis of Major Depressive Disorder, fetal alcohol syndrome, or epilepsy. (Select one option)

Programma in dispersion in the state of the

* 3. I have read the above, and I agree to my data and contact information being recorded for the purposes of this study (Select one option)

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The Indical Integrations of Option C Str. Follow Tol Social Research of Indicates Vision Line Line Water Line Line	- DESCRIPTION -

Biographic Information

* 4. What is your full (legal) name? (First name(s) Surname)
5. What is your student number, if applicable? (Necessary for UCT SRPP)
* 6. What is your phone number?
* 7. What is your e-mail address?
* 8. Do you know what test confirmed your COVID-19 diagnosis? (Select one option) Nose swab Laboratory test (serotology) Other (Please specify)
* 9. Are you currently taking any of the following medications? (Check all that apply) I am not taking any medication Antidepressants (e.g. Zoloft, Prozac, Sarafem, Celexa, Paxil, Brisdelle, Pexeva, Lexapro, Luvox, Viibryd) Anti-anxiety medication (e.g. Alzam, Azor, Xanax, Zopax, Lexotan) Allergy medication (e.g. antihistamines) Blood pressure medication Other (Please specify)

Demographic Information

This section of the questionnaire records some important demographic information - please answer to the best of your ability. All data is strictly confidential.

* 10. How old are you?
* 11. Which of the following best describes your gender? (Select one option)
Female
Male Male
Non-Binary
Other (Please specify)
* 12. What level of education have you received? (Choose the highest level you have received) (Select one option) Preparatory School (Grades 1-7)
High School (Grades 8-12)
Completed or enrolled for an undergraduate degree
Completed or enrolled for a postgraduate degree
Technical course or diploma equivalent
reclinical course of dipionia equivalent
* 13. Are you currently employed? (Select one option)
Yes
Formal and the second s
* 14 Where do you live? (Select one ention)
* 14. Where do you live? (Select one option)
Cape Town
Other (Please specify)

*	15	What is your estimated monthly household income? (Select one option)
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*	16	What is your home language (Select one option)
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	The tribude many control for displayed. This the think shoul has meanly manual or address. Venly that the line.	Venda
	The straight and the straight of the straight	Other (Please specify)
1	7. \	Which languages are you fluent in?
	The brised recognition of the brised recognition of the brised based recognition of the brised based of the brised based of the brised based based by the brised based by the brised based based by the brised based based by the brised based b	Afrikaans
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	The british intoje classed in displayed, the first Nation (Inc. the control of the classes), or distinct (arrely that the left t	isiZulu
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	The White Connect to department. The file has been been been been been been been bee	Pedi
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	The brings image cannot be departed. The fire may have the may have the may have promoted, or commend,	Swati
	The brisis of the beautiful for the beautiful fo	Tsonga
	The brisel image cannot be displayed. The fit has blood book from the bo	Tswana

F the Wall in Figure creat the specials. The same in the special is the special in the special is the special in the special i

Other (Please specify)

Page 3 of 9

* 18. Would you like to continue? The next questions will ask about your fatique and cognition. Keep in mind that you can leave the tab open and return to the surve within an hour and your data will be saved.

You are under no obligation to continue if you do not want to. We appreciate your participation.

(Select one option)



If you are experiencing any distress while answering the questionnaire, please contact the researchers at the email addresses listed below:

Donné Minné Donneminne.za@gmail.com

Altay Turan trnalt001@myuct.ac.za

If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadag.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

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We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

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ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline

0800 12 13 14

SMS 32312

Suicide Crisis Line

0800 567 567

SADAG Mental Health Line

011 234 4837

Akeso Psychiatric Response Unit 24 Hour

0861 435 787

Cipla Whatsapp Chat Line

(9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21

SMS 43001

NPOWERSA Helpline

0800 515 515

SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

Fatigue Screening Part One

Please read the statement, and select the most appropriate response. The first test consists of nine statements that refer to the experience you may have with fatigue.

Please read each statement, consider if it applies to you, and then circle a number from 1 to 7 according to how accurately you believe it describes your fatigue over the past seven days, and the extent that you agree or disagree with the statement's description of your fatigue. A low value (for example, 1) reflects strong disagreement, whereas a high value (e.g., 7) reflects strong agreement. You must circle a number for every statement.

1 represents strongly disagree, and 7 represents strongly agree

19. Select only one answer per question.								
	1 (Strongly Disagree)	2 3 4 5 6	7 (Strongly Agree)					
*(a) My motivation is lower when I am fatigued.	F To be been a reason of the r	F	P The State of the					
*(b) Exercise brings on my fatigue.	The trace of the control of the cont	The Name of Section	The state of the s					
*(c) I am easily fatigued.	F The Should The State of the	F has based on promoting the company months of the company months	F The dead of the count of the					
*(d) Fatigue interferes with my physical functioning.	The based of the state of the s	The based of the b	P requests (P requests) (P requ					
*(e) Fatigue causes frequent problems for me.	F bearing Compared to the com	To be seed of the content of the c	F Nomenous Contraction of Contractio					
*(f) My fatigue prevents sustained physical functioning.	F Branch of Control of	Transfer	P States of the Control of the Contr					
*(g) Fatigue interferes with carrying out certain duties and responsibilities.	The hands of the state of the s	F NAME. F NAME. F NAM	F Anthrop Control of the Control of					
*(h) Fatigue is among my most disabling symptoms.	F Bandwar Charles Comment	The State of the Control of the Co	P Statement of Sta					
*(i) Fatigue interferes with my work, family or social life.	F No Section Conference on Con	F Andrey F A	Francisco					

Fatigue Screening Part Two

20. The MFIS (Modified Fatigue Impact Scale) is a questionnaire designed to evaluate how fatigue has affected your experience. Please read the statements, and then circle the number which best reflects how regularly fatigue has impacted you in this way, over the past four weeks. Please select ONE response per row

*(a) I have been less alert.	Never	Rarely Francisco to the street of the stree	Sometimes The state of the sta	Often	Almost Always
*(b) I have had difficulty paying attention for long periods of time.	Figure 1 and a second of the s	The body control to the control to t	To have any control of the control o	To be been for the property of	The state of the s
*(c) I have been unable to think clearly.	The heard groups count for groups count for groups count for the sea hear secretal and processed and processed processed and processed proces	The behalf of the control of the con	The state of the s	The black ample control for declared. The declared. The forecast of the seasons ample control ample	F washed to go on the board of
*(d) I have been clumsy and uncoordinated.	The below in programme for shadows. The shadows. The shadows is the shadows in th	The bilest integer accords for displayed, The bilest integer accords for displayed, The billstone of the displayed, The billstone of the bills	To his breast and improved the company of the compa	The blade improved the department of the departm	The base of the control of the contr
*(e) I have been forgetful.	The fellowing impagramme is an simple of the designed. The files rais share soon should, sharings or owners, world over the file.	To the ideast incape carmed for displayed. The based related, to the carmed and opposited, or opposited, or other face for	The featured in the control of the c	The final impercay and for displayed, The first right from Coch final for the first right from Coch final coch final coch final coch final coch final coch final f	To be found the state of the st
*(f) I have had to pace myself in my physical activities.	The beautiful properties of the control for control for control for the contro	The black is supplied to the distribution of t	To the broad in the property of the property o	The blad important be displayed in the d	The based of the property of t
*(g) I have been less motivated to do anything that requires physical effort.	To be been any management of the state of th	F Yes brief to the property of	To The Market of the State of t	The best of the second of the	The way
*(h) I have been less motivated to participate in social activities.	The bound in the property of the bound in the property of the first the property of the proper	The bridge of the control for department for department for the control for the control for the control for the control for department for department for department for the control for the c	The street of th	The short of the s	To have been a compared to the
*(i) I have been limited in my ability to do things away from home.	F The below companional for the property of the Section of the Section One Account control of control of control of control of control of	The behalf integer cannot be the control of the th	To the beard in contract to the contract to th	The below to be the control of the c	F two bear control of the control of
*(j) I have trouble maintaining physical effort for long periods.	The facility of the property o	The felial improvement by the property of the	To the bear in a second of the	The level of the level of the level of the state of the s	The state of the s
*(k) I have had difficulty making decisions.	The beard to conjugate the state of the stat	The below image cannot be designed. The second of the contract of the second of the contract, responded, or designed for the second of the contract designed of the contract of the second of the contract of the second of the contract of the second of the contract of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the second of the contract of the contract of the contract of the contract of the second of the contract o	The based of the second of the	The bland in the property of the bland in the property of the displaced. The displaced is the property of the	(F) The black of contract of the contract of t
*(I) I have been less motivated to do anything that requires thinking.	The board of the property of the state of th	The beautiful control of the control of cont	The state of the s	The behalf of th	To design the second se
*(m) My muscles have felt weak.	The latest many count to depend to depend to depend the dependent that the latest term to the latest terminal resources or dependent to the latest terminal to depend the latest terminal to depend the latest terminal ter	The bridge of the country of the cou	The West of the story connect to the story connect	The tribud maps, count for coloured. The file has have been meanly reasonal, or selected, soully fold for the total or to the selected of the property of the total	F me States From Control to replaced from states and states an
*(n) I have been physically uncomfortable.	The final in the property of t	The block of the b	To the stand of th	The West State of Sta	The Northead Control of the Control
*(o) I have had trouble finishing tasks that require thinking.	The federal supportunities for the	The brief of the state of the s	To the stand of standard to st	5" The Initial Initi	F Townson Contact to Contact
*(p) I have had difficulty organizing my thoughts when doing things at home or at work.	The letters of the state of the	To this lease to long parameter to the control of t	To have the second of the seco	To the bease in comparison to the comparison to	Parameter and the second secon
*(q) I have been less able to complete tasks that require physical effort.	The letters of the state of the	F you have been considered to the constraint of	F To be been considered to the constant of the	To the beast interpretation of the control of the c	F Name of the control
*(r) My thinking has been slowed down.	The below interpretation for the part of the part of the part of the part of the part of the part of described, described, while described with	The least from the property of the least from the l	The based of the property of the second of t	The fellow in the control of the con	F Two states of the control of the c
*(s) I have had trouble concentrating.	F The below companied by companied by the state of the state of the state of the state of companied by the state of the	The behalf is tropy cannot be the story cannot be the story cannot be the story better the story better the story cannot defined. the story that the better the better that the better the	To have been an experience of the contract of	The below to be the control of the c	F to what to contain the contain to the contain the co
*(t) I have limited my physical activities.	The finance of the control of the co	The best best for the property of the best best for the best best best best best best best bes	The second secon	The West West was a supported to the support of the	Phaseure Control of the Control of t
*(u) I have needed to rest more often or for longer periods.	The beard to the property of t	The blast I have been been been been been been been be	The board of the control of the cont	The bland To the bland To the bland College of the College	P Todayan, and the state of the

Cognitive Assessment Part One

The following questions are about minor mistakes which everyone makes from time to time, but some of which happen more often than others.

We would like you to estimate how often these things happened to you before and after your COVID-19 infection.

Please use the following scale:

Never - 0

Very Rarely – 1

Occasionally - 2

Quite Often – 3

Very Often – 4

21. Rating Before COVID-19 Infection

21. Rating Before COVID-19 Infection								
	0 (Never)	1 (Very Rarely)	2 (Occasionally)		4 (Very Often)			
*(a) Do you read something and find you haven't been thinking about it and must read it again?	F backet The bac	The base of the second of the	Finance and the second of the	F backers and a second of the	P National of Market of Ma			
*(b) Do you find you forget why you went from one part of the house to the other?	The back of the property of th	The best process of the control of t	P To Made of the Control of the Cont	The bank programme is supported by the programme is the programme in the programme is the programme in the programme in the programme in the programme is the programme in the programme in the programme in the programme is the programme in the programme in the programme is the programme in the programme in the programme is the programme in the programme in the programme in the programme is the programme in the p	P Payment of the control of the cont			
*(c) Do you fail to notice signposts on the road?	F the bear in many arms in the many arms in the many arms in the standard of t	For the below to be a second to be a	F Parameter September 1 Septem	The bear to the property of the bear to the property of the bear to the bear t	To Turined programme to the control of the control			
*(d) Do you find you confuse right and left when giving directions?	To have being a common to the	To the breast in the property of the breast in the breast	To Charged to the Cha	To the being a second by the control of the control	The best of the state of the st			
*(e) Do you bump into people?	The blood of the b	The West West I was a series of the series o	To No. colors of the colors of	The blood of the blood state of the blood state of the blood of the blood state of the bl	F 1% insular Princip content for the princip content for the princip content the princip content to the princip c			
*(f) Do you find you forget whether you've turned off a light or a fire or locked the door?	To have dead to grow of the second to grow o	To the state of the control of the c	Those of the state	The had been been been been been been been bee	This was a second of the secon			
*(g) Do you fail to listen to people's names when you are meeting them?	The state of the s	The beautiful contract to the	F have	F was ded to grow the second of the second	F Primary and the state of the			
*(h) Do you say something and realize afterwards that it might be taken as insulting?	The state of the s	The state of the s	T Passes Section 1 to 1	T No. and a company of the company o	T Parago			
*(i) Do you fail to hear people speaking to you when you are doing something else?	F was and the control of the control	The state of the s	F Parties of the Control of the Cont	F would be considered to the constant of the c	F Name of the second of the se			
*(j) Do you lose your temper and regret it?	To the least of the control of the c	The trick of the control of the cont	The Property of the Control of the C	T was lead to stop growing to the stop growing	The final of the first of the f			
*(k) Do you leave important letters unanswered for days?	To the bread in comparison to the comparison to	The best best properties of the best best best best best best best bes	F Contraction of Cont	To the brief of the property o	The based of the property of t			
*(I) Do you find you forget which way to turn on a road you know well but rarely use?	To be about the second	The beat in the control of the contr	P To place of the control of the con	To the brief of the state of th	P Paymer and the control of the cont			
*(m) Do you fail to see what you want in a supermarket (although it's there)?	The season of th	To stand the second to the sec	F Name American	To the state of th	This sead of the sead of			

*(n) Do you find yourself anddest.					
*(n) Do you find yourself suddenly wondering whether you've used a word correctly?	To Note had a supplementary to the supplementary to	This basis May Control to May Control to May to the May to the	T November of the Control of the Con	The State of the Control of the Cont	To Account of the Control of the Con
*(o) Do you have trouble making up your mind?	The based of the control of the cont	The state of the s	F To wood or control to the control	The behalf of the property of the control of the co	For the stand of the standard
*(p) Do you find you forget appointments?	The final fi	To the West of the	The Common of th	The short of the s	T the result. I they go come to be the result of the resu
*(q) Do you forget where you put something like a newspaper or a book?	The base of the property of th	To the board of the contract o	P Parameter Comments of the Co	To hand The state of the state	F Processor of the Control of the Co
*(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket?	New York Control of the Control of t	There's a series of the series	Programme Control of the Control of	The state of the s	Faces
*(s) Do you daydream when you ought to be listening to something?	F to best	To be been compared to the com	T home of the state of the stat	To hand the man water and the state of the s	The final control of the final
*(t) Do you find you forget people's names?	The best best in the property of the property	The best best long cover be dispersed by the second by the	To brain of the control of the contr	The board of the control of the cont	To the beard If the beard is seen as a see that the bear
*(u) Do you start doing one thing at home and get distracted into doing something else (unintentionally)?	F To the lead of t	The State of Control o	The second secon	F Twisted the Control of the Control	The house of the control of the cont
*(v) Do you find you can't quite remember something although it's "on the tip of your tongue"?	To the board of company and the company and th	The second of the contract of	P To Nation of Section 1 of Sec	The based of the state of the s	To Parameter of the Control of the C
*(w) Do you find you forget what you came to the shops to buy?	P has had be the property of t	F" the bead to the control for	F Programme to the programme of the prog	The blood of the b	F the board Fing good Cla We have been a second cla Find the been a second cla Find the been a second cla Find the been a second cla
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*(y) Do you find you can't think of	F The BACK To describe the description of the descr	The Ward to dispersate the dispersate the	E West	E to say	This maps
anything to say?	The ten of the control of the contro	The transport for image cover in the distribution of the control of the major bear formed to cover desired, former could be to cover cover to cover.	** Changes of the department o	The State of the S	To Name the second of the seco
		de no la los de la constante d	and the state of t	" migration to the light of the	See the see of the see
anything to say? 22. Rating After COVID-19 Infection	on O	1 (Very	2 (Occasionally)	3 (Quite	4 (Very
anything to say?	on O	1 (Very	2	3 (Quite	4 (Very
*(a) Do you read something and find you haven't been thinking about it and must read it	on 0 (Never)	1 (Very Rarely)	2 (Occasionally)	3 (Quite Often)	4 (Very Often)
*(a) Do you read something and find you haven't been thinking about it and must read it again? *(b) Do you find you forget why you went from one part of the	on 0 (Never)	1 (Very Rarely)	2 (Occasionally)	3 (Quite Often)	4 (Very Often)
*(a) Do you read something and find you haven't been thinking about it and must read it again? *(b) Do you find you forget why you went from one part of the house to the other? *(c) Do you fail to notice signposts	On O (Never)	1 (Very Rarely)	2 (Occasionally)	3 (Quite Often)	4 (Very Often)
*(a) Do you read something and find you haven't been thinking about it and must read it again? *(b) Do you find you forget why you went from one part of the house to the other? *(c) Do you fail to notice signposts on the road? *(d) Do you find you confuse right	On O (Never)	1 (Very Rarely)	2 (Occasionally)	3 (Quite Often)	4 (Very Often)
*(a) Do you read something and find you haven't been thinking about it and must read it again? *(b) Do you find you forget why you went from one part of the house to the other? *(c) Do you fail to notice signposts on the road? *(d) Do you find you confuse right and left when giving directions?	On O (Never)	1 (Very Rarely)	2 (Occasionally)	3 (Quite Often)	4 (Very Often)

*(g) Do you fail to listen to people's names when you are meeting them?	[27] You below to regular start to the comparation of the comparation	The based of the second of the	F Towards of the state of the s	P to have P may now to the State of the S	Francisco
*(h) Do you say something and realize afterwards that it might be taken as insulting?	The based of the control of the cont	This has been a support of the suppo	2 Paramonal State of the Control of	This had to the state of the st	P Assertion to the control of the co
*(i) Do you fail to hear people speaking to you when you are doing something else?	To be board on the control of the co	The based of the control of the cont	F Name of the state of the stat	The hands of the control of the cont	F the stand of the
*(j) Do you lose your temper and regret it?	The billed of control to control to control to control to control to the total to the total tota	The bend of control of the bend of the ben	The broad and the property of	The Salad In- company of the Company	The based of the management of
*(k) Do you leave important letters unanswered for days?	To the second of	The second to control to the second to the s	F Parameter of the Control of the Co	The based of the state of the s	F "Number of the state of the s
*(I) Do you find you forget which way to turn on a road you know well but rarely use?	The stand The stand of the sta	To be seen of the contract of	The state of the s	This hash. If the hash is the second of the	The American State of the Control of
*(m) Do you fail to see what you want in a supermarket (although it's there)?	To the body specific property of the	The Body of the State of the St	F Posterior and the state of th	The second of th	F Available Control of the control
*(n) Do you find yourself suddenly wondering whether you've used a word correctly?	To be book on the control of the con	The beautiful and the second of the second o	To hand of the state of the sta	This based of the second of th	F (An Area). The Area of the
*(o) Do you have trouble making up your mind?	The hands many control to the many terms of the many term remained, as the many terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the terms of the ter	The broad work of the broad of	F Particular Company of the Company	The habid rouge country to the count	The local of the state of the s
*(p) Do you find you forget appointments?	To the factors as the control of the	To be below many count in the contract of the first sub-table of the sub-table of the contract of the	The beautiful control of the control	The below to the property of t	The stores of the store of the
*(q) Do you forget where you put something like a newspaper or a book?	F the head of the second to th	The thing the control of the control	F * Notice of the state of the	P the head. If may work is the control of the cont	F November 1997 Annual Control of the Control of th
*(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket?	The Management of the Control of the	Thirty of the state of the stat	Notice The Control of the Control of	The state of the s	Market Ma Market Market Ma Ma Market Ma Market Ma Ma Market Ma Ma Ma Ma Ma Ma M
*(s) Do you daydream when you ought to be listening to something?	F the head of the control of the con	The state of the s	F "Name of the state of the sta	F the head of the state of the	F As American Conference of Co
*(t) Do you find you forget people's names?	The should be compared to the	To the street of	To Noting of the Control of the Cont	The based of the state of the s	The Property of the Control of the C
*(u) Do you start doing one thing at home and get distracted into doing something else (unintentionally)?	T The band of the control of the con	F manufacture of the control of the	To Name of State of S	F "Na sud- ing of the control of the	P Nome Section 1 to the section of
*(v) Do you find you can't quite remember something although it's "on the tip of your tongue"?	To based or company of the company o	This house for the property of the control of the control of the control of the control of the control of the control of the c	T Parameter and the state of th	To be been a service of the service	To Deline Land
*(w) Do you find you forget what you came to the shops to buy?	To the board impay care to be displayed. The displayed for the control of the con	The freeze of th	F No treat. I see you come to be a see to	The below to the state of the s	Processed to design the first that the state of the state
*(x) Do you drop things?	The balls image cannot be displayed. The to class have to the ball to construct the displayed, or displayed, or displayed, or the ball to be ball.	The behalf	To be load. To find the load of the load of the load of the load by load of the load by load of the load by load of the load	The behalf of the control of the con	To be loaded, as a supplementable of the sup
*(y) Do you find you can't think of anything to say?	The Model to Compare America to Compare America to Compare America to Compare America Compare	The Medical comparement is a comparement in the comparement in the comparement is a comparement of the comparement of comparement in the comparement is compared to the comparement in t	The training in the contract of the contract o	The Section of Section	To be based to great the second to the secon

* 23. Would you like to continue?

The next questions will ask about your emotion and mood. We remind you that you can leave the tab open and return to the survey as there is no time limit.

You are under no obligation to continue if you do not want to. We appreciate your participation.

(Select one option)



If you are experiencing any distress while answering, please contact the researchers at the email addresses listed below:

Donné Minné Donneminne.za@gmail.com

Altay Turan trnalt001@myuct.ac.za

If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadaq.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)

We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline 0800 70 80 90

ADHD Helpline 0800 55 44 33 **Department of Social Development Substance Abuse Line 24hr helpline**

0800 12 13 14 SMS 32312

Suicide Crisis Line

0800 567 567

SADAG Mental Health Line

011 234 4837

Akeso Psychiatric Response Unit 24 Hour

0861 435 787

Cipla Whatsapp Chat Line

(9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21

SMS 43001

NPOWERSA Helpline

0800 515 515

SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

Emotional Assessment Part One

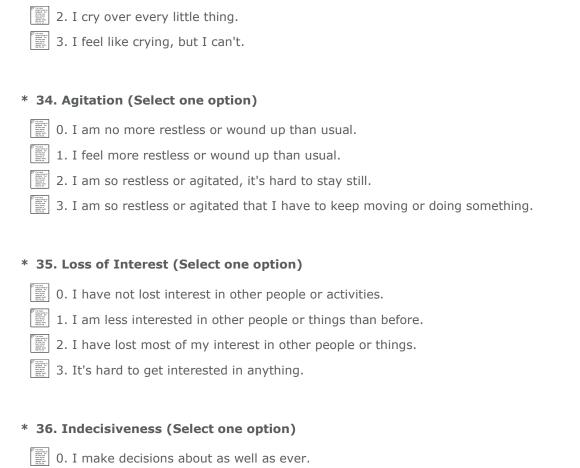
This questionnaire has 21 groups of statements. Please read each statement carefully, before selecting out the one statement in each group which most appropriately describes the way you've felt over the past two weeks, including today. If multiple statements apply to your experience, pick the one that has the highest number in the relevant group. Do not choose multiple answers for any group, including item 16 (sleep pattern changes), or item 18 (Changes in Appetite).

1. I feel sad much of the time.
2. I am sad all the time.
3. I am so sad or unhappy that I can't stand it.
* 25. Pessimism (Select one option)
0. I am not discouraged about my future.
1. I feel more discouraged about my future than I used to.
2. I do not expect things to work out for me.
3. I feel my future is hopeless and will only get worse.
* 26. Past Failure (Select one option)
0. I do not feel like a failure.
1. I have failed more than I should have.
2. As I look back, I see a lot of failures.
3. I feel I am a total failure as a person.
* 27. Loss of Pleasure (Select one option)
0. I get as much pleasure as I ever did from the things I enjoy.
1. I don't enjoy things as much as I used to.
2. I get very little pleasure from the things I used to enjoy.
3. I can't get any pleasure from the things I used to enjoy.

* 24. Sadness (Select one option)

0. I do not feel sad.





* 37. Worthlessness (Select one option)

3. I have trouble making any decisions.

- 0. I do not feel I am worthless.
- 1. I don't consider myself as worthwhile and useful as I used to.

2. I have much greater difficulty in making decisions than I used to.

2. I feel more worthless as compared to others.

1. I find it more difficult to make decisions than usual.

3. I feel utterly worthless.

* 38. Loss of Energy (Select one option)

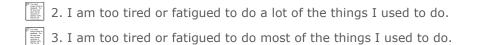
- 0. I have as much energy as ever.
- 1. I have less energy than I used to have.
- 2. I don't have enough energy to do very much.
- 3. I don't have enough energy to do anything.

0. I have not experienced any change in my sleeping. 1a. I sleep somewhat more than usual. 1b. I seep somewhat less than usual. 2a. I sleep a lot more than usual. 2b. I sleep a lot less than usual. 3a. I sleep most of the day. 3b. I wake up 1-2 hours early and can't get back to sleep. * 40. Irritability (Select one option) 0. I am not more irritable than usual. 1. I am more irritable than usual. 2. I am much more irritable than usual. 3. I am irritable all the time. * 41. Changes in Appetite (Select one option) 0. I have not experienced any change in my appetite. 1a. My appetite is somewhat less than usual. 1b. My appetite is somewhat greater than usual. 2a. My appetite is much less than before. 2b. My appetite is much greater than usual. 3a. I have no appetite at all. 3b. I crave food all the time. * 42. Concentration Difficulty (Select one option) 0. I can concentrate as well as ever. 1. I can't concentrate as well as usual. 2. It's hard to keep my mind on anything for very long. 3. I find I can't concentrate on anything. * 43. Tiredness or Fatigue (Select one option)

0. I am no more tired of fatigued than usual.

1. I get more tired or fatigued more easily than usual.

* 39. Changes in Sleeping Pattern (Select one option)



* 44. Loss of Interest in Sex (Select one option)



- 1. I am less interested in sex than I used to be.
- 2. I am much less interested in sex now.
- 3. I have lost interest in sex completely.

Emotional Assessment Part Two

45. This questionnaire is designed to measure how you've been feeling over the past week, including today. Please rate how much you have been bothered by each symptom, on a 4-point scale where 0 represents *Not at all*, to 3 representing, *Severely -I could barely stand it*.

	0 (Not at all)	1 (mildly but it didn't bother me much)	2 (Moderately, it wasn't pleasant at times)	
*(a) Numbness or tingling	The bridge committee for discourse from the discour	To The States of Program common law common l	The transact is designed in the contract of th	The management and section of the contract of
*(b) Hands trembling	The federal law discovery for the federal law discovery. The federal law discovery for the federal law discovery for the federal law discovery for the fed law discovery for the federal law discovery	The final manual law chapters is the chapters in the final manual law to be considered to the chapters in the chapter in the c	The format of the control of the con	The best section of the control of t
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*(f) Fear of losing control	The beautiful control for designation for the designation. The the designation for the designation for the designation of the d	The block of the property of t	The long means to the control of the	To the based to the control of the c
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*(i) Fear of the worst happening	The Bridge of the Control of the Sen.	F Trained (COC) (C	F Parlocation (F) Parl	The third beautiful and the second of the se
*(j) Fear of dying	The bridge of the control of the con	The STAND COST COST COST COST COST COST COST COST	The Third Control of the Control of	The ten beautiful for the company of
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*(n) Indigestion or discomfort in abdomen	The blood image among to the blood image among to the blood image among to the blood image among	The Theorem is a second as a s	F Production of August and Augus	P To be promoted for the control of
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Emotional Assessment Part Three

46. Thinking about yourself and how you've felt over the past week, to what extent do you generally feel the following? Rate it on a scale from 1 to 5, where 1 represents never, and 5 always

	1 (Never)	2	3 4	5 (Always)
*(a) Upset	The backets to programme to programme to programme to programme to programme to the program	The behalf	The listed to be considered to the listed to be considered to the	The York Indeed many procession of the processio
*(b) Hostile	To the below the property of t	The late of the control of the contr	To the little of	To have a common of the common
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*(g) Determined	The best of the control of the contr	The bridge of the bride of the bridge of the bridge of the bridge of the bridge of the	The listed to be compared to be comp	The beams and the state of the
*(h) Attentive	To the skeller improvement all the contract of	The between the control for the fire for the fire fire fire fire fire fire fire fir	To the little of	To have a common of the common
*(i) Afraid	The state of the control of the cont	The black of the b	The Street Indian Control for Street Indian	F ** The Second of the Control of th
*(j) Active	The second control of the control of	The Bridge Control Se designation. The discount Se designation. The discount Se designation. The discount Search S	The product of the second of t	The results of the second of t

Emotional Assessment Part Four

47. The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, please indicate your response by selecting the circle that represents HOW OFTEN you felt or thought a certain way.

	0 (Never)	1 (Almost Never)	2 (Sometimes)	3 (Fairly Often)	4 (Very Often)
*(a) In the last month, how often have you been upset because of something that happened unexpectedly?	P to be the service of the service o	F Production of the Control of the C	(F) Name of the state of the st	The house of the second of the	F has our with the second of t
*(b) In the last month, how often have you felt that you were unable to control the important things in your life?	P Towards and the second secon	Figure 1 Common	Throng the state of the state o	To Shared to the state of the s	To the state of th
*(c) In the last month, how often have you felt nervous and "stressed"?	(2) The hander of the control of the	To be brown and the state of th	(C) Thereines, and the second of the second	The head of control of the control o	F has been properly and the properly and

*(d) In the last month, how often have you felt confident about your ability to handle your personal problems?	To the second of	Francis	Francis Market Tall Market Tal	T N. MARE TO SERVE THE	To have a service of the service of
*(e) In the last month, how often have you felt that things were going your way?	T The Marian Compared to the Compared to t	The house the state of the stat	F Trainer And The Control of the Co	To be about the company of the compa	F Towards to the state of the s
*(f) In the last month, how often have you found that you could not cope with all the things that you had to do?	The state of the s	Townstand and the state of the	P ANALY TO SEE THE PROPERTY OF	T "Na North Control of the Control o	The state of the s
*(g) In the last month, how often have you been able to control irritations in your life?	F to be designed to the control of t	The Name of State of	F rectair where the control of the	The State of the Control of the Cont	F Toward of the state of the st
*(h) In the last month, how often have you felt that you were on top of things?	The beautiful control of the control	To the second of	F Parameter and	The Mandard In- Company of the Compa	The state of the s
*(i) In the last month, how often have you been angered because of things that were outside your control?	To the short of the control of the c	F Name of the second of the se	F waste of the state of the sta	F To AND TO SERVICE TO	F Name of the state of the stat
*(j) In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	The state of the s	To consider the second of the	P TO NOT ANY OWN TO SEE ANY OWN TO S	F States	F Market of the Control of the Contr

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48. Would you like to continue? The next questions will ask about your Long Covid experience. Keep in mind that you can leave the tab open and return to the survey as there is no time limit.

You are under no obligation to continue if you do not want to. We appreciate your participation. (Select one option)



If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadag.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)

If you are experiencing any distress while answering, please contact the researchers at the email addresses listed below:

Donné Minné Donneminne.za@gmail.com

Altay Turan trnalt001@myuct.ac.za

We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline

0800 70 80 90

ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline

0800 12 13 14 SMS 32312 **Suicide Crisis Line**

0800 567 567

SADAG Mental Health Line

011 234 4837

Akeso Psychiatric Response Unit 24 Hour

0861 435 787

Cipla Whatsapp Chat Line

(9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21

SMS 43001

NPOWERSA Helpline

0800 515 515

SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

Long Covid is the term used to describe effects of COVID-19 that persist for much longer after the initial illness's period. Usually, people become sick and recover from COVID-19 within 4 weeks, but long COVID-19 symptoms have even been found in patients up to 6 months after the initial infection period. Common symptoms include fatigue, tiredness, and concentration problems. Other symptoms have also been found, such as organ damage, insomnia, and erectile dysfunction.

49. When did you first get infected with COVID-19? Please give the month and year (If unable to provide the month, please state the year)
50. Which of the following best describes the severity of your COVID-19 infection? (Select one option)
I was able to recover at home
I recovered at home, but should've gone to the hospital
I was admitted to hospital care
I received Oxygen therapy at hospital
I was in critical care/ ICU at hospital
Other (Please specify)
51. How long were you in hospital for? (Select one option)
I was not hospitalised
Less than 5 days
a week
2-3 weeks
more than a month
Other (Please specify)
* 52. Do you think you are experiencing Long Covid? (Select one option)
Yes
F Out of the control
* 53. Do you think you may have experienced Long Covid, and then later recovered? (Select one option) Yes
Formal No

54. If you are currently experiencing Long Covid now, what symptoms do you have? Please tick all that apply I am not experiencing any symptoms

country to the text	I am not experiencing any symptoms
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55. If you think you recovered from Long Covid, what symptoms did you experience? (if you think you still have Long Covid, please refer to the previous question)

Other (Please specify)

Financial deposition of the control of the control

Lack of smell/ issues with smell

Lack of taste/ issues with taste

Other (Please specify)

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This what is deposed for the same later for the sam	Difficulty breathing
The brief in page chand be deployed, the fits have been took never, reasonat, or stated, body took the bit.	You feel like you 'think slower than you used to'
The brised integer served for dispersions for dispersions for the major bean bean bean bean bean bean bean bean	You find it more difficult to think than before your COVID-19 infection

56. Do	you have any	comments to	o make on your	experience with	Long Covid?
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57.	Would you be willing for someone who is in close enough proximity to you, who
	can comment on your changes due to COVID-19, to accompany you to a session at
	our research lab so that we can improve our understanding of your experience
	with Long Covid? (Select one option)

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Appendix J

Control Group Questionnaire

* Required Information

Online Questionnaire: Consent Form

We are a team of researchers studying the long-term effects of the COVID-19 Virus. The overall purpose of this research is to characterise the mental aspects of fatigue that those with Long Covid present with. This questionnaire seeks to collect important data about your fatigue, emotional state, and cognitive levels as a means of comparison with Long Covid participants. If you, or anyone you know believes they have long Covid, please email the researchers so we may recruit you for the long Covid participant group. All mandatory questions only require you to select an option or one-word answer.

It should take a maximum of 35 minutes to complete and it is likely you will finish far sooner. We have inserted break pages between sections for your convenience. You may use these break pages as an opportunity to take a break; as long the browser tab is kept open, and you return to the survey within an hour your data will be retained.

There are risks involved with the questionnaire, as there are questions on mental health that will ask about suicidality, emotional strain, and stress. There are also questions on your overall physical and mental state. We have left our email contact at the bottom of this consent form; please email us if you experience distress while answering this questionnaire. We have also inserted links and contacts for mental health advocacy groups that can provide counselling at the end of this form and throughout the questionnaire.

This questionnaire will record some important data for this study, including your demographic information. Additionally, we will need your contact details to send you a de-briefing email. None of this information will be disclosed to any person outside of this study. At study completion, records shall also be stored in a two-factor authenticated drive, only accessible to researchers.

In the next few days after you complete the survey, you will receive a de-briefing email thanking you for your participation, with a list of support contacts and a reiteration of the rationale of the study. If you do submit a response on this survey, you will also receive an aggregation of the research findings early next year once the findings have been analysed. After this point, your contact information shall be removed from our database.

To start the survey, please give your consent below, and confirm that you meet the eligibility criteria. This is not binding - you may choose to stop the questionnaire at any time. The next section will then record biographic and demographic information before beginning the questionnaire. If any of this is unclear, please contact us at the email addresses listed below. Thank you for your time.

Rest

Altay Yuce Turan Donné Minné Madeleine Ashton Arjun Maharaj

Email Contacts:

donneminne.za@gmail.com - Dr Donné Minné

trnalt001@myuct.ac.za - Altay Yuce Turan

Mental Health Referrals:

If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadag.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline 0800 70 80 90

ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline

0800 12 13 14 SMS 32312

Suicide Crisis Line 0800 567 567

SADAG Mental Health Line 011 234 4837

Akeso Psychiatric Response Unit 24 Hour 0861 435 787

Cipla Whatsapp Chat Line (9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21 SMS 43001

NPOWERSA Helpline

0800 515 515 SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

* 1. I confirm that I (Select all that	apply)
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- Am between the age of 18 and 60 years old
- Am not currently diagnosed with neuropathy, neurological disorders, central nervous system disorders, developmental disorders or cognitive disorders
- Did not have a confirmed diagnosis of COVID-19
- Do not suspect that I contracted COVID-19 (IE: had all symptoms but did not confirm diagnosis with lab test)
- * 2. I am not currently diagnosed with neuropathy, neurological disorders, central nervous system disorders, developmental disorders or cognitive disorders. Examples of such diagnoses include but are not limited to a diagnosis of: Alzheimer's disease, dementia, brain damage (caused either by a stroke or a traumatic head injury), intellectual disabilities, autism, a recent diagnosis of Major Depressive Disorder, fetal alcohol syndrome, or epilepsy. (Select one option)
 - Financial Notation No
- * 3. I have read the above, and I agree to my data and contact information being recorded for the purposes of this study (Select one option)
 - To the least to the state of th
 - No.

Biographic Information

*	4. What is your full (legal) name? (First name(s) Surname)
5	. What is your student number, if applicable? (Necessary for UCT SRPP)
*	6. What is your phone number?
*	7. What is your e-mail address?
*	8. Are you currently taking any of the following medications? (Check all that apply) I am not taking any medication Antidepressants (e.g. Zoloft, Prozac, Sarafem, Celexa, Paxil, Brisdelle, Pexeva, Lexapro, Luvox, Viibryd) Anti-anxiety medication (e.g. Alzam, Azor, Xanax, Zopax, Lexotan) Allergy medication (e.g. antihistamines) Blood pressure medication Other (Please specify)
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Demographic Information

This section of the questionnaire records some important demographic information - please answer to the best of your ability. All data is strictly confidential.

* 9. How old are you?
* 10. Which of the following best describes your gender? (Select one option)
Female
Male
Non-Binary
If unmentioned, Please specify
* 11. What level of education have you received? (Choose the highest level you have received) (Select one option)
Preparatory School (Grades 1-7)
High School (Grades 8-12)
Completed or enrolled for an undergraduate degree
Completed or enrolled for a postgraduate degree
Technical course or diploma equivalent
* 12. Are you currently employed? (Select one option)
Yes
No
* 13. Where do you live? (Select one option)
Town
Cape Town
If elsewhere, please specify:

* 14. What is your estimated monthly household income? (Select one option)

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The lectural integral current for distributed, for distributed, and the contract of the contra	If unmentioned, Please specify	
	Page 3	of 8
	rage 5	۷. ۷

* 17. Would you like to continue? The next questions will ask about your fatigue and cognition. Keep in mind that you can leave the tab open and return to the surve within an hour and your data will be saved.

You are under no obligation to continue if you do not want to. We appreciate your participation.

(Select one option)



If you are experiencing any distress while answering the questionnaire, please contact the researchers at the email addresses listed below:

Donné Minné Donneminne.za@gmail.com

Altay Turan trnalt001@myuct.ac.za

If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadag.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)

We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline 0800 70 80 90

ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline

0800 12 13 14 SMS 32312

Suicide Crisis Line

0800 567 567

SADAG Mental Health Line

011 234 4837

Akeso Psychiatric Response Unit 24 Hour

0861 435 787

Cipla Whatsapp Chat Line

(9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21

SMS 43001

NPOWERSA Helpline

0800 515 515

SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

Fatigue Screening Part One

Please read the statement, and select the most appropriate response. The first test consists of nine statements that refer to the experience you may have with fatigue.

Please read each statement, consider if it applies to you, and then circle a number from 1 to 7 according to how accurately you believe it describes your fatigue over the past seven days, and the extent that you agree or disagree with the statement's description of your fatigue. A low value (for example, 1) reflects strong disagreement, whereas a high value (e.g., 7) reflects strong agreement. You must circle a number for every statement.

1 represents strongly disagree, and 7 represents strongly agree

18. Select only one answer per question.						
	1 (Strongly Disagree)	2 3 4 5 6	7 (Strongly Agree)			
*(a) My motivation is lower when I am fatigued.	To have the response of the re	Fig. base Fig.	P to have one of the control of the			
*(b) Exercise brings on my fatigue.	The sense of the s	The Section of Land Control of	The second of th			
*(c) I am easily fatigued.	F [®] the Nation of State of St	P The bear P T	The second secon			
*(d) Fatigue interferes with my physical functioning.	The state of the s	T The result of	T to pain or it is a second of the control of the c			
*(e) Fatigue causes frequent problems for me.	F To be a sear or a sear o		F To State of the Control of the Con			
*(f) My fatigue prevents sustained physical functioning.	T TO THOSE OF THE PARTY OF THE	This body This	P Traped To Trap			
*(g) Fatigue interferes with carrying out certain duties and responsibilities.	[7] To be made of the control of the	Francisco Control Cont	F harm. The state of the state			
*(h) Fatigue is among my most disabling symptoms.	The stand of the s	The base of the ba	This way of the following of the followi			
*(i) Fatigue interferes with my work, family or social life.	F States	Formula Form	F manager for the second for the second for the second manager of			

Fatigue Screening Part Two

19. The MFIS (Modified Fatigue Impact Scale) is a questionnaire designed to evaluate how fatigue has affected your experience. Please read the statements, and then circle the number which best reflects how regularly fatigue has impacted you in this way, over the past four weeks. Please select ONE response per row

*(a) I have been less alert.	Never	Rarely The base of the state o	Sometimes Fundaments Fundame	Often	Almost Always
*(b) I have had difficulty paying attention for long periods of time.	T the trial of the	The word was a second with the second was a second with the second was a second with the second seco	The state of the s	To this beautiful to the second of the secon	Townson and the second
*(c) I have been unable to think clearly.	The bland of the property of t	To the blood of the blood blood one of the blood blood one of the blood blood of the blood of th	F To be dead to the first	To have been considered to the constant of the	P "Named of the Park of the Pa
*(d) I have been clumsy and uncoordinated.	To briend the first of the firs	The final to the first final to	The state of the s	The left and the l	P Townson I was seen I was a
*(e) I have been forgetful.	The linked image covered to delighted. The first older the delighted. The first older that delight makes the delight makes delight of the del	The bridged of the control of the co	The foliation of the state of t	The Industrial Image amount to shaping and the shaping and . The first only those does not shape and the shaping and the shapi	The base of the contract of th
*(f) I have had to pace myself in my physical activities.	The bland of child of	The hand for the proper control to Sprond, the Sprond,	To be dead to the second of th	The below for the condition of the condi	Property in the property of th
*(g) I have been less motivated to do anything that requires physical effort.	The trial continues of the continues of the continues of the third continues of the continu	To be bridged from the comparation of the comparati	F Statement Company of the Company o	The behavior of the second control of the se	F was a series of the series o
*(h) I have been less motivated to participate in social activities.	To bried one of the control of the c	The blood image street in the blood image.	The second of th	The left and the second of the	The state of the s
*(i) I have been limited in my ability to do things away from home.	The brief of stops control of the stops control of the stops control of the stop of the st	To the bland in the proof of the bland in the proof of the bland in the bland commons or despised, lawly	T	The Main improved the control of the	F Toward To Special To Speci
*(j) I have trouble maintaining physical effort for long periods.	The linear investigation of the second to the properties of the second to the properties of the second to the seco	The binds in the binds in the binds in the binds in the binds of the b	To his state of the contract o	This below image served be deployed. The deployed have been strong, of deployed.	This state of the
*(k) I have had difficulty making decisions.	The brief of the following control of the following control of following control of the followin	The head in the property of the head in the property of the head in the head i	The beautiful control of the beautiful control	The below improved the following the following the following the second to following the transfer of the second the second the second second the second th	The same of the sa
*(I) I have been less motivated to do anything that requires thinking.	T Day Select to find the find	To be been the first of the second the first of the second the sec	The state of the s	To the second we for finding the second we find the second the finding the second the second the second the second	F strong
*(m) My muscles have felt weak.	The bland in the control or depresent the fee may have less more, more of detect, both ,	The Braid major carried in the care in the care have been secured, or distinct, the fig.	The Medical Indiana Control of the C	The bridge or control of the control	The second of th
*(n) I have been physically uncomfortable.	The West of the Control of the Contr	The Bold complete the second complete the seco	The state of the s	The Mind of the Control of the Contr	P Tokked P T
*(o) I have had trouble finishing tasks that require thinking.	The fellow improvement is suppressed to the property of the fellow in th	To the beautiful image named image named image named image named image to the beautiful image to the beautiful image ima	To be seen the seed of the see	The Mean temps remaind temps remaind temps remaind the second temps remaind the second temps remaind	F To hand For the control of the co
*(p) I have had difficulty organizing my thoughts when doing things at home or at work.	This least form of the second	The best programme of the state	T To the way of the control of the c	To the below. Improve standard improve	F Share Sha Share Sha Sha Sha Sha Sha Sha Sha Sha Sha Sha
*(q) I have been less able to complete tasks that require physical effort.	To be least to compare and the	To have been considered to the constraint of the	F 7s have been considered to the constant of t	To be below. I may strong strong and the strong st	F waster
*(r) My thinking has been slowed down.	The final compression of the com	The least image states in the party states in the party states in the party state in the party states in the p	The second of th	The Model Image counts Image counts Image counts The Model The Model The Model Topics The Model Topics	Proceed or service of the control of
*(s) I have had trouble concentrating.	The behind stops county for the first the firs	F The Model compare careful compare careful compare careful compare careful compare careful compare careful careful compared, are careful care	F The brack of the property of the brack of	The Main integration of the control	F "was and to have a support t
*(t) I have limited my physical activities.	The linear language of the lan	To be below to progression to the flat of the con- traction of the con- traction of the con- ception of th	To You know the second of the	This below image content for fingle-sed to fingle-sed to the content content, or desired, or desired, or desired, or	The state of the s
*(u) I have needed to rest more often or for longer periods.	To be been a constraint of the desired of the desir	F The Model on September of the Septembe	The based of the b	The Mean of the Me	T manu () m

Cognitive Assessment Part One

The following questions are about minor mistakes which everyone makes from time to time, but some of which happen more often than others.

We would like you to estimate how often these things happened to you before and after the pandemic.

Please use the following scale:

Never - 0

Very Rarely – 1

Occasionally - 2

Quite Often – 3

Very Often – 4

20. Rating Before Pandemic

20. Rating Before Pandemic					
	0 (Never)	1 (Very Rarely)	2 (Occasionally)	3 (Quite Often)	4 (Very Often)
*(a) Do you read something and find you haven't been thinking about it and must read it again?	F Shares of the state of the st	F To how on the control of the contr	To have a series of the series	F Toward or and the state of th	To Contract of the Contract of
*(b) Do you find you forget why you went from one part of the house to the other?	To response of the second of t	To the second of	The State of the S	To the detail of the control of the	T This model of the control of the c
*(c) Do you fail to notice signposts on the road?	To the sheet in the proper second in the Spherical in the	The Section in the Control of the C	To be seen to be a final or be	The Section of the Control of the Section of the Se	The based on the proper served on the factories of the based on the factories of the based on th
*(d) Do you find you confuse right and left when giving directions?	The State of the S	The break of the b	To the least of the state of th	The Board of the B	The stand of the s
*(e) Do you bump into people?	The second particle of the second sec	For the best of th	The third of the state of the s	F may want to ready according to the displayed in the displayed to the form of the displayed in the displaye	The Vessel improved to depend to the depend to the common to the common the common the common c
*(f) Do you find you forget whether you've turned off a light or a fire or locked the door?	This haded of the control of the con	To band of the property of the	To Manage Comment of the Comment of	To haded	This was properly to the properly of the prope
*(g) Do you fail to listen to people's names when you are meeting them?	To handed of the hand of the h	To based of the property of th	To Manage (Manage) (Manag	To hand	The second of th
*(h) Do you say something and realize afterwards that it might be taken as insulting?	This seed of the s	To the bands of th	For the Manager Control of the Manager Contro	To be seed of the	The beautiful control of the control
*(i) Do you fail to hear people speaking to you when you are doing something else?	T "Na Badd" T The Standard To	F We hand	To the second of	T "Na Based" The Standard of S	The transport of the control of the
*(j) Do you lose your temper and regret it?	The world. The world of the property of the p	The second of th	The shape to the shape to the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of the shape of	The world The way of the control of	The formal programmer of the formal programmer
*(k) Do you leave important letters unanswered for days?	To Describe the Control of the Contr	The sense of the s	The Nature of Section	To the desired of the control of the	The state of the s
*(I) Do you find you forget which way to turn on a road you know well but rarely use?	To handed for the state of the	The former of the forether of the former of the former of the former of the former of	To the company of the	To be treat To depend on To	The man and the state of the st
*(m) Do you fail to see what you want in a supermarket (although it's there)?	The based The	To the benchmark of the second	F to have been a second of the	The first of the control of the cont	F to be more for the property of the property

*(n) Do you find yourself suddenly wondering whether you've used a word correctly?	This model of the control of the con	To based to the property of th	To Name of State of S	T The About To the About To the About To the About To the About Ab	Townsel With a second control of the second
*(o) Do you have trouble making up your mind?	To "The initial in the control of th	To "The below in the first of the below in t	To be stated to be	T	\$\overline{\subset}^2 Two Sound to Engineers to Eng
*(p) Do you find you forget appointments?	The bread frequency of	The sheet of the s	T TANKS T T	This hand in the control of the cont	T he read In produce to the produce
*(q) Do you forget where you put something like a newspaper or a book?	The hand of the part of the pa	To be dead of the control of the con	F hands	F the hand for the property of	To A month of the control of the con
*(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket?	The state of the s	These control of the	Charles Charle	To make the second of the seco	France Street St
*(s) Do you daydream when you ought to be listening to something?	To the state of th	To hade the control of the control o	F house to design the state of	[7] We have the property of th	To home to be a family of the state of the s
*(t) Do you find you forget people's names?	The local to the property of the local to the property of the local to	The bright of th	To the second of	The beat to be a support of	To have In favor In favo
*(u) Do you start doing one thing at home and get distracted into doing something else (unintentionally)?	[F] Toward of the control of the con	[F] To be seed of the control of the	There are a second of the seco	The beautiful control of the control	F Annual Francis Control of Contr
*(v) Do you find you can't quite remember something although it's "on the tip of your tongue"?	To the season of	To be been for the control of the co	T Political of the Control of the Co	The season of th	To No load of the control of the con
*(w) Do you find you forget what you came to the shops to buy?	F "Para hadad, propaga carron", propaga carron", propaga carron pr	To be being the control of the contr	F to stand of the	The based of the property of t	For the stand For the stand No regional in No regional in No reason When the stand When
*(x) Do you drop things?	The limited integral former in	With Mind C. White Mind C. The Min may be a many bear from many bear many	The Market of Ma	The Minist Things served Things served The fire may Serve Serve even, ev	The result of the control of the con
*(y) Do you find you can't think of anything to say?	F "Para based of the parameter of the pa	The special of the sp	F TAXAD	[27] "Yes had a fine of the second of the se	The stand of the s
21. Rating After/During Pandemic					
	0 (Never)	1 (Very Rarely)	2 (Occasionally)		4 (Very Often)
*(a) Do you read something and find you haven't been thinking	The should require the state of	The broad count of the co	T to know of the state of the s	To the stand to the standard of the standard o	F the total in the property of the total of
about it and must read it again?	mediat Parts.	related or delicated and delic			
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*(b) Do you find you forget why you went from one part of the				F Marin	The state of the s
again? *(b) Do you find you forget why you went from one part of the house to the other? *(c) Do you fail to notice signposts	Finance Control of Con	The state of the s	The state of the s	F harmonic and the second of t	To have a second of the second
again? *(b) Do you find you forget why you went from one part of the house to the other? *(c) Do you fail to notice signposts on the road? *(d) Do you find you confuse right	The state of the s	The state of the s	To the same of the	To have been seen to be a final from the second seen to be a final from the second sec	F Name
again? *(b) Do you find you forget why you went from one part of the house to the other? *(c) Do you fail to notice signposts on the road? *(d) Do you find you confuse right and left when giving directions?	Finance Control of Con	The state of the s	The state of the s	F harmonic and the second of t	To have a second of the second

*(g) Do you fail to listen to people's names when you are meeting them?	The State of	F to be seen the seen of the s	To be the control of	The host of the state of the st	T To be the second of the seco
*(h) Do you say something and realize afterwards that it might be taken as insulting?	The stand of the s	The war of the state of the sta	To The Manager of the Control of the	F the hand the property of the	F TANDON TO THE PROPERTY OF T
*(i) Do you fail to hear people speaking to you when you are doing something else?	The head of the property of th	To head may be a few of the second of the se	F Toward of the control of the contr	F to had To the h	F Named Street, Stree
*(j) Do you lose your temper and regret it?	The based manager and the second manager and	The Males The Males The County The Coun	The shade of the state of the s	The base of the property of the base of th	To the season's service of the season's service of the season's se
*(k) Do you leave important letters unanswered for days?	To make the control of the control o	To the basics of the basic of t	To the their way to the their section of their section of the their sect	F may a set of many and many a	The Study of the S
*(I) Do you find you forget which way to turn on a road you know well but rarely use?	The manual response of the second response of	The Book of the Bo	T A RANGE CONTROL OF THE PROPERTY OF THE PROPE	T TO A MAN OF THE PARTY OF THE	C NAME OF THE PARTY OF THE PART
*(m) Do you fail to see what you want in a supermarket (although it's there)?	The second of th	T We have been seen as a s	F NAMED TO SERVICE AND SERVICE	F Portion To the proof of the p	F NAME OF STATE OF ST
*(n) Do you find yourself suddenly wondering whether you've used a word correctly?	The board Tage from	The beam of the control of the contr	Parameter Control of C	The base of the control of the contr	Paramon Paramon Control of the Control of the Con
*(o) Do you have trouble making up your mind?	F The Stand Frogs (proof of the Standard of t	The bead required of the bead required to the bead	T To the or To	F the band report control for the band from	\$\overline{\sum_{\subset}}\$ The based of the formation of
*(p) Do you find you forget appointments?	The blood programmed and the state of the st	The below improved the control of th	To the stand of the standard o	The best important of the control of	To be seed to be formed to be f
*(q) Do you forget where you put					
something like a newspaper or a book?	The bridge couper seriors couper seriors the first serior three fears to be found couperful, if	The New March Control of the New March Control	F To compare of the compared o	Fr more shaped in the department of the departme	F no could in factor in fa
something like a newspaper or	Formula in the control of the contro	F Married State of the Control of th	Finance of the state of the sta	F ANTONIO	F ANNERS OF THE PROPERTY OF TH
something like a newspaper or a book? *(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used					
something like a newspaper or a book? *(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket? *(s) Do you daydream when you ought to be listening to	Tanana Tanana Tanana Tanana Tanana	F Mary	To be a second of the second o	Towns of the control	F AND CONTROL OF THE PARTY OF T
something like a newspaper or a book? *(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket? *(s) Do you daydream when you ought to be listening to something? *(t) Do you find you forget people's	Tangar Tangar	Manufacture of the state of the	The Manager of the Control of the Co	F Aller Street S	F ANNUAL STATE OF THE PARTY OF
something like a newspaper or a book? *(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket? *(s) Do you daydream when you ought to be listening to something? *(t) Do you find you forget people's names? *(u) Do you start doing one thing at home and get distracted into doing something else	Formula Control of the Control of th	F Name of the control	Program The state of the state	F Share and the state of the st	Formula and the second
something like a newspaper or a book? *(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket? *(s) Do you daydream when you ought to be listening to something? *(t) Do you find you forget people's names? *(u) Do you start doing one thing at home and get distracted into doing something else (unintentionally)? *(v) Do you find you can't quite remember something although	Particular and the state of the	Francisco The state of the sta	France The state of the state	Farmer Control of the	Francisco de la constante de l
something like a newspaper or a book? *(r) Do you find you accidentally throw away the thing you want and keep what you meant to throw away as in the example of throwing away the matchbox and putting the used match in your pocket? *(s) Do you daydream when you ought to be listening to something? *(t) Do you find you forget people's names? *(u) Do you start doing one thing at home and get distracted into doing something else (unintentionally)? *(v) Do you find you can't quite remember something although it's "on the tip of your tongue"? *(w) Do you find you forget what	Particular and the state of the	Francisco The state of the sta	Francisco State	Parties The state of the state	Formation of the state of the s

* 22. Would you like to continue?

The next questions will ask about your emotion and mood. We remind you that you can leave the tab open and return to the survey as there is no time limit.

You are under no obligation to continue if you do not want to. We appreciate your participation.

(Select one option)



If you are experiencing any distress while answering, please contact the researchers at the email addresses listed below:

Donné Minné Donneminne.za@gmail.com

Altay Turan trnalt001@myuct.ac.za

If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadaq.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)

We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline 0800 70 80 90

ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline

0800 12 13 14

SMS 32312

Suicide Crisis Line

0800 567 567

SADAG Mental Health Line

011 234 4837

Akeso Psychiatric Response Unit 24 Hour

0861 435 787

Cipla Whatsapp Chat Line

(9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21

SMS 43001

NPOWERSA Helpline

0800 515 515

SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

Emotional Assessment Part One

This questionnaire has 21 groups of statements. Please read each statement carefully, before selecting out the one statement in each group which most appropriately describes the way you've felt over the past two weeks, including today. If multiple statements apply to your experience, pick the one that has the highest number in the relevant group. Do not choose multiple answers for any group, including item 16 (sleep pattern changes), or item 18 (Changes in Appetite).

* 24. Pessimism (Select one option)
0. I am not discouraged about my future.
1. I feel more discouraged about my future than I used to.
2. I do not expect things to work out for me.
3. I feel my future is hopeless and will only get worse.
* 25. Past Failure (Select one option)
0. I do not feel like a failure.
1. I have failed more than I should have.
2. As I look back, I see a lot of failures.
3. I feel I am a total failure as a person.
* 26. Loss of Pleasure (Select one option)
0. I get as much pleasure as I ever did from the things I enjoy.
1. I don't enjoy things as much as I used to.
2. I get very little pleasure from the things I used to enjoy.
3. I can't get any pleasure from the things I used to enjoy.
* 27. Guilty Feelings (Select one option)

* 23. Sadness (Select one option)

1. I feel sad much of the time.

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

0. I do not feel sad.

0. I don't feel particularly guilty.
1. I feel guilty over many things I have done or should have done.
2. I feel quite guilty most of the time.
3. I feel guilty all of the time.
* 28. Punishment Feelings (Select one option)
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.
* 29. Self-Dislike (Select one option)
0. I feel the same about myself as ever.
1. I have lost confidence in myself.
2. I am disappointed in myself.
3. I dislike myself.
* 30. Self-Criticalness (Select one option)
0. I don't criticize or blame myself more than usual.
1. I am more critical of myself than I used to be.
2. I criticize myself for all my faults.
3. I blame myself for everything bad that happens.
* 31. Suicidal Thoughts or Wishes (Select one option)
0. I don't have any thoughts of killing myself.
1. I have thoughts of killing myself, but I would never carry them out.
2. I would like to kill myself.
3. I would kill myself if I had the chance.
* 32. Crying (Select one option)
(Final)
0. I don't cry any more than I used to.
1. I cry more than I used to.
2. I cry over every little thing.
3. I feel like crying, but I can't.

* 33. Agitation (Select one option) 1. I feel more restless or wound up than usual. 2. I am so restless or agitated, it's hard to stay still. 3. I am so restless or agitated that I have to keep moving or doing something. * 34. Loss of Interest (Select one option) 0. I have not lost interest in other people or activities. 1. I am less interested in other people or things than before. 2. I have lost most of my interest in other people or things. 3. It's hard to get interested in anything.

* 35. Indecisiveness (Select one option)

The trial majorana to deprese to farme to farme married or details verify.	0. I	make decisions about as well as ever.
The intent integrational by Significant The Stemay have been should shelled or skelled verify.	1. I	find it more difficult to make decisions than usual.
The Intend transproperated to displayed, this disp has been nown, watered, or played, defend, Verify	2. I	have much greater difficulty in making decisions than $\ensuremath{\mathrm{I}}$ used to.
The trial magnosmo. to depresent the feature feature manual or the control of the contr	3. I	have trouble making any decisions.

* 36. Worthlessness (Select one option)

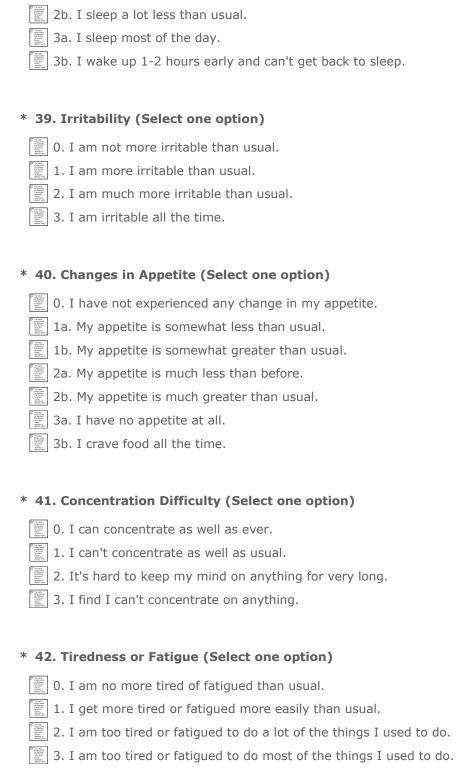
The triand image connel. In digital of the fee may have been	0.	Т	do not feel I am worthless.
In the state of th	1.	Ι	don't consider myself as worthwhile and useful as I used to.
The Intend straight services in September 19 to September 19 t	2.	Ι	feel more worthless as compared to others.
The based strain-const. Or digitaled. The file may have been more as wearend, or placed, shally	3.	Ι	feel utterly worthless.

* 37. Loss of Energy (Select one option)

New York News), or stated, or street, Verly	υ.	Τ	nave as much energy as ever.
The treat might const to depend to d	1.	Ι	have less energy than I used to have.
The loaned in page content for displayed. The Stemay flow Soon flowing, contents, or played, or of page 100.	2.	Ι	don't have enough energy to do very much
The Indeed strape-Control to distribut, the texture have been record;	3.	Ι	don't have enough energy to do anything.

* 38. Changes in Sleeping Pattern (Select one option)

The bland straight control to displayed. The filter New York notices of the straight new York news of the straight new partners, while the straight new partners of the straight new partners.	0. I have not experienced any change in my sleeping
The trial respondence to eigenent the facing	1a. I sleep somewhat more than usual.
The bland improved to depend on the bland bar	1b. I seep somewhat less than usual.
The Inland sengerunnels be deplayed. The Soliday New York (No. 100 to 10	2a. I sleep a lot more than usual.



* 43. Loss of Interest in Sex (Select one option)

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 am much less interested in sex now.

3. I have lost interest in sex completely.

Emotional Assessment Part Two

44. This questionnaire is designed to measure how you've been feeling over the past week, including today. Please rate how much you have been bothered by each symptom, on a 4-point scale where 0 represents *Not at all*, to 3 representing, *Severely -I could barely stand it*.

	0 (Not at all)	1 (mildly but it didn't bother me much)	2 (Moderately, it wasn't pleasant at times)	
(a) Numbness or tingling	To the bear image parents for dispersion for dispersion for the disper		F we would be a second of the	Fig. Was deady to see the second to the second seco
*(b) Hands trembling	Was tricked image premised for discipling premised for discipling the state of the	TO NO. ORGANIC TO NO. ORGANICAL TO SERVICE AND TO	To the second of	The stand of the s
*(c) Feeling hot	The black maps cannot be dependent to depend to the dependent bear mounts, and defined the dependent bear to define the dependent to the depen	\$\overline{\pi}\sum \text{ three minus.} \\ \times \overline{\pi}\sum	\$\sum_{\text{trans}} The transfer of the control of the cont	Fig. Was Add to the Control to the Stophesia Control to the Stophesia Control to the Stophesia Control to the C
*(d) Shaky	The black image consider to depend to the proposed to the prop	The state of the s	The second of th	To The Market Land of the September of t
*(e) Wobbliness in legs	The federal image current in department in the department is a department in the dep	\$\overline{\subset}\tau \text{ (minus)} \\ \text{ in destroyed to the destroyed, to the destroyed, to the Decil (minus) \\ \text{ Non-Decil (minus)} \\ \text{ Non-Decil (minus)} \\ \text{ (minus)} \\ \te	The trace of the state of the s	The State Mean of the State Me
*(f) Fear of losing control	The below I image current to be depresed to be depr	The stead to display the stead of the stead	The second in the second	To the stand the first of the stand
*(g) Unable to relax	F You know image prompt to depart prompt	FT YN URSELL to displayed, to displayed, to or tom control of the control	FT "No total to the state of to the state of to the state of the state of the the state of the state of th	F The Stand of the Stand
*(h) Difficulty breathing	The blood ones of the blood of	T PAR (MINE) to designate to designate to designate to de sem to de sem to designate to de sem to designate t	To the tends to the property of the foreign of the	To the state of th
*(i) Fear of the worst happening	The behalf image carried to depend on the proposed to the prop	BT the state of the control to the c	The transport of the control of the	F Touristand to Superior to the Superio
*(j) Fear of dying	The bridged interpolation of the control of the con	The best and the control of the cont	The second contract of	The based of the control of the cont
*(k) Dizzy or lightheaded	The bridged image parents for fining parents for fi	For the failant of the fail of	The beautiful property of the control of the contro	The base dead of the control of the
*(I) Scared	The federal image named image named image named image named image. The same Nove based image, to the same named image, as it is not named in the named image, as it is not named in the named image, as it is not named in the named image, as it is not named in the named image, as it is not named in the named image, as it is not named image.	The filmed programme to a filmed to a fil	The second of th	To be been for the property of
*(m) Heart pounding or racing	The brack maps cannot be dependent to the property of the prop	F PARTICUM CONTY No. department No. department No. department No. de automotive No.	F we would be considered to be dependent to be	F Water Committee Committe
*(n) Indigestion or discomfort in abdomen	The black for the state of the	To No. Stead of the American Stead of the Am	To find the control of the control o	The stand of the s
*(o) Unsteady	The beautiful image served for deputy and the following for the following for the following following following following, as property, and deputy following	The street of th	The second of th	The Track stands the stands of
*(p) Faint	The Model Image serons for findings for find	The Common	To the tends of the control of the c	To the dead of the control of the co
*(q) Terrified	F This black mode carried to the dependent of the depende	FT Yes stand to confidence to confidence to confidence to confidence to confidence to the confidence t	The train of the control of the cont	To the Mandal the Mand
*(r) Flushed	The black maps cannot be dependent to the property to the prop	The state of the s	The second of th	To The State of the Control of the State of
*(s) Nervous	The factor of the proper control of the property of th	For the bland Recognitional be followed. Supplying the state of the	To the former to	To the beautiful the property of the beautiful the property of the beautiful the beaut
*(t) Sweating (not due to heat)	The brief of the price of the proper control for the proper control for the proper control for the price of t	To Noviced became several by the sev	To the description of the following of t	To Parameter to Agencies to Agencies the Agencies the Control
*(u) Feelings of choking	F You know image present to design a server to be designed to the designed to be designed to be designed to be designed to be designed to the		FT WA SHOOT TO SHOOT THE PROPERTY OF THE PROPE	F To stand of the

Emotional Assessment Part Three

45. Thinking about yourself and how you've felt over the past week, to what extent do you generally feel the following? Rate it on a scale from 1 to 5, where 1 represents never, and 5 always

	1 (Never)	2	3 4	5 (Always)
*(a) Upset	F ^{**} to wheat it compares to the compares of	The track of the control of the co	The things the property of the street of the	For the install programmer of the installation
*(b) Hostile	The second of th	The limber of the property of	PM, this limit and provide the	The Parameter of the Control of the
*(c) Alert	The trained of the state of the	F The total ()	The friend FIGURE ONE CONTROL OF THE STREET ONE CONTROL OF CONTROL OT CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL OF CONTROL	F To Street Control Control
*(d) Ashamed	Fine has been a considered on the constant of	The load of the lo	The fellow troop cont. The fellow troop cont. The fellow troop cont. The fellow troop cont. The fellow troop troop troop cont. The fellow troop t	The State of Control o
*(e) Inspired	For the process to the process of th	F The linked by	The foliated study secured by the foliated study secured by the foliated by th	F but mean a contract of the c
*(f) Nervous	The second composition of the co	The Created Mapp strong Mapp strong The disk may Note Stori Front, y Address, YMF)	The friend storage country for the friend storage country for the friend storage country for the fill storage from the fill storage	To the state of th
(g) Determined	For the second to the second t	F This map! The prompt the displayed, the displayed, there have morand, morand, or mora	This result image count is the service of the servi	F Personal Control of the Control
*(h) Attentive	To the basis of the control of the c	This map! Proper promy to the first proper promy to the first proper pro	PM, Whited I To Miss Whited I make county through the county of the coun	Projection of the control of the con
(i) Afraid	The section of the control of the co	F The locked trape promot, to discharge promot, to discharge, the discharge money, and the promoted, and the discharge promoted, and the discharge promoted	The Indianal straight of the Melanal straight cannot be desired, but the Common of the	F Twitter
*(j) Active	The state of the s	The local trape arms, by displaying a most, by displaying the state of	The Initial strain of	To the black of the control of the c

Emotional Assessment Part Four

46. The questions in this scale ask you about your feelings and thoughts during THE LAST MONTH. In each case, please indicate your response by selecting the circle that represents HOW OFTEN you felt or thought a certain way.

	0 (Never)	1 (Almost Never)	2 (Sometimes)	3 (Fairly Often)	4 (Very Often)
*(a) In the last month, how often have you been upset because of something that happened unexpectedly?	[7] Ye had good of the state of	F National Control of the Control of	P Name of the state of the stat	F - named of the state of the s	F hand property of the propert
*(b) In the last month, how often have you felt that you were unable to control the important things in your life?	T To still the state of the sta	To State of	Property Control of Co	F "Askard of the state of the s	That was
*(c) In the last month, how often have you felt nervous and "stressed"?	The fixed of the control of the cont	To the stand of th	The Name of Particular Conference of Particula	The final state of the state of	This was a second of the secon
*(d) In the last month, how often have you felt confident about your ability to handle your personal problems?	T To the state of	The state of the s	To Assess To Ass	T maked of the control of the contro	Property of the control of the contr
*(e) In the last month, how often have you felt that things were going your way?	The stand of the s	To the best of the	To Name The state of the s	F min that and a second of the	T THE WAS ASSOCIATED A
*(f) In the last month, how often have you found that you could not cope with all the things that you had to do?	T To trial to the property of	The State of	Throat Control of the	T - "Anchor of the state of the	The state of the s

*(g) In the last month, how often have you been able to control irritations in your life?	To the head of the property of the head of the property of the	F to seed or seed of the seed	To have the property of the control	F Tour head to the property of	P Tolerand Warman and A Tolerand
*(h) In the last month, how often have you felt that you were on top of things?	To the head of the state of the	The shape of the state of the s	T RAMED WE STORY WE S	To the final of the control of the c	The man of the control of the contro
*(i) In the last month, how often have you been angered because of things that were outside your control?	The state of the s	To the total of the state of th	F - Annual Control of the Control of	F manual representation of the second represe	F variety property of the control o
*(j) In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	The standard of the standard o	To the house of the second sec	F wand The state of the state	T maked of the control of the contro	F throat of the state of the st

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If you are needing a referral to a psychologist, psychiatrist or support group, we encourage you to call The South African Depression and Anxiety Group (SADAG) on 011 234 4837 or 0800 20 50 26 and speak to a trained counsellor who can assist you further. Or alternatively email Zane on zane@sadaq.org

You are also encouraged to email one of the Principal Investigators in this study, Dr Donné Minné, who is a registered neuropsychologist with the HPCSA and who will be able to provide you with a consultation should you be requiring one.

Donneminne.za@gmail.com

(PS 0150380)

If you are experiencing any distress while answering, please contact the researchers at the email addresses listed below:

Donné Minné Donneminne.za@gmail.com

Altay Turan trnalt001@myuct.ac.za

We would also like to draw your attention to a number of other mental health support resources available to you:

Dr Reddy's Help Line 0800 21 22 23

Cipla 24hr Mental Health Helpline 0800 456 789

Pharmadynamics Police &Trauma Line 0800 20 50 26

Adcock Ingram Depression and Anxiety Helpline 0800 70 80 90

ADHD Helpline 0800 55 44 33

Department of Social Development Substance Abuse Line 24hr helpline 0800 12 13 14

SMS 32312

Suicide Crisis Line 0800 567 567

SADAG Mental Health Line 011 234 4837

Akeso Psychiatric Response Unit 24 Hour 0861 435 787

Cipla Whatsapp Chat Line (9am-4pm, 7 days a week)

076 882 2775

24 hour Healthcare Workers Care Network Helpline

0800 21 21 21 SMS 43001

NPOWERSA Helpline

0800 515 515 SMS 43010

For affordable counselling, please contact the Counselling Hub

021 462-3902 (landline) or 067 235-0019 (mobile)

For non-appointment enquiries please email info@counsellinghub.org.za

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