

A looming mental health pandemic in the time of COVID-19? Role of fortitude in the interrelationship between loneliness, anxiety, and life satisfaction among young adults

Tyrone Pretorius 
and Anita Padmanabhanunni 

Abstract

This study investigates loneliness, anxiety, and life satisfaction among a sample of young adults in South Africa during the COVID-19 pandemic, as well as the role of fortitude in the interrelationship between these variables. Fortitude refers to the psychological strength to manage stress and stay well, and it is derived from positive appraisals of self, family, and support from others. Participants included 337 young adults who completed four self-report questionnaires: the UCLA Loneliness Scale, the State-Trait Anxiety Scale, the Satisfaction with Life scale, and the Fortitude Questionnaire. Stepwise regression analysis was performed to determine the direct, indirect, mediating, and moderating role of fortitude on psychological outcomes. The results demonstrated unprecedented levels of anxiety, loneliness, and reduced life satisfaction among the sample. These levels were significantly higher than those encountered in previous studies in other contexts, as well as in studies of similar populations conducted during the COVID-19 pandemic. Women reported higher levels of psychological distress than men. The results confirmed the mediating role of fortitude; however, they also suggested that the predictors (loneliness and anxiety) are the mediated pathways and fortitude is causally antecedent to loneliness and anxiety. These findings suggest a looming mental health crisis among young adults in South Africa and identify potential targets for intervention efforts. A strengths-based approach that focuses on enhancing individuals' appraisals of coping and support may serve to build fortitude and potentially mitigate adverse mental health outcomes.

Keywords

Anxiety, COVID-19, fortitude, life satisfaction, loneliness, South Africa

Department of Psychology, University of the Western Cape, South Africa

Corresponding author:

Tyrone Pretorius, Department of Psychology, University of the Western Cape, Robert Sobukwe Rd., Bellville, Cape Town 7535, South Africa.

Email: tpretorius@uwc.ac.za

The COVID-19 pandemic is a major global health crisis. In March 2020, the South African government implemented a strict national lockdown enforced by the military and national police in response to the first confirmed case of COVID-19 in the country. The lockdown included prohibitions on all outdoor social movement and in-person socializing, directives to work from home if possible, restrictions on local and international travel, and cessation of all non-essential services such as schools, universities, restaurants, and retail outlets (South African Government Gazette, 2020). From a public health perspective, these drastic measures represent an effective strategy to limit the spread of the disease and protect the public. However, prolonged social confinement and separation from loved ones, loss of freedom of movement, and sudden disrupted daily routines can contribute to significant psychological distress and adverse mental health outcomes (e.g., Cao et al., 2020).

An increasing number of South Africans face a range of pandemic-related stressors, including rapid economic decline, fear of contracting the disease, general health-related worry, uncertainty about job security, and work–family conflict (African Development Bank, 2020). There has also been a reported escalation in pre-existing societal issues such as gender-based violence (Adebayo, 2020) and alcohol abuse (Berlinger, 2020). It is therefore conceivable that this situation has important implications for psychological well-being. Emerging international evidence suggests that significant dimensions of pandemic-related mental health include anxiety, loneliness, and decreased life satisfaction (e.g., Trzebiński et al., 2020; Zhang & Tower, 2020). Life satisfaction refers to an individual's subjective evaluation of their quality of life and includes domains such as friendship, leisure time activities, general health, income, living conditions, occupation, and family life (Diener et al., 1985). Fear of contracting COVID-19, constant vigilance toward potential health-related threats, and worries about the health and safety of loved ones have been found to lead to heightened anxiety and reduced life satisfaction among the general public (Dymecka et al., 2020).

Loneliness is considered the signature mental health consequence of the COVID-19 pandemic (Killgore et al., 2020). It has been linked to premature death and cardiovascular disease, as well as depression, generalized anxiety disorder, substance use, and suicide risk (e.g., Beutel et al., 2017). Preliminary data also support an association between loneliness and increased anxiety and reduced life satisfaction in the context of the pandemic (Tso & Park, 2020). However, this relationship may be moderated by psychological factors. Pandemics can trigger a wide range of adverse emotional responses; yet not everyone experiences the same levels of anxiety, depression, and loneliness (Dymecka et al., 2020). Specific intrinsic characteristics may render an individual more or less capable of adapting to adversity than others. The current study investigates the extent of loneliness, anxiety, and life satisfaction among a sample of young adults. In addition, it examines the role of fortitude as a potential protective factor in the interrelationship between loneliness, anxiety, and life satisfaction.

Fortitude is defined as an individual's ability to manage stress and stay well, and it is derived from positive or adaptive appraisals of self, family, and significant others (Pretorius et al., 2016). Adaptive appraisals refer to particular beliefs that may protect one from adverse psychological outcomes by activating the individual's salutogenic potential (i.e., psychological strength to manage adversity; Pretorius et al., 2016). Previous South African studies (e.g., Padmanabhanunni, 2020; Pretorius et al., 2016) have found that individuals with high levels of fortitude are able to effectively adapt to life stressors while maintaining their levels of life satisfaction and well-being. In the current study, it is expected that indices of positive and negative psychological well-being will prove to be interrelated, and it is further expected that fortitude will prove to mediate and/or moderate the relationship between these indices.

Method

Participants

The study participants were young adults enrolled in undergraduate studies at a university in the Western Cape Province and completed the survey during the period of national lockdown from March to June 2020. Young adults are a particularly vulnerable group who have been uniquely affected by the COVID-19 pandemic and pandemic-related preventive measures such as closure of universities, economic decline, rising unemployment, and job insecurity (Cao et al., 2020). This study used a cross-sectional research design, and participants ($N=337$) were randomly sampled (95% confidence level and 6% confidence interval) from the university student population. The majority of participants were female (77.2%), and the mean age of participants was 21.95 years ($SD=4.7$).

Instruments

Participants completed five self-report measures: the UCLA Loneliness Scale (UCLA-LS: Russell et al., 1978), the Fortitude Questionnaire (FORQ: Pretorius, 1998), the Satisfaction with Life Scale (SWLS: Diener et al., 1985), the State-Trait Anxiety Inventory (STAI: Spielberger et al., 1970), and a demographic questionnaire that contained items pertaining to age, gender, and area of residence.

The UCLA-LS is a 20-item measure of an individual's general loneliness and degree of satisfaction with their social network. Responses are measured on a 4-point Likert-type scale that ranges from *I often feel this way* to *I never feel this way*. Examples of items include *I lack companionship* and *I am no longer close to anyone*. The UCLA-LS has demonstrated good internal consistency reliability with Cronbach's alphas ranging from .94 to .96 (Doğan et al., 2011). In South Africa, Pretorius (1993) reported a Cronbach's alpha of .77 for this scale.

The FORQ is a 20-item questionnaire that consists of appraisals in three domains namely, self-appraisals, family-appraisals, and support-appraisals. The FORQ uses a 4-point scale that ranges from *Does not apply* to *Applies very strongly*. Examples of items include *I trust my ability to solve new and difficult problems*, *I have a deep sharing relationship with a number of members of my family*, and *My friends give me the moral support I need*. Pretorius (1998) reported a coefficient alpha of 0.85 for the full scale while reliabilities for the subscales ranged between 0.74 and 0.82.

The SWLS is a five-item scale that measures global cognitive judgments of an individual's life satisfaction. Respondents indicate to what extent they agree or disagree with each of the five items on a 7-point scale that ranges from 7 = *strongly agree* to 1 = *strongly disagree*. Examples of items include *In most ways my life is close to my ideal* and *The conditions of my life are excellent*. Sound internal consistency reliability coefficients for the scale have been reported ($\alpha = .91$; Lorenzo-Seva et al., 2019).

The STAI-T is a 20-item measure of trait anxiety. Inventory items include *I worry too much over something that really doesn't matter* and *I am content; I am a steady person*. All items are rated on a 4-point scale that ranges from *almost never* to *almost always*. Satisfactory internal consistency coefficients for the STAI-T have been reported (e.g., Lin et al., 2020: $\alpha = .83$).

Procedure

An electronic survey comprising the five instruments was generated using Google Forms and distributed to a random sample of students during the period of national lockdown from March–June

2020. Reminders were sent to participants twice per month for a 4-month period following the initial distribution. The response rate was 28%.

Ethical considerations

Ethical approval for the study was obtained from the Humanities and Social Sciences Research Committee of the University of the Western Cape. The survey was completed anonymously, and participants provided informed consent prior to accessing the survey. Given the context of COVID-19 and the nature of the questionnaires, participants were provided with the contact details of the South African Anxiety and Depression Group and the Centre for Student Support Services in the event that they experienced psychological distress as a result of completing the questionnaire.

Data analysis

Data were captured and analyzed using the Statistical Package for the Social Sciences (SPSS-26). Descriptive statistics, means, and reliabilities were generated. Two sets of regression analyses were used to examine the role of fortitude. In both regression analyses, psychological outcomes (anxiety and life satisfaction) were used as the dependent variable. The predictor variables (loneliness and anxiety, in turn) were entered in the first step, the predictor and the potential mediator (fortitude) were entered together in the second step and the product of the predictor (loneliness and anxiety) and the potential mediator were entered in the third step. The deviation scores (score minus mean) of the predictor and the presumed mediator/moderator were used to calculate the product term to avoid the problem of multicollinearity and to assist with the interpretation of interaction effects (Cohen et al., 2013). The second regression analysis differed from the first in that the potential mediator (fortitude) was entered in Step 1 instead of the predictor variables.

A significant effect for fortitude in Step 1 of the alternative regression analysis would indicate that fortitude has a direct effect on anxiety and life satisfaction. The second step of the regression analysis indicates whether fortitude has a mediating or indirect effect. If the predictor variables are found to predict the psychological outcome in Step 1 but the effect of the predictor variables is reduced in Step 2, this finding would indicate that fortitude functions as a mediating variable. However, if the effect of fortitude is reduced in Step 2, the predictor variables would be indicated as the mediated pathway (i.e., fortitude would have an indirect effect on the outcome variable). The findings described above would indicate full mediation if the statistical significance was reduced in Step 2. Partial mediation would be indicated if the relationship between the predictor variables and the psychological outcome was direct and significant but reduced in absolute size. The same holds for when the predictor is the mediated pathway, that is, if the relationship between fortitude and the outcome was reduced in absolute size (Kenny, 2018).

The indirect effects were obtained using AMOS (version 26) because it allows for bootstrapping of confidence levels and *p* values. In contemporary analysis, indirect effects are regarded as the measure of mediation, and the value of the indirect effects indicates the amount of mediation. In addition, confidence intervals are used to determine whether the indirect effects are different from zero. If zero does not fall within the confidence interval, the indirect effects are said to be significant (Kenny, 2018).

The third step of the regression analysis indicates whether fortitude acts as a moderator. If the product of fortitude and the predictors is significant in the third step, a moderating effect is indicated.

Table 1. Intercorrelations, descriptive statistics, and reliabilities of variables.

Variable	1	2	3	4
1. Loneliness	–			
2. Anxiety	.69***	–		
3. Satisfaction	–.56***	–.56***	–	
4. Fortitude	–.64***	–.61***	.54***	–
<i>M</i>	49.1	48.1	20.0	53.8
<i>SD</i>	11.6	10.5	7.7	11.5
Alpha	.92	.90	.89	.91

*** $p < .001$.

Results

The intercorrelations, descriptive statistics, and reliabilities (coefficient alpha) are reported in Table 1.

The mean loneliness score of 49.1 ($SD=11.6$) is substantially higher than the mean scores that were originally reported by the developer of the scale (Russell et al., 1978: $M=38.9$, $SD=10.6$). The mean loneliness score in this study is also higher than those reported in other previous contexts (e.g., Bangladesh – Mamun et al., 2020: $M=44.9$, $SD=10.1$; Turkey – Topaloglu, 2017: $M=36.0$, $SD=9.8$), as well as those reported during the COVID-19 pandemic (Killgore et al., 2020: $M=43.8$, $SD=13.5$). A one-sample t -test confirmed that the loneliness scores for this sample were significantly higher than those reported among a similar sample of young adults in South Africa prior to the COVID-19 pandemic, Pretorius, 1993: $M=38.8$, $SD=7.8$, $t(336)=16.28$, $p < .001$. A cutoff score of >43 on the UCLA-LS was used to identify lonely individuals, as suggested by Chatterjee (2018). Based on these cutoff score, 71.8% of the sample could be considered lonely.

The mean score for anxiety was 48.1 ($SD=10.5$), which is significantly higher than the mean scores reported in the original field test of the STAI-T (Spielberger et al., 1970: $M=34.9$, $SD=9.2$ among men and 34.8 among women, $SD=9.2$). The mean anxiety score is also higher than those previously reported in other contexts (e.g., Korea – Lee et al., 2017: $M=38.9$, $SD=11.7$; China – Yang et al., 2017: $M=43.3$, $SD=9.2$), as well as those reported during the COVID-19 pandemic (Lin et al., 2020: $M=45.7$, $SD=8.5$). One-sample t -tests confirmed a statistically significant difference between the COVID-19 sample and a similar sample of young South African adults prior to the pandemic, Heppner et al., 2002: $M=44.4$, $SD=10.6$, $t(336)=6.49$, $p < .001$. Paddock and Nowicki (1986) indicate that a cutoff score of >31 is consistent with the norms set by Spielberger et al. (1970). Using this cutoff score an overwhelming number of respondents (95.8% of participants >31) in this study reported high anxiety scores.

The mean life satisfaction score in the study sample was 20.0 ($SD=7.7$), which is lower than the means identified in a summary of young adult samples in studies prior to 2008 that was published by the developers of the scale (Pavot & Diener, 2008). In these prior studies, mean life satisfaction ranged from 21.0 to 24.4 ($SD=4.6$ – 12.2). The mean life satisfaction score in this study is also lower than recent scores in different contexts (e.g., Romania – Dimitrova et al., 2016: $M=25.7$, $SD=6.5$; Indonesia and Sweden – Nur'aini A'yunnisa et al., 2019: $M=23.5$ among Indonesian respondents and 23.8 among Swedish respondents, $SD=5.4$ and 5.4, respectively), as well as those reported during the COVID-19 pandemic (Trzebiński et al., 2020: $M=21.6$, $SD=6.3$). Furthermore, the life satisfaction scores among this study sample were significantly lower than those reported

Table 2. Hierarchical regression analyses using anxiety as outcome and fortitude and loneliness as predictors.

Predictor ^a	Regression				Indirect effects		
	B	SE	β	p value	β	95% CI	p value
Loneliness	.62	.04	.69	<.001	.18	[.10, .24]	.023
Fortitude ^b	-.55	.04	-.61	<.001	-.33	[-.42, -.26]	.007

Loneliness	.46	.05	.51	<.001			
Fortitude	-.26	.05	-.28	<.001			

Loneliness \times Fortitude	-.00	.00	-.04	.29			

^aA dashed line represents different steps in the regression analysis. ^b Alternative first step in a separate regression analysis.

among a similar sample of young adults prior to the pandemic, Pretorius, 1997: $M=22.6, SD=6.8, t(336)=-6.2, p<.001$.

Statistically significant differences were observed between men and women in terms of anxiety, $t(332)=-3.28, p=.001$, and loneliness, $t(332)=-2.87, p=.038$. Women reported higher mean anxiety ($M=49.0, SD=10.3$) and loneliness scores ($M=49.9, SD=11.5$) than men (anxiety: $M=44.5, SD=10.4$; loneliness: $M=45.6, SD=11.2$). Despite these gendered differences in indices of psychological well-being, a preliminary separate analysis of the role of fortitude among men and women indicated no gendered differences in the role of fortitude. Given the relatively small sample of men ($n=74$), it was therefore decided to pool the data of men and women.

The various scales used in this study demonstrated satisfactory reliability ranging from .89 to .92. These reliabilities are consistent with those reported by the developers (UCLA-LS – Russell et al., 1978: .96; STAI-T – Spielberger et al., 1970: .92; SWLS – Diener et al., 1985: .87; FORQ – Pretorius, 1998: .85). They are also consistent with the findings of previous studies that used these instruments in South Africa with similar samples (UCLA-LS – Pretorius, 1993: .81; STAI-T – Heppner et al., 2002: .81; SWLS – Pretorius, 1997: .77; FORQ – Pretorius et al., 2016: .76).

All of the intercorrelations observed in this study were in the expected direction. Fortitude was negatively related to the negative indicators of psychological well-being, including loneliness, $r(335)=-.64, p<.001$, and anxiety, $r(335)=-.61, p<.001$, and positively related to life satisfaction, $r(335)=.54, p<.001$. The two negative indicators – anxiety, $r(335)=-.56, p<.001$, and loneliness, $r(335)=-.56, p<.001$ – were negatively related to life satisfaction and positively related to each other, $r(335)=.69, p<.001$.

The results of the regression analysis are reported in Table 2, as are the indirect effects with loneliness as predictor, fortitude as presumed mediator and anxiety as outcome.

Fortitude did not have a moderating effect on the loneliness–anxiety relationship ($\beta=-.04, p=.29$). There are various conditions Baron and Kenny (1986) view as necessary to demonstrate a mediating effect of a variable. However, it should be noted that Kenny (2018) recently changed his stance on statistical significance in the four conditions and observed that it is with reference to zero and non-zero coefficients and not statistical significance. First, the independent variable must be associated with the mediator. Through an additional regression analysis, it was established that fortitude was significantly associated with loneliness ($\beta=-.64, p<.001$). Second, the mediator must be associated with the dependent variable. Table 2 reflects that there was a significant association between fortitude and anxiety ($\beta=-.55, p<.001$). Third, the independent variable must

Table 3. Hierarchical regression analyses using life satisfaction as outcome and fortitude and anxiety as predictors.

Predictor ^a	Regression				Indirect effects		
	B	SE	β	p value	β	95% CI	p value
Anxiety	-.41	.03	-.56	<.001	-.19	[-.27, -.12]	.009
Fortitude ^b	.36	.03	.54	<.001	.23	[.15, .30]	.023

Anxiety	-.27	.04	-.37	<.001			
Fortitude	.21	.04	.31	<.001			

Anxiety \times Fortitude	.00	.00	.03	.196			

^aA dashed line represents different steps in the regression analysis. ^b Alternative first step in a separate regression analysis.

affect the dependent variable. Table 2 indicates that there was a significant association between loneliness and anxiety ($\beta = .62, p < .001$). Finally, when the mediator is controlled for (by entering it simultaneously with the independent variable into the regression equation – step two), the effect of the independent variable on the dependent variable should be reduced. The regression coefficient for loneliness was reduced in step two of the regression analyses ($\beta = .51, p < .001$) and the indirect effect of loneliness on anxiety ($\beta = .18, p = .023$) was significant. Zero does not fall within the confidence interval, which indicates that fortitude mediated the relationship between loneliness and anxiety. However, if it is the presumed mediator that is reduced, it would indicate that the independent variable is the mediated pathway (Pretorius, 2020). The regression coefficient for fortitude was also reduced in Step 2 of the regression analyses ($\beta = -.26, p < .001$), and the indirect effect of fortitude on anxiety was significant ($\beta = -.33, p = .007$). Finally, zero does not fall within the confidence interval, and all of these findings indicate that loneliness is the mediated pathway. The indirect effect of fortitude on anxiety was greater than the indirect effect of loneliness on anxiety ($-.33 > .18$). Indirect effects represent the level of mediation (Kenny, 2018); therefore, the evidence suggests that fortitude impacts anxiety via loneliness, as well as directly.

The results of the regression analysis are reported in Table 3, as are the indirect effects with anxiety as predictor, fortitude as presumed mediator, and satisfaction as outcome.

In terms of the four steps outlined above, anxiety was significantly associated with fortitude ($\beta = -.55, p < .001$: established through a separate regression analysis), fortitude was significantly associated with life satisfaction ($\beta = .36, p < .001$), and anxiety was significantly associated with life satisfaction ($\beta = -.41, p < .001$). Table 3 further reflects the mediating role of fortitude as the regression coefficient for anxiety was reduced in Step 2 ($\beta = -.27, p < .001$), the indirect effect of anxiety on life satisfaction was significant ($\beta = -.19, p = .009$), and zero falls outside the confidence interval. However, the regression coefficient for fortitude was also reduced ($\beta = .21, p < .001$), and the indirect effect of fortitude on life satisfaction was stronger ($\beta = .23, p = .023$) than that of anxiety on life satisfaction. These findings confirm that anxiety is the mediated pathway. Fortitude had no moderating effect in the anxiety–life satisfaction relationship.

The results of the regression analysis are reported in Table 4, as are the indirect effects with loneliness as predictor, fortitude as presumed mediator, and satisfaction as outcome.

In terms of the four steps, loneliness was significantly associated with fortitude ($\beta = -.64, p < .001$: established through a separate regression analysis), fortitude was significantly associated with life satisfaction ($\beta = .36, p < .001$), and loneliness was significantly associated with life satisfaction ($\beta = -.37, p < .001$). The regression coefficients for both fortitude ($\beta = .30, p < .001$) and

Table 4. Hierarchical regression analyses using life satisfaction as outcome and fortitude and loneliness as predictors.

Predictor ^a	Regression				Indirect effects		
	B	SE	β	p value	β	95% CI	p value
Loneliness	-.37	.03	-.56	<.001	-.19	[-.29, -.12]	.006
Fortitude ^b	.36	.03	.54	<.001	.23	[.16, .30]	.013

Loneliness	-.24	.04	-.37	<.001			
Fortitude	.20	.04	.30	<.001			

Loneliness × Fortitude	.00	.00	.02	.626			

^aA dashed line represents different steps in the regression analysis. ^b Alternative first step in a separate regression analysis.

loneliness ($\beta = -.37, p < .001$) were reduced in the second step; however, the indirect effect of fortitude on life satisfaction ($\beta = .23, p = .013$) was stronger than the indirect effect of loneliness on life satisfaction ($\beta = -.19, p = .006$). This finding indicates that loneliness is the mediated pathway. There were no moderating effects.

Discussion

As in most countries globally, the South African public has faced significant and prolonged restrictions since the identification of the first COVID-19 cases in the country and the subsequent declaration of a national state of disaster. These disruptions to daily life routines, coupled with economic volatility and job insecurity, are likely to create significant psychological distress. It is imperative to understand the mental health consequences of the pandemic to inform a comprehensive public health response. The current study is the first to the author’s knowledge to identify mental health outcomes of the pandemic in South Africa using real-time data, and several potentially useful findings have emerged from the study.

First, unprecedented levels of loneliness, anxiety, and diminished life satisfaction were found among the sample of young adults. It was expected that this sample would exhibit elevated levels of common psychiatric conditions due to fears associated with contracting a potentially fatal disease and the dramatic restrictions that have been imposed to curtail the spread of the COVID-19 pandemic. This expectation has been confirmed by emerging international research on the mental health impact of the COVID-19 pandemic (e.g., Spain: González-Sanguino et al., 2020; Turkey: Satici et al., 2020; United States: Huckins et al., 2020). However, the higher levels of loneliness, anxiety, and diminished life satisfaction observed in the current sample were statistically significant in comparison to previous samples from similar populations (e.g., Pretorius, 1993), as well as other normative data (Cao et al., 2020; Huckins et al., 2020; Lin et al., 2020). These findings suggest that young adults in South Africa are experiencing an unparalleled mental health crisis during the COVID-19 pandemic.

The current study found that 73.3% of the sample reported symptoms of anxiety in the clinically significant range, and 71.8% reported significant levels of loneliness. Consistent with the existing literature (e.g., Zhang & Tower, 2020), heightened loneliness was associated with heightened anxiety, and both loneliness and anxiety were related to reduced life satisfaction. It is probable that the abrupt closure of universities, the rapid transition to remote learning in resource-constrained

conditions, disruptions to academic routines, and the economic and material difficulties typically experienced by young adults have escalated levels of anxiety among this age group (Cao et al., 2020). Loneliness was a significant public health concern among young adults prior to the COVID-19 pandemic (Matthews et al., 2019), and pandemic-related home confinement and physical distancing measures may have exacerbated this problem. In high-income countries, digital communication has been used to circumvent the restrictions on in-person contact. In low-middle income countries, however, online and digital platforms are not readily available or accessible to significant portions of the population (Semo & Frissa, 2020). This lack of access can aggravate individuals' sense of disconnection from friends and peer groups and escalate feelings of loneliness, anxiety, and reduced life satisfaction.

Second, the study found gender differences in indices of psychological well-being. Women reported higher levels of anxiety and loneliness than men, but there were no significant gendered differences in life satisfaction. The gendered differences observed in this study are consistent with other studies (e.g., Li & Wang, 2020). Heightened anxiety and loneliness among women may be due to gender role socialization, which leads women to prioritize affiliations with friends and family (Li & Wang, 2020). Pandemic-related disruptions to these affiliations can produce significant psychological distress, including increased anxiety and loneliness among women (Li & Wang, 2020). Furthermore, reports of gender-based violence have increased in South Africa during the pandemic (Adebayo, 2020), and this increase may lead to a heightened sense of threat and isolation for women, which can exacerbate anxiety and loneliness. Preliminary findings suggest that women have disproportionately borne the burden of responsibility in the domestic sphere during the pandemic, and this disruption to work–life balance can heighten distress (Farré et al., 2020). This gendered burden may also account for the findings on gender differences in the present study.

Third, low levels of fortitude were associated with heightened loneliness and anxiety and reduced life satisfaction. Previous studies (e.g., Lee et al., 2016) have demonstrated that individuals' appraisals of their current life situation as highly stressful or threatening may negatively influence their assessment of their own ability to cope, as well as their evaluations of the availability and accessibility of social networks to assist with coping. It is plausible that many people in low-middle income countries may appraise the current pandemic as highly threatening due to a lack of resources to protect them from infection (e.g., access to clean running water and personal protective equipment: Zar et al., 2020). In addition, overcrowded living conditions make social distancing difficult (Zar et al., 2020), and such conditions may lead to appraisals of family and friends as potential sources of threat. These conditions could negatively impact fortitude, leading to heightened anxiety and loneliness and reduced life satisfaction.

The study findings provide some evidence for the mediational role of fortitude, because the indirect effects of loneliness on anxiety, anxiety on life satisfaction, and loneliness on life satisfaction were significant. However, it seems that loneliness and anxiety are more likely the mediated pathways, because the indirect effects of fortitude on anxiety and life satisfaction were stronger than the indirect effect of loneliness on anxiety and loneliness and anxiety on life satisfaction, respectively, and therefore reflected a "higher amount of mediation" (Kenny, 2018). Rather than mediating the loneliness–anxiety, loneliness–life satisfaction and anxiety–life satisfaction relationships, fortitude had significant indirect effects. In other words, the effect of fortitude on the outcome variables was mediated by the predictor variables of loneliness and anxiety. These findings suggest that individuals with high fortitude experience loneliness and anxiety differently than those with low fortitude and therefore may have different psychological outcomes. Fortitude could potentially be a causal antecedent to loneliness and anxiety because it is an enduring psychological characteristic that develops through various experiences across one's lifespan. If so, this relationship could have potentially useful implications for intervention. In addition to addressing the mental health impact of the

pandemic, a strengths-based approach that focuses on enhancing individuals' appraisals of coping and support may increase fortitude, which could result in positive psychological outcomes.

Online and digital platforms have been used to offer mental health education and psychological counseling services in high-income settings (Chen et al., 2020). This strategy may not be feasible in South Africa due to limited access to digital technologies and internet connectivity. However, mental health care services could potentially be delivered through low-cost mobile phone applications such as WhatsApp. These applications offer video, phone, and chat options, and they could be used by trained community health care workers to disseminate knowledge about COVID-19, normalize fear, and uncertainty and provide psychological support. Prior evidence from South Africa (Jarvis et al., 2019) suggests that psychological interventions delivered through mobile phone applications such as WhatsApp can be effective in reducing loneliness and psychological distress.

This study is cross-sectional, and this design limits the extent to which causal relationships can be inferred. However, the findings are consistent with emerging research on mental health in the context of the pandemic (e.g., Tso & Park, 2020). The use of an electronic measure may have limited participation to those who had internet connectivity; however, reports from the University of the Western Cape indicate that 94% of the student body are able to engage in electronic modes of communication. While random sampling was used in the study, it is largely a convenience sample at only one university. This limits the generalizability of the findings and it calls for further research that replicates this finding in young adults and other samples.

Conclusion

To date, very little has been documented about the mental health impact of COVID-19 in sub-Saharan Africa; therefore, this study is a potentially important contribution to the knowledge base. The unprecedented levels of loneliness, anxiety, and diminished life satisfaction in this sample of young adults underscores a looming mental health crisis in South Africa. The findings of the current study potentially provide a useful platform for cross-national studies that identify psychological universals (i.e., etic approach: Lonner, 1980) and culturally specific constructs (i.e., emic approach: Lonner, 1985).

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ORCID iDs

Tyrone Pretorius  <https://orcid.org/0000-0002-6325-6623>

Anita Padmanabhanunni  <https://orcid.org/0000-0001-7733-7486>

References

- Adebayo, B. (2020, June 19). South Africa has the continent's highest Covid-19 cases. Now it has another pandemic on its hands. *CCN*. <https://edition.cnn.com/2020/06/19/africa/south-africa-gender-violence-pandemic-intl/index.html>
- African Development Bank. (2020, July 17). *Southern Africa economic outlook 2020 – Coping with the COVID-19 pandemic*. <https://www.afdb.org/en/documents/southern-africa-economic-outlook-2020-coping-covid-19-pandemic>

- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182. <http://dx.doi.org.ezproxy.uwc.ac.za/10.1037/0022-3514.51.6.1173>
- Berlinger, J. (2020, June 13). South Africa to resume curfew and ban on alcohol sales as it faces a surge in Covid-19 cases. *CNN*. https://edition.cnn.com/world/live-news/coronavirus-pandemic-07-12-20-intl/h_9622ba57b62a99f4de1e8fc6bde4351d
- Beutel, M. E., Klein, E. M., Brähler, E., Reiner, I., Jünger, C., Michal, M., . . . Tibubos, A. N. (2017). Loneliness in the general population: Prevalence, determinants and relations to mental health. *BMC Psychiatry, 17*(1), 1–7. <https://doi.org/10.1186/s12888-017-1262-x>
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J., & Zheng, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research, 287*, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Chatterjee, R. (2018, May 1). Americans are a lonely lot, and young people bear the heaviest burden. *NPR*. <https://www.npr.org/sections/health-shots/2018/05/01/606588504/americans-are-a-lonely-lot-and-young-people-bear-the-heaviest-burden>
- Chen, S., Li, F., Lin, C., Han, Y., Nie, X., Portnoy, R. N., & Qiao, Z. (2020). Challenges and recommendations for mental health providers during the COVID-19 pandemic: The experience of China's First University-based mental health team. *Globalization and Health, 16*(1), 1–10. <https://doi.org/10.1186/s12992-020-00591-2>
- Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). *Applied multiple regression/correlation analysis for the behavioral sciences*. Routledge.
- Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71–75. https://doi.org/10.1207/s15327752jpa4901_13
- Dimitrova, R., Buzea, C., Abubakar, A., & Stefanel, D. (2016). Measurement invariance of the satisfaction with life scale in Roma minority and Romanian majority adolescents in Romania. *Psihologia Resurselor Umane, 14*(2), 111–121. <https://hrp-journal.com/index.php/pru/article/view/73>
- Doğan, T., Çötök, N. A., & Tekin, E. G. (2011). Reliability and validity of the Turkish Version of the UCLA Loneliness Scale (ULS-8) among university students. *Procedia-social and Behavioral Sciences, 15*, 2058–2062. <https://doi.org/10.1016/j.sbspro.2011.04.053>
- Dymecka, J., Gerymski, R., & Machnik-Czerwik, A. (2020). How does stress affect our life satisfaction during COVID-19 pandemic? Moderated mediation analysis of sense of coherence and fear of coronavirus. *PsyArXiv*. <https://doi.org/10.31234/osf.io/3zjrx>
- Farré, L., Fawaz, Y., González, L., & Graves, J. (2020). How the covid-19 lockdown affected gender inequality in paid and unpaid work in Spain. <https://econ-papers.upf.edu/papers/1728.pdf>
- González-Sanguino, C., Ausín, B., ÁngelCastellanos, M., Saiz, J., López-Gómez, A., Ugidos, C., & Muñoz, M. (2020). Mental health consequences during the initial stage of the 2020 coronavirus pandemic (COVID-19) in Spain. *Brain, Behavior, and Immunity, 87*, 172–176. <https://doi.org/10.1016/j.bbi.2020.05.040>
- Heppner, P. P., Pretorius, T. B., Wei, M., Lee, D. G., & Wang, Y. W. (2002). Examining the generalizability of problem-solving appraisal in Black South Africans. *Journal of Counseling Psychology, 49*(4), 484. <https://doi.org/10.1037/0022-0167.49.4.484>
- Huckins, J. F., DaSilva, A. W., Wang, W., Hedlund, E., Rogers, C., Nepal, S. K., . . . Wagner, D. D. (2020). Mental health and behavior of college students during the early phases of the COVID-19 pandemic: Longitudinal smartphone and ecological momentary assessment study. *Journal of Medical Internet Research, 22*(6), e20185. <https://doi.org/10.2196/20185>
- Jarvis, M. A., Padmanabhanunni, A., & Chipps, J. (2019). An evaluation of a low-intensity cognitive behavioral therapy mHealth-supported intervention to reduce loneliness in older people. *International Journal of Environmental Research and Public Health, 16*(7), 1305. <https://doi.org/10.3390/ijerph16071305>
- Kenny, D. (2018). *Mediation*. <http://davidakenny.net/>
- Killgore, W. D. S., Cloonan, S. A., Taylor, E. C., & Dailey, N. S. (2020). Loneliness: A signature mental health concern in the era of COVID-19. *Psychiatry Research, 290*, 113117. <https://doi.org/10.1016/j.psychres.2020.113117>

- Lee, E. H., Lee, S. J., Hwang, S. T., Hong, S. H., & Kim, J. H. (2017). Reliability and validity of the Beck Depression Inventory-II among Korean adolescents. *Psychiatry Investigation, 14*(1), 30. <https://doi.org/10.4306/pi.2017.14.1.30>
- Lee, J., Kim, E., & Wachholtz, A. (2016). The effect of perceived stress on life satisfaction: The mediating effect of self-efficacy. *Ch'ongsonyonghak Yongu, 23*(10), 29–47. <https://doi.org/10.21509/KJYS.2016.10.23.10.29>
- Li, L. Z., & Wang, S. (2020). Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. *Psychiatry Research, 291*, 113267. <https://doi.org/10.1016/j.psychres.2020.113267>
- Lin, Y., Hu, Z., Alias, H., & Wong, L. P. (2020). Knowledge, attitudes, impact, and anxiety regarding COVID-19 infection among the public in China. *Frontiers in Public Health, 8*, 236. <https://doi.org/10.3389/fpubh.2020.00236>
- Lonner, W. J. (1980). The search for psychological universals. In H. C. Triandis & W. W. Lambert (Eds.), *Handbook of cross-cultural psychology, (Vol. 1, pp. 143–204)*. Allyn & Bacon.
- Lonner, W. J. (1985). Issues in testing and assessment in cross-cultural counseling. *The Counseling Psychologist, 13*, 599–614. <https://doi.org/10.1177%2F0011000085134004>
- Lorenzo-Seva, U., Calderon, C., Ferrando, P. J., Del Mar Muñoz, M., Beato, C., Ghanem, I., . . . Jiménez-Fonseca, P. (2019). Psychometric properties and factorial analysis of invariance of the Satisfaction with Life Scale (SWLS) in cancer patients. *Quality of Life Research, 28*, 1255–1264. <https://doi.org/10.1007/s11136-019-02106-y>
- Mamun, M. A., Hossain, M. S., Moonajilin, M. S., Masud, M. T., Misti, J. M., & Griffiths, M. D. (2020). Does loneliness, self-esteem and psychological distress correlate with problematic internet use? A Bangladeshi survey study. *Asia-pacific Psychiatry, 12*(2), e12386. <https://doi.org/10.1111/appy.12386>
- Matthews, T., Danese, A., Caspi, A., Fisher, H. L., Goldman-Mellor, S., Képa, A., . . . Arseneault, L. (2019). Lonely young adults in modern Britain: Findings from an epidemiological cohort study. *Psychological Medicine, 49*, 268–277. <https://doi.org/10.1017/S0033291718000788>
- Nur'aini A'yunnissa, R., & Adrianson, L. (2019). Subjective well-being of Indonesian and Swedish college students: A cross-cultural study on happiness. *International Journal of Research Studies in Psychology, 8*(2), 25–36. <https://doi.org/10.5861/ijrsp.2019.4007>
- Paddock, J. R., & Nowicki, S. (1986). Paralanguage and the interpersonal impact of dysphoria: It's not what you say but how you say it. *Social Behavior and Personality: An International Journal, 14*(1), 29–44. <https://doi.org/10.2224/sbp.1986.14.1.29>
- Padmanabhanunni, A. (2020). Caring does not always cost: The role of fortitude in the association between personal trauma exposure and professional quality of life among lay trauma counselors. *Traumatology, 26*, 420–426. <https://doi.org/10.1037/trm0000262>
- Pavot, W., & Diener, E. (2008). The satisfaction with life scale and the emerging construct of life satisfaction. *The Journal of Positive Psychology, 3*(2), 137–152. <https://doi.org/10.1080/17439760701756946>
- Pretorius, T. B. (1993). The metric equivalence of the UCLA Loneliness Scale for a sample of South African students. *Educational and Psychological Measurement, 53*(1), 233–239. <https://doi.org/10.1177/0013164493053001026>
- Pretorius, T. B. (1997). *Salutogenic resistance resources: The role of personal and environmental characteristics in stress-resistance* (DPhil dissertation). University of the Free State.
- Pretorius, T. B. (1998). Fortitude as stress resistance: Development and validation of the Fortitude Questionnaire (FORQ). <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.464.1299&rep=rep1&type=pdf#:~:text=The%20FORQ%20is%20a%20,the%20theoretical%20construct%20of%20fortitude.&text=The%20results%20indicated%20that%20the,three%2Dfactor%20structure%20of%20fortitude>
- Pretorius, T. B. (2020). Pathways to health: Conceptual clarification and appropriate statistical treatment of mediator, moderator and indirect effects using examples from burnout research. *South African Journal of Psychology, 50*, 320–335. <https://doi.org/10.1177%2F0081246320943498>
- Pretorius, T. B., Padmanabhanunni, A., & Campbell, J. (2016). The role of fortitude in relation to exposure to violence among adolescents living in lower socio-economic areas in South Africa. *Journal of Child & Adolescent Mental Health, 28*(2), 153–162. <https://doi.org/10.2989/17280583.2016.1200587>

- Russell, D., Peplau, L. A., & Ferguson, M. L. (1978). Developing a measure of loneliness. *Journal of Personality Assessment*, 42(3), 290–294. https://doi.org/10.1207/s15327752jpa4203_11
- Satici, B., Gocet-Tekin, E., Deniz, M. E., & Satici, S. A. (2020). Adaptation of the Fear of COVID-19 Scale: Its association with psychological distress and life satisfaction in Turkey. *International Journal of Mental Health and Addiction*, 29, 315–318. <https://doi.org/10.1111/inm.12726>
- Semo, B. W., & Frissa, S. M. (2020). The mental health impact of the COVID-19 pandemic: Implications for Sub-Saharan Africa. *Psychology Research and Behavior Management*, 13, 713–720. <https://doi.org/10.2147/PRBM.S264286>
- South African Government Gazette. (2020). Disaster Management Act: Regulations to address. *Prevent and Combat the Spread of Coronavirus COVID-19: Amendment*. <https://www.gov.za/>
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Anxiety Inventory*. Consulting Psychologists Press.
- Topaloglu, A. O. (2017). Examining the predictability of loneliness levels of college students with various variables. *Global Journal of Psychology Research: New Trends and Issues*, 7(2), 42–47. <https://un-pub.eu/ojs/index.php/gjpr/article/download/2569/2750>
- Trzebiński, J., Cabański, M., & Czarnicka, J. Z. (2020). Reaction to the COVID-19 pandemic: The influence of meaning in life, life satisfaction, and assumptions on world orderliness and positivity. *Journal of Loss and Trauma*, 25, 544–557. <https://doi.org/10.1080/15325024.2020.1765098>
- Tso, I. F., & Park, S. (2020). Alarming levels of psychiatric symptoms and the role of loneliness during the COVID-19 epidemic: A case study of Hong Kong. *Psychiatry Research*, 293, 113423. <https://dx.doi.org/10.1016%2Fj.psychres.2020.113423>
- Yang, R., Cui, L., Li, F., Xiao, J., Zhang, Q., & Oei, T. P. (2017). Effects of cognitive bias modification training via smartphones. *Frontiers in Psychology*, 8, 1370. <https://doi.org/10.3389/fpsyg.2017.01370>
- Zar, H. J., Dawa, J., Fischer, G. B., & Castro-Rodriguez, J. A. (2020). Challenges of COVID-19 in children in low-and middle-income countries. *Paediatric Respiratory Reviews*, 35, 70–74. <https://doi.org/10.1016/j.prrv.2020.06.016>
- Zhang, S. X., & Tower, N. (2020). Unprecedented disruptions of lives and work – A survey of the health, distress and life satisfaction of working adults in China one month into the COVID-19 outbreak. *Psychiatry Research*, 288, 112958. <https://doi.org/10.1016/j.psychres.2020.112958>