Received: 22 June 2023 | Revised: 26 November 2023 | Accepted: 2 December 2023

DOI: 10.1002/nop2.2069

EMPIRICAL RESEARCH QUANTITATIVE

NursingOpen Open Access WILEY

The mechanisms of student grit at the height of a major crisis: Identifying key predictors when times get really tough

Daniel Terry[1] | Blake Peck[2] | Marianne Biangone[3]

[1]School of Nursing and Midwifery, University of Southern Queensland, Ipswich, Queensland, Australia

[2]Institute of Health and Wellbeing, Federation University, Mt Helen, Victoria, Australia

[3]School of Nursing University of California, San Francisco, California, USA

Correspondence
Daniel Terry, School of Nursing and Midwifery, University of Southern Queensland, Raceview LPO, Raceview, QLD 4305, Australia.
Email: daniel.terry@usq.edu.au

Abstract

Aim: The study aims to provide insights into the key predictors of grit both before, during and throughout a common crisis event, where other more individualised challenges may not provide these insights.

Design: A repeated cross-sectional design.

Methods: Data were collected via an anonymous questionnaire among $n = 818$ (20.8% response rate) nursing students who were undertaking a three-year baccalaureate degree. Data collection occurred in the mid-year break of 2019, 2020 and 2021. The online questionnaire, which examined student demographics, personality, locus of control-4, general self-efficacy, psychological capital and grit, took 15–25 min to complete. Data were prepared and analysed using Statistical Package for the Social Sciences to undertake Structural Equation Modelling. Reporting methods adhered to the STROBE guidelines.

Results: The pathway models of grit prior to, at the time of, and after the global pandemic varied slightly as to their predictor variables, however, neuroticism was consistently present. Locus of control and psychological capital also varied over this period with hope having a positive impact, prior to and after the initial crisis, however, negatively impacted grit afterwards. Understanding the key drivers of grit, particularly those essential at or around the time of a crisis guides our understanding of how to better support nursing or healthcare students. These insights enable a greater focus of energies towards malleable attributes that can increase grit levels and better fortify nursing students for challenges they may encounter in practice. These insights also serve to further prepare healthcare, emergency, or other professionals who may encounter regular crises. Within months of a global pandemic occurring, the key predictors of grit were shown to fundamentally alter. Each pathway model varied slightly suggesting the timing of a crisis impacts students' capacity to manage new or novel situations, with hope as a key driver of grit throughout a crisis.

KEYWORDS
crisis, efficacy, grit, nursing student, personality, students

1 | INTRODUCTION

The novel coronavirus (SARS-CoV-2) led to the declaration of the coronavirus disease (COVID-19) as a global pandemic on 11th February 2020 (Rammstedt et al., 2021). In Australia, a national public health emergency was declared on the 16th of March 2022. Between March and June of the same year, key precautionary and public health measures were enacted nationally and within each state (Storen & Corrigan, 2020). Public health measures included, but were not limited to, working and studying from home, along with restrictions on leaving home. Individuals could not leave their homes except to seek essential services such as purchasing food, seeking medical care, to provide essential care or to exercise – restricted to 1 h per day. If leaving home was required, the public were to undertake social distancing, wear a face mask and use hand sanitiser. In addition, throughout the height of the pandemic period, individuals within some cities, such as Melbourne, could not travel more than 5 km from their homes unless they were to conduct or attend essential work or care (Storen & Corrigan, 2020). It was this shared and collective crisis that tested the grit of individuals, the wider communities, and particularly those who were undertaking primary, secondary or tertiary education. However, grit was shown to potentially protect individuals academically and personally at the time (Chen et al., 2022).

Grit is a non-cognitive trait that centres on the determination to meet challenging goals, both short and specifically long-term. It is the ability to persistently forge ahead irrespective of the challenge or difficulties that may be encountered (Duckworth & Quinn, 2009). Grit is more than resilience as it is centred on the indicators of success, while resilience, which is ensconced within grit, is centred on the indicators of wellbeing (Roslan et al., 2022). As such, grit encompasses two characteristics, the consistency of interest (passion) and the perseverance of effort (perseverance) which enable an individual to achieve despite adversity or challenge. Grit remains more predictive of achievement amid challenges than talent alone (Duckworth & Quinn, 2009). In this sense, grittier individuals have a propensity, when encountering setbacks, poor feedback, disappointments or plateaus in their pursuits, to continually move forward to improve – they have the capacity not to deviate from their goals (Duckworth & Quinn, 2009).

Grit was first introduced by Duckworth et al. (2007) and was shown to correlate with other traits including conscientiousness, perseverance and consistency (Duckworth et al., 2007; Terry & Peck, 2020a). More recently, agreeableness, conscientiousness, general self-efficacy and locus of control were demonstrated to be significant predictors of grit among nursing students (Terry & Peck, 2020a). As such, students with higher levels of grit were associated with those who had greater levels of conscientiousness, agreeableness and efficacy (Terry & Peck, 2020a). These cognitive and non-cognitive traits were shown to impact higher education student performance, while increasing internal locus of control was demonstrated to further impact university student initiative, motivation, persistent performance and even lifestyle behaviours (Terry & Peck, 2020a). More specifically, among nursing students, it was demonstrated that grit was the only significant predictor of overall clinical and academic performance (Terry & Peck, 2020b). Thus, developing and improving grit among nursing students is fundamental to student success (Terry & Peck, 2020b). Overall, while studies have identified that conscientiousness and agreeableness are much less amenable to change, it has been highlighted that efficacy and locus of control are more open to a degree of modification (Terry & Peck, 2020a).

Developing or increasing grit remains complex and often elusive as it is a multidimensional and dynamic process, has been demonstrated to change over time and remains malleable while others argue it is even an unstable non-cognitive trait (Ghanizadeh, 2021). These changes have been demonstrated when increasing levels of grit were observed among undergraduate nursing students, and where significant increases in the non-cogitative trait occurred between first and second years of study (Biangone, 2020; Terry & Peck, 2020a). At the time, it was hypothesised that a rise in Grit levels represent a fertile period of development where enough challenge was present to stimulate its growth. In this sense challenges incentivised the development of grit, particularly when sufficient support is made available among those individuals who are prepared to accept the challenges they may encounter (Biangone, 2020; Terry & Peck, 2020a). In addition, it has also been noted that perseverance of effort remains a relatively stronger predictor of achieving long-term goals than consistency of interest, particularly when experiencing adverse events that may also include the feeling of failure or lack of improvement (Huéscar Hernández et al., 2020).

Despite the challenges that stimulate the development and growth of grit, including the predictors of consistency of interest and perseverance of effort, it is further postulated that individuals may not require the experience of trauma, tragedy, disadvantage or discrimination for grit to be more fully enacted or developed. As such, encountering 'appropriate' levels of challenges or difficulties, with adequate and consistent support, allows individuals to grow and develop grit (Duckworth, 2016, Terry & Peck, 2020a). However, the challenges people may experience are often individual or only shared among a relatively small number of people. As such, our understanding regarding the predictors of grit may be challenged by other external forces or influences.

Thus, a shared challenge or collective trauma, such as a global pandemic, may provide a greater insight into the key predictors of grit both before, during and throughout the common event or crisis, and further help our understanding. It is known that excessive challenges may be detrimental to or counterproductive to the development of grit (Duckworth & Quinn, 2009). Although grit scores have been shown to be relatively stable over time, this understanding has been recently challenged, where it was demonstrated that grit had significantly decreased at the height of a major crisis (Terry, et al., 2023).

Specifically, Terry, et al. (2023), demonstrated the levels of consistency of interest, perseverance of effort and overall grit

among nursing students decreased within weeks of the World Health Organisation declaring the coronavirus disease (COVID-19) a global pandemic. However, consistency of interest, perseverance of effort and overall grit then stabilised and closely returned to pre-pandemic levels the following year. Although the findings are insightful regarding how psychological capital mediates grit within a crisis, it was indicated additional research is required to understand the impact of all the key mechanisms of grit at the time of a crisis to inform how grit can be further developed to buffer against the detrimental impact of a crisis. As such, our understanding of what impact major challenges or crises have on the predictors of grit remains somewhat elusive.

2 | THE STUDY

2.1 | Aims

Building on the work of Terry, et al. (2023), the aim of the study was to examine the same data to further understand how a global crisis, that permeated all aspects of life, may have influenced the predictors of consistency of interest and perseverance of effort to better prepare and inform further grit development strategies among nursing students. Overall, the greater in-depth interrogation of the student data seeks to provide insights into the key predictors of grit both before, during and throughout a common crisis event, where other more individualised challenges may not provide these insights. The additional study seeks to explore the direct and indirect predictors of grit in term of demographic elements (age, gender, income), personality, self-efficacy, psychological capital and locus of control.

2.2 | Hypothesis

1. Predictor variables, including personality, locus of control and psychological capital encompassing self-efficacy, would have an altered impact on the consistence of interest and perseverance of effort at the beginning of a crisis (H1); and
2. Predictor variables observed pre-crisis would be further present after the initial crisis had occurred (H2).

3 | METHODS

3.1 | Design

To examine the direct and indirect predictors of grit among nursing students prior to, during the height of the pandemic and after the initial announcement, a repeated cross-sectional design was used to collect student data annually over 3 years at an Australian university, as already outlined in Terry, et al. (2023). Reporting methods adhered to the STROBE guidelines.

3.2 | Sample

All nursing students studying the program between 2019 to 2021 were invited to complete an anonymous online questionnaire using Qualtrics software (Qualtrics©, Version May 2021). The repeated cross-sectional design enabled all students to participate in the questionnaire annually over this time ($n=3933$); however, the authors did not specifically follow a continuing sample of students. The sample size required ($n=363$) was calculated to have power to detect a 5% absolute difference within and between groups, alpha (2 tailed)=0.05, margin of error=±5%, as previously described (Terry, et al., 2023).

3.3 | Instruments

The questionnaire included several standardised demographic questions (Terry, et al., 2019; Terry & Peck, 2020a; 2023). Additional scale items included the following (where items were not provided within the public domain permission to use the scales were sought from the developers):

- The eight-item short grit scale (Grit–S), where participants self-rate against eight items using a five-point Likert scale (Very much like me through to Not like me at all) to measure two distinct constructs, consistency of interest (passion) and perseverance of effort (perseverance). At the time of its development, the reliability of the scale was $\alpha=0.755$ and was currently measured as $\alpha=0.743$ (Duckworth et al., 2007);
- The big five inventory extra-short form (BFI-2XS), where participants were to self-rate themselves against 15 key statements and how true the personality traits of extraversion, agreeableness, conscientiousness, neuroticism and openness. The scale used a five-point Likert scale (from 'Strongly agree' to 'Strongly disagree'). At the time of its development, the reliability ranged from $\alpha=0.690–0.800$ and was measured at the time of this study ranged from $\alpha=0.698–0.824$ (Soto & John, 2017);
- The internal external locus of control-4 (IE-4) scale, where participants self-rate themselves against four questions, which enables the measurement of the psychological concept regarding how strongly an individual believes they have control over the situations and experiences that affect their lives. The scale used a five-point Likert scale (from 'Applied completely' to 'Does not apply at all'). At the time of its development, the reliability was $\alpha=0.653$ and was measured at the time of this study as $\alpha=0.687$ (Klaus et al., 2020; Kovaleva, 2012);
- The General Self-Efficacy Scale (GSE-10) where participants self-rate themselves against 10 questions which examine self-efficacy, the general belief in an individual's ability to respond to difficult situations, obstacles and setbacks. The scale used a five-point Likert scale (from 'Exactly true' to 'Not at all true'). At the time of its development, the reliability was 0.790–0.900 and was measured at the time of this study as $\alpha=0.877$ (Schwarzer & Jerusalem, 2010); and

- The Psychological Capital Questionnaire (PCQ-12), measuring four attributes that enable individuals to manage difficult situations, which include efficacy (reliability $\alpha = 0.836$), hope (reliability $\alpha = 0.963$), optimism (reliability $\alpha = 0.820$) and resilience (reliability $\alpha = 0.649$) (Luthans et al., 2004, 2007). The scale used a six-point Likert scale (from Strongly agree' to 'Strongly disagree'). The reliability for each item at the time of the study included efficacy (reliability $\alpha = 0.849$), hope (reliability $\alpha = 0.852$), optimism (reliability $\alpha = 0.722$) and resilience (reliability $\alpha = 0.822$).

3.4 | Data collection

Data were collected in the mid-year break of 2019, 2020 and 2021 (May–June) of each study year. It must be noted the 2020 data were collected 12 weeks after the national public health emergency was declared. Each year, administration staff assisted with distributing an invitation letter via email from the researchers to all nursing students. The aim was to ensure there was no coercion from researchers towards students and to maintain confidentiality. The invitation included a web-link to the information regarding student participation, where students gave informed consent and could undertake the questionnaire. Follow-up emails were sent via administration staff to students in weeks 1, 2 and 4 post initial invitation to ensure an adequate sample size ($n \geq 363$) was obtained to meet 95% CI (MOE ± 5%). If students did not complete the questionnaire in full, these data were excluded. The online questionnaire took 15–25 min to complete.

3.5 | Data analysis

To test the hypotheses, data were prepared and analysed using Statistical Package for the Social Sciences (SPSS, Version 25.0), while Structural Equation Modelling was undertaken using SPSS Analysis of Moment Structures (AMOS, Version 27.0) and undertook path analysis using Structural Equation Modelling (SEM). c, Chi-square divided by Degree of Freedom (CMIN/DF), which indicates if the sample data and hypothetical model are an acceptable fit in the analysis, where scores ≤3 = acceptable fit and ≤5 = reasonable fit; Comparative Fit Index (CFI) demonstrates the discrepancy between the data and the hypothesised and is measured between 0 and 1, where values closed to 1 show a very good fit; and Root Mean Square Error of Approximation (RMSEA) estimates the discrepancy between the model-implied population the actual population, where values ≤0.05 are considered excellent (Kline, 2023). Overall significance was determined at two-tailed $p \leq 0.05$.

3.6 | Ethical considerations

Research Ethics Committee approval was granted by Federation University Human Research Ethics Committee (Approval #18-017) and was conducted in accordance with the Declaration of Helsinki (1964).

4 | RESULTS

Among all students across the three-year study period, $n = 818$ (20.8%) unique responses were completed which was well above the sample size required. In addition, there was a level of homogeneity among participants between years; however, there were slightly more first-year students who participated in 2020 (47.7%) than other years. In addition, slightly more females (90.0%), those under the age of 30 years (49.4%) and students born in Australia (63.9%) participated in 2021 that previous years (Terry, et al., 2023) (Table 1).

4.1 | Predictors of grit in 2019

To explore the direct and indirect predictors of grit the various scales and subscale data were examined using path analysis for each individual year. Specifically, path analysis for 2019 data was achieved through SEM and demonstrated a good model fit ($\chi^2 = 104.304$; CMIN/df = 9.482; $p = 0.001$; CFI = 0.841; RMSEA = 0.001). In this model a one standard deviation increase in Conscientiousness was associated with a 0.40 standard deviation increase in consistency of interest (CI), followed by General Self-Efficacy (0.17), and Neuroticism (−0.14), which directly predicted consistency of interest ($R = 28.0\%$). In addition, one standard deviation increase in Conscientiousness was associated with a 0.33 standard deviation increase in perseverance of effort (PE), in addition to Agreeableness (0.20), General Self-Efficacy (0.15), Locus of Control (0.15) and Hope (0.12) which directly predicted perseverance of effort ($R = 36.6$) (Figure 1, Table 2).

4.2 | Predictors of grit in 2020

In contrast, the examination of the direct and indirect predictors of grit path analysis of 2020 data was also achieved through SEM and demonstrated a good model fit ($\chi^2 = 34.556$; CMIN/df = 4.937; $p = 0.001$; CFI = 0.896; RMSEA = 0.001). In this model a one standard deviation increase in Locus of Control was associated with a 0.17 standard deviation increase in consistency of interest, followed by Neuroticism (−0.20) directly predicting consistency of interest ($R = 7.7\%$). In addition, Hope (0.20), Optimism (0.18) and Agreeableness (0.20) directly predicted perseverance of effort ($R = 17.4\%$) (Figure 2, Table 2).

4.3 | Predictors of grit in 2021

Lastly, the examination of the direct and indirect predictors of grit path analysis of 2021 data was achieved through SEM and demonstrated a good model fit ($\chi^2 = 25.365$; CMIN/df = 4.228; $p = 0.001$; CFI = 0.943; RMSEA = 0.008). In this model a one standard deviation increase in conscientiousness was associated with a 0.33 standard deviation increase in consistency of interest, followed

TABLE 1 Participant demographics.

	Frequency						
	2019		2020		2021		Total
Demographic information	***n***	**(%)**	***n***	**(%)**	***n***	**(%)**	***n***
Year of program (*n* = 818)							
First year	118	34.9%	143	47.7%	55	30.6%	316
Second year	131	38.8%	109	36.3%	74	41.1%	314
Third year	89	26.3%	48	16.0%	51	28.3%	188
Gender (*n* = 818)							
Male	25	7.4%	33	11.0%	18	10.0%	76
Female	250	74.0%	265	88.3%	162	90.0%	677
Other	2	0.6%	0	0.0%	0	0.0%	2
Missing	61	18.0%	2	0.7%	0	0.0%	63
Age (years) (*n* = 818)							
Under 30	140	41.4%	139	46.3%	89	49.4%	368
30–39 years	87	25.7%	95	31.7%	55	30.6%	237
40 years and over	74	21.9%	66	22.0%	36	20.0%	176
Missing	37	10.9%	0	0.0%	0	0.0%	37
Born in Australia (*n* = 818)							
Yes	198	58.6%	170	56.7%	115	63.9%	483
No	79	23.4%	130	43.3%	65	36.1%	274
Missing	61	18.0%	0	0.0%	0	0.0%	61

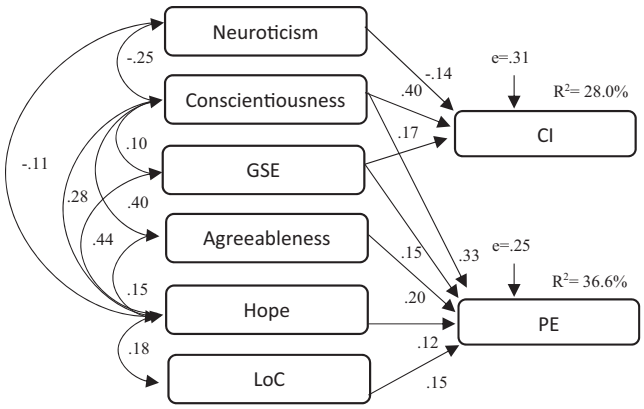

FIGURE 1 Path model of 2019. Neuroticism, Agreeableness and Conscientiousness are three Big Five personality traits; GSE, General Self-Efficacy Scale; LoC, Locus of Control; Hope is one of the Psychological Capital attributes. CI, Consistency of Interest a construct of grit; PE, Perseverance of Effort a construct of grit. Numbers next to straight arrows represent the standardised direct effects of all variables in the model, double headed arrows represent covariances between different variables, *e* = estimated error, *R* = variance level or percentage reflected by predictors of the factors in the model.

by openness (0.15), hope (−0.15) and neuroticism (−0.16) directly predicted consistency of interest (*R* = 33.7%). In addition, one standard deviation increase in conscientiousness was associated with a 0.39 standard deviation increase in perseverance of effort, while efficacy (0.30) also directly predicted perseverance of effort (*R* = 35.8%) (Figure 3, Table 2).

5 | DISCUSSION

Within months of a global pandemic occurring, where all individual's lives were disrupted, challenged and in some cases changed, the key predictors of consistency of interest and perseverance of effort were, on the most part, shown to fundamentally alter. These key predictors centred on personality traits, locus of control and psychological capital, while all other elements such as age, gender and income were extraneous. Within this context each of the predictors prior to, at the time of, and after the pandemic are discussed in detail.

5.1 | Personality

In addition to the emerging understanding of grit within the literature, when examining the pathway models for 2019, 2020 and 2021, several personality traits were predictors of consistence of interest or perseverance of effort. For example, it was noted that in terms of the Big Five personality traits, neuroticism was present across all three time periods, while conscientiousness was present in the 2019 and 2021 models, while agreeableness was present in 2019 and 2020 models. Further, openness was only present in the 2021 model.

Among these personality traits, conscientiousness, the capacity to self-regulate to achieve tasks or goals, was the strongest positive predictor of both consistency of interest and perseverance of effort, while neuroticism was the strongest or only negative predictor of consistency of interest. Agreeableness was

TABLE 2 Factors that impact Grittiness of nursing students.

Year	Factor	R^2	Predictor	Standardised beta	SE	*p*-value
2019 ($n=338$)	Consistency of interest	0.280	Conscientiousness	0.402	0.047	0.001**
			Neuroticism	−0.142	0.040	0.007*
			General Self-Efficacy	0.162	0.008	0.003*
	Perseverance of effort	0.366	Agreeableness	0.192	0.048	0.001**
			Conscientiousness	0.315	0.045	0.001**
			Hope	0.118	0.039	0.029*
			General Self-Efficacy	0.219	0.008	0.001**
			Locus of Control	0.149	0.050	0.001**
2020 ($n=338$)	Consistency of interest	0.077	Locus of Control	0.170	0.052	0.002*
			Neuroticism	−0.200	0.034	0.001*
	Perseverance of effort	0.174	Agreeableness	0.174	0.041	0.002*
			Hope	0.196	0.036	0.002*
			Optimism	0.183	0.031	0.005*
021 ($n=180$)	Consistency of interest	0.337	Conscientiousness	0.332	0.066	0.001**
			Neuroticism	−0.163	0.049	0.019*
			Openness	0.150	0.060	0.018*
			Efficacy	0.298	0.048	0.001**
			Hope	−0.156	0.062	0.045*
	Perseverance of effort	0.358	Conscientiousness	0.392	0.066	0.001**
			Efficacy	0.320	0.048	0.001**

*$p \le 0.05$. **$p \le 0.001$.

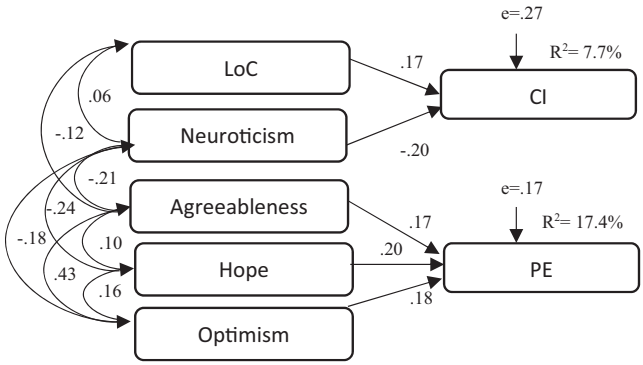

FIGURE 2 Path model of 2020. LoC, Locus of Control; Neuroticism and Agreeableness are two Big Five personality traits; Hope and Optimism are two Psychological Capital attributes. CI, Consistency of Interest a construct of grit; PE, Perseverance of Effort a construct of grit. Numbers next to straight arrows represent the standardised direct effects of all variables in the model, double headed arrows represent covariances between different variables, *e* = estimated error, *R* = variance level or percentage reflected by predictors of the factors in the model.

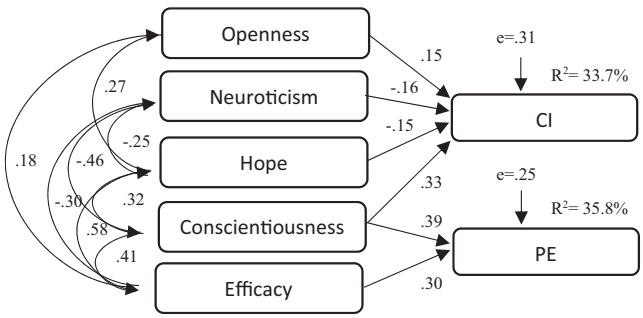

FIGURE 3 Path model of 2021. Openness, Neuroticism and Conscientiousness are three Big Five personality traits; Hope and Efficacy are two Psychological Capital attributes. CI, Consistency of Interest a construct of grit; PE, Perseverance of Effort a construct of grit. Numbers next to straight arrows represent the standardised direct effects of all variables in the model, double headed arrows represent covariances between different variables, *e* = estimated error, *R* = variance level or percentage reflected by predictors of the factors in the model.

a positive predictor of perseverance of effort, while openness was a predictor of consistency of interest only. Duckworth and Quinn (2009), indicated they found, regardless of age, similar correlations for consistency of interest, perseverance of effort and grit were observed among these same personality traits, with conscientiousness having the greatest positive correlation, while neuroticism was negatively correlated. However, it is noted that openness only correlated with perseverance of effort within their study. Although consistencies are observed between studies, despite the differing analyses, a number of nuanced differences are also present (Duckworth & Quinn, 2009).

Neuroticism throughout the three-year period was the only constant, albeit a personality trait, that had a negative impact on the consistency of interest construct of grit. Neuroticism is centred on an individual's impulsivity, pessimistic attitudes and experience

higher levels of anxiety, anger, guilt and depression (Schmiedeberg & Thönnissen, 2021). It is indicated those with higher levels of neuroticism also have poorer responses to environmental stressors, emotional regulation, feeling threatened and overwhelming hopelessness (Widiger, 2009). Although neuroticism was present prior to 2020, the level of predictability present was greater in 2020 and would have had a higher negative impact on consistency of interest, and although these levels had improved slightly in 2021, they remained higher than pre-pandemic levels.

In terms of conscientiousness, Credé et al. (2017), argues there is an overlap between grit and conscientiousness and suggest that grit may be, in effect, a quasi-construct or a facet of conscientiousness itself. However, we found in 2020, at the beginning of the pandemic, that conscientiousness or the tendency to respond in certain ways under certain circumstances, as a personality trait, 'disappears' as predictor of both consistency of interest and perseverance of effort. However, in 2019 and 2021 conscientiousness was the strongest predictor of consistency of interest and perseverance of effort in either year. In this sense, those students who had higher levels of conscientiousness prior to and after the initial crisis of the pandemic were more likely to exhibit higher levels of consistency of interest and perseverance of effort, while at the commencement of the pandemic, having higher levels of conscientiousness had no impact at all.

This finding suggests that at the time of a major crisis, being goal-directed, having the capacity to plan, and delaying gratification plays a less important role than other key traits and attributes. More specifically, given the level of uncertainty being experienced during the commencement of the pandemic, goals, planning and postponing pleasure made way for hope, optimism and being agreeable to drive consistency of interest and perseverance of effort. In essence, this finding suggests that students were 'hanging on' or trying to 'just get through' the major crisis rather than planning a way forward (Perez, 2023). This finding this may be vital as it provides insight into supporting those who experience a major crisis where conscientiousness has little impact on consistency of interest and perseverance of effort. Given this finding, it would be assumed that beyond the study period, higher levels of conscientiousness would again feature as a key predictor of both consistency of interest and perseverance of effort.

In addition to conscientiousness, agreeableness was present prior to the pandemic and remained at the commencement of the pandemic, however, was not a predictor in 2021. Agreeableness is associated with cooperation and trust of others with a willingness to maintain relationships by being compassionate, sympathetic and generous, which is demonstrated to lead to increased levels of perseverance of effort over this time. Further, Rammstedt et al. (2021), indicated higher levels of agreeableness had played a key role in predicting individual responses to trusting, adapting to and complying with information, directives and policies that were provided or mandates regarding the pandemic, which included imposed distance learning (Neuwirth et al., 2021). This suggests that higher levels of agreeableness had a positive impact on perseverance of effort prior to and at the time of the pandemic.

However, given the trait was not a predictor in 2021, this would suggest higher levels of agreeableness and being complicit, and trusting of societal, community and higher education policies and mandates had no impact on perseverance of effort. In many cases, the need to devote energy and time towards pandemic mandates, including imposed distance learning, and the need to invest in student relationship under pandemic conditions was already well established and stable in 2021. Therefore, the status quo of the situation in which the students found themselves may indicate why high levels of agreeableness did not have any bearing on perseverance of effort in 2021 – there was no need.

Agreeableness relies on trusting, adapting to and complying with information, directives and policies amid adversity, however, when these factors remain unchanged, predictor of agreeableness are shown here not to impact on perseverance of effort. Specifically, the adversity of the pandemic and key drivers prior to the pandemic were not in play as there was a level of stability across the student cohort in terms of what was required to do at the community and at the university level, including distance learning and how and where to invest their time in student relationships.

Given this finding, it would be presumed that after the pandemic mandates were ceased and the need to invest in student relationships were required again that higher levels of agreeableness would again feature as a predictor of perseverance of effort. In this sense, those students who had higher levels of agreeableness prior to and at the time of the initial crisis of the pandemic were more likely to exhibit higher levels of perseverance of effort, while after in the immediate aftermath of the pandemic crisis, having higher levels of agreeable had no impact at all.

The final personality trait was openness to new experiences, or being openminded, which was predictive of perseverance of effort and appeared in the 2021 model only. Rammstedt et al. (2021) and Schmiedeberg and Thönnissen (2021), found when examining the impact of personality and the pandemic, those with higher levels of openness to new experiences had a greater positive perception of the crisis and were more likely to adapt to the new or novel situation. Further, those who are open to new experiences at the time of the pandemic were more likely to have greater emotional regulation, were able to problem-solve, and positively coped with the challenging situation (Schmiedeberg & Thönnissen, 2021). This would suggest higher levels of openness to new experiences may not have been relevant prior to the pandemic and may not have been vital at the commencement of the pandemic, as the emphasis may have been centred on crisis management rather than adapting to the longer-term changes, which was more relevant in 2021 (Schmiedeberg & Thönnissen, 2021).

5.2 | Locus of control

Together with personality, another key factor was locus of control and its association with grit, where our current understanding

of this relationship remains scarce (Çelik & Sariçam, 2018; Quing & Baudin, 2021). Those with an internal locus of control examine, evaluate and adaptively meet challenging tasks, while an external of locus of control have a propensity to evade such challenges, are unable to cope and have a predisposition to use emotion to cope (Groth et al., 2019; Krampe et al., 2021). Within this context, locus of control was identified and present in the 2019 and 2020 models, however, was absent in the 2021 model. What is also evident is a greater internal locus of control had a positive impact on perseverance of effort in 2019 and consistency of interest in 2020.

Locus of control is associated with the belief regarding if outcomes are influenced by individual actions or by external forces that individuals cannot or are less likely to control (Quing & Baudin, 2021). Thus, we posit that prior to the pandemic in 2019, the higher the levels of internal locus control, the greater the positive impact it has on the perseverance of effort. As such, those students with higher levels of internal locus of control have a greater propensity to put higher levels of effort into their goals and achievements they sought to accomplish. In a sense, they are the 'masters of their destiny' rather than some external force being in control.

However, at the time of the pandemic in 2020, the model demonstrates that higher levels of locus control had a positive impact on consistency of interest rather than persistence of effort. In this sense, those students with higher levels of internal locus of control at the commencement of pandemic were more likely to lead to higher consistency of interest among students. However, at the time these outcomes have been demonstrated to be contingent on a student's own actions rather than external forces, such as chance or the influence of others (Çelik & Sariçam, 2018; Quing & Baudin, 2021). After the height of the pandemic, locus of control does not appear in the 2021 model, suggesting that regardless of students having an internal or external locus of control, this does not have an impact on the two constructs of grit within the model.

Although locus of control is not within the 2021 model, additional research indicates that this trait does continue to have an impact on overall student wellbeing and study performance (Krampe et al., 2021). In this sense, this trait remains important at the time of a crisis or trauma, as it is a buffer to depression, anxiety and other mental health challenges (Groth et al., 2019; Krampe et al., 2021). However, after the commencement of the pandemic it is not a predictor of grit, and this may require further research to understand the mechanisms of locus of control on achieving long-term goals after an initial crisis occurs.

5.3 | Psychological capital

In addition to locus of control, psychological capital was also examined and has been regarded as a positive resource factor that can influence success in achieving goals and outcomes and remains a mechanism that mediates the development of grit (DeWitz et al., 2009; Luthans et al., 2007; Schyns, 2004). Three of the four psychological capital attributes, including hope, optimism and efficacy were identified to be predictor variables of either consistency of interest or perseverance of effort throughout the three models across each year. It must be noted that the one attribute of psychological capital that was not a predictor of grit across all three models was resilience. However, it has been demonstrated that there is a poor correlation between grit and resilience in the study conducted by Credé et al. (2017), and therefore, our finding may be considered unremarkable. In contrast to resilience not being a predictor, hope was the only predictor, along with neuroticism, to be present in each of the models throughout the three-year period. Although hope had a positive impact on perseverance of effort in 2019 and 2020, it has a negative impact as a predictor for consistency of interest in 2021.

Duckworth (2016), indicates that the hope associated with grit is the expectation that our own efforts can improve a future event. Snyder, Rand, and Sigmon (2002), further purports hope theory, which emphasises agency and pathway thinking, leads to developing workable pathways and planning to achieve desired goals. As such, Snyder (1995, p. 355), stated hope is 'the process of thinking about one's goals along with the motivation to move towards those goals (agency), and the ways to achieve those goals (pathways)'. In this sense both 2019 and 2020 models emulate such theoretical understanding of hope and its application to perseverance of effort.

For example, such hope requires developing workable solutions to meeting goals ('I will find a way to achieve my goal regardless of the obstacles'), along with the thinking that enables hope to thrive to achieve the planned goals ('I have confidence I can achieve my goal') (Snyder, Shorey, et al., 2002). It is about the goal itself, applying effort to achieving the goal, changing plans as necessary and having the motivation to achieve the goal. Further, such hope also requires positive emotions to enable successful goal outcomes, as such positivity enables the ongoing ability to achieve long-term goals and to manage problems or unplanned impediments as goals are being realised (Avey et al., 2009).

However, in the 2021 model, hope is a negative predictor for consistency of interest, in that as hope increases, it reduces an individual's consistency of interest to achieve the long-term goal. As such, as Duckworth (2016) and Snyder, Rand, and Sigmon (2002) have stated, hope is centred on the effort that can improve the future and the requisite application of the thinking to achieve said goal. Therefore, it may be argued the hope observed in the 2021 model is patterned on 'everyday' or basic hope where there is an expectation that tomorrow will be better but is without the burden of responsibility and application of thinking or action to achieve. For example, it may be that as an individual's hope without effort and vision to achieve increases, this reduces their level of consistency of interest to pursue the long-term goal.

Thus, we posit what is being observed prior to and at the beginning of the pandemic is the presence of agency-pathway hope; however, after the initial experience of the pandemic has occurred, this action-embedded hope at the commencement of the second

year of the pandemic is lost or wains, leading to little impact on grit. Students lose or relinquish the hope that their effort can improve the situation; therefore, the basic hope that things will work out is resorted to, thus removing the need of the effort, or looking for alternative pathways to achieve said goals. This then leads to basic hope being negative predictor on the consistency of interest. Hoping that things will work out without any effort, plan or positive emotion leads to decreased grit, and therefore, it is reasonable to argue that poorer grades or greater attrition among students may ensue (Chen et al., 2022).

In addition to hope, the only incidence of optimism as a predictor variable for perseverance of effort was in the 2020 model at the commencement of the pandemic. Optimism is an individual's belief of being successful combined with a positive, yet realistic, outlook concerning the capacity to succeed now and into the future (Avey et al., 2009). Overall, it has been indicated that optimism theory is centred on high-value goal-based outcomes, where negative achievements are distanced by those who seek to achieve these goals. Moving towards desired goals is achieved much like, as Snyder, Rand, and Sigmon (2002) argue, the process of agency-pathway hope leading to goal-directed behaviours being achieved; however, optimism is absence of the emotion that is embedded in hope (Myślińska et al., 2016).

Within the context of the 2020 model, given the commencement of the pandemic had occurred, it would be reasonable to argue that among students there was a level of optimism that was developed or enabled at this time. Optimism may not have needed to be in place previously and given the prospect of the pandemic entering its second year, this may have dissipated the level of optimism among the cohort. This was also observed with agency-pathway hope, which was either lost or waned, leading to little impact on grit in 2021.

The third attribute of psychological capital, efficacy, was present only in the 2021 model and not a predictor in earlier models. However, the alternate measure of general self-efficacy (Schwarzer & Jerusalem, 1995) was noted to be present in the 2019. As such, in the 2019 model general self-efficacy was a predictor of both consistency of interest and perseverance of effort, while general self-efficacy was not evident the later models, but only as the attribute of psychological capital.

General self-efficacy is anticipated to impact grit given self-efficacy is the self-belief and motivation that one can undertake and achieve difficult tasks, cope with challenges or produce anticipated outcomes (DeWitz et al., 2009; Schyns, 2004). In this sense, this situation-specific construct is enacted, as outlined by (Bandura, 1982), as a mediator of action and behaviour where 'people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives' (Bandura, 1994, p. 71).

However, in the event of a crisis where uncertainty occurs, such as the pandemic, general self-efficacy as a predictor of consistency of interest and perseverance of effort was shown to dissipate. General self-efficacy remains present among the students; however, in the 2020 models, it is not a predictor. Then again in the 2021 model general self-efficacy is also not a predictor, yet efficacy, as an attribute of psychological capital, presents itself as a much higher predictor of perseverance of effort only.

Although these two different measures of self-efficacy predicted one or both elements of grit, Bandura et al. (2006), has indicated that measuring self-efficacy has no one unique method or approach to measure this attribute and measuring self-efficacy is often tailored to specific situations or domains (Park & Avery, 2019). Thus, we posit that although the two measure of self-efficacy have differed, the second scale as a measure of psychological capital was more likely to capture self-efficacy that pertained to the student's beliefs of their capacity to be successful during the crisis. In this sense, the second scale, although also measuring self-efficacy, is more sensitive as a measure within a crisis that the general self-efficacy scale. As such, the second scale demonstrated that efficacy could predict perseverance of effort (Park & Avery, 2019). Overall, regardless of the type of scale, student's self-efficacy was a predictor prior to and after the initial crisis of the pandemic had occurred, yet at the initial point of the crisis in the 2020 model self-efficacy was not a predictor.

Bandura (1977), has indicated that self-efficacy levels do differ among people specifically when crisis exists. Given the heterogenous lived experiences among individuals within a crisis, specifically how individuals manage, cope and navigate the even impacts the robustness of self-efficacy. In this sense, what may be observed in the 2020 model is that students may have had an inability to manage the situation due to lack of knowledge, information or experience to navigate the unknown crisis that was unfolding. Thus, the situation led to an inconsistency between an individual's knowledge and capacity for action. It is where self-belief and motivation were required needed to produce an anticipated outcomes or to cope with challenges; however, at the point of crisis, this is incumbered (Park & Avery, 2019). However, the following year, self-efficacy, when enabled through greater knowledge, understanding and experience, was having a greater impact or predictability on the persistency of effort for the long-term goals of students.

5.4 | Limitations

It must be noted that although an adequate number of students participated, the response rate may impact the findings of the study and potentially be less representative of the whole student cohort. The low response rate may be due to its administration occurring in the mid-year break, where students may not check student emails, have competing demands at this time with work or childcare responsibilities associated with school holidays. Further, the student cohort at the time of the pandemic and the following year may be somewhat altered due to student attrition that had occurred. In this case, students with competing family or income generating responsibilities, or those who have had lower levels of grit may have selected to either pause their studies at the time or may have dropped out of the program altogether.

6 | CONCLUSION

This study examined how a global crisis influenced the key predictor variables of consistency of interest and perseverance of effort among nursing students before, during and throughout a large-scale crisis event, which remains one of the earliest known studies to examine this phenomenon prior to, at the time of and after a large global event. The need to understand the key drivers of grit, consistency of interest and perseverance of effort, particularly at the time of or in the aftermath of a crisis enables the better support of nursing students and the wider healthcare student population. Utilising and developing those key drivers of grit, such as hope and self-efficacy, remain essential as a strategy among nursing students that empowers them as they encounter large scale or even individual crises. As such, there is capacity for nursing education to purposefully embed specific curriculum to increase grit among students that will impact student 'stickability' leading to improved academic and clinical performance. Beyond nursing or healthcare studies, these insights enable a greater focus on those key elements or attributes that will continue to support and increase grit levels prior to, at the time of, or in the aftermath of a crisis when things may be considered 'really tough'. For example, nurses, health professionals and the public in general are and will continue to encounter large-scale challenges or future natural or manmade disasters which include, but are not limited to, drought, fire, floods, hurricanes or other impacts of climate change. Although attributes, such as personality are less likely to be altered, the other divers of grit are areas where future development strategies of grit can be focussed. In these circumstances, understanding those more malleable traits, such as Locus of control, Hope and self-efficacy, at the time or after a crisis can enable individuals to be fortified. This is particularly essential among health care, emergency, other public facing professionals who may work in or around crisis situations. In addition, such development strategies may also be beneficial for the public who may live, work and negotiate crises on a regular basis and such strategies may be used as a resource for everyday life.

AUTHOR CONTRIBUTIONS

Daniel Terry and Blake Peck provided the conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualisation, original draft preparation, review and editing. Marianne Biangone provided the conceptualization, visualisation, original draft preparation, review and editing.

ACKNOWLEDGEMENTS

This research has been supported by the Australian Government through the Institute of Health and Wellbeing at Federation University. Open access publishing facilitated by University of Southern Queensland, as part of the Wiley – University of Southern Queensland agreement via the Council of Australian University Librarians.

FUNDING INFORMATION

This work was supported by the Council of Australian University Librarians as a participating institution to publish the work. The research did not receive any other specific funding support.

CONFLICT OF INTEREST STATEMENT

None.

ETHICS STATEMENT

Ethical approval was obtained from FederationUniversity Human Research Ethics Committee (Approval #18-017).

DATA AVAILABILITY STATEMENT

Data may be available upon request through the corresponding author and upon authorization of the Federation University Australia Human Research Ethics Committee.

ORCID

Daniel Terry https://orcid.org/0000-0002-1969-8002
Blake Peck https://orcid.org/0000-0002-2444-9780
Marianne Biangone https://orcid.org/0000-0001-7210-6961

REFERENCES

Avey, J. B., Luthans, F., & Jensen, S. M. (2009). Psychological capital: A positive resource for combating employee stress and turnover. *Human Resource Management*, *48*(5), 677–693.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, *84*(2), 191–215.

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*(2), 122–147.

Bandura, A. (1994). Self-efficacy, encyclopedia of human behavior. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. *4*, pp. 71–81). Academic Press.

Bandura, A., Pajares, F., & Urdan, T. (2006). Self-efficacy beliefs of adolescents. In F. Pajares & T. Urdan (Eds.), *Guide for constructing self-efficacy scales* (pp. 307–337). Information Age.

Biangone, M. (2020). *Fostering the non-academic trait of grit to increase nursing student success*. William Carey University.

Çelik, İ., & Sariçam, H. (2018). The relationships between positive thinking skills, academic locus of control and grit in adolescents. *Universal Journal of Educational Research*, *6*(3), 392–398.

Chen, D. L., Ertac, S., Evgeniou, T., Miao, X., Nadaf, A., & Yilmaz, E. (2022). Grit and Academic Resilience During the Covid-19 Pandemic. *INSEAD Working Paper No. 2022/02/DSC*. https://doi.org/10.2139/ssrn.4001431

Credé, M., Tynan, M. C., & Harms, P. D. (2017). Much ado about grit: A meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology*, *113*(3), 492–511.

DeWitz, S. J., Woolsey, M. L., & Walsh, W. B. (2009). College student retention: An exploration of the relationship between self-efficacy beliefs and purpose in life among college students. *Journal of College Student Development*, *50*(1), 19–34.

Duckworth, A. (2016). *Grit: The power of passion and perseverance*. Scribner.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology*, *92*(6), 1011–1087.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the short grit scale (GRIT–S). *Journal of Personality Assessment*, *91*(2), 166–174.

Ghanizadeh, A. (2021). Higher education amid COVID-19 pandemic: Contributions from resilience, positive orientation and grit. *Journal of Applied Research in Higher Education*, *14*(4), 1670–1685.

Groth, N., Schnyder, N., Kaess, M., Markovic, A., Rietschel, L., Moser, S., Michel, C., Schultze-Lutter, F., & Schmidt, S. J. (2019). Coping as a mediator between locus of control, competence beliefs, and mental health: A systematic review and structural equation modelling meta-analysis. *Behaviour Research and Therapy*, *121*, 103442.

Huéscar Hernández, E., Moreno-Murcia, J. A., Cid, L., Monterio, D., & Rodrigues, F. (2020). Passion or perseverance? The effect of perceived autonomy support and grit on academic performance in college students. *International Journal of Environmental Research and Public Health*, *17*(6), 2143.

Klaus, G., Ernst, A., & Oswald, L. (2020). Psychological factors influencing laypersons' acceptance of climate engineering, climate change mitigation and business as usual scenarios. *Technology in Society*, *60*, 101222.

Kline, R. B. (2023). *Principles and practice of structural equation modeling*. Guilford Publications.

Kovaleva, A. (2012). *The IE-4: Construction and validation of a short scale for the assessment of locus of control*. GESIS—Leibniz-Institut für Sozialwissenschaften.

Krampe, H., Danbolt, L. J., Haver, A., & Schnell, T. (2021). Locus of control moderates the association of COVID-19 stress and general mental distress: Results of a Norwegian and a German-speaking cross-sectional survey. *BMC Psychiatry*, *21*(1), 437.

Luthans, F., Avolio, B. J., & Avey, J. B. (2007). *Psychological capital (PsyCap) questionnaire (PCQ)*. Mind Garden Inc.

Luthans, F., Luthans, K. W., & Luthans, B. C. (2004). Positive psychological capital: Beyond human and social capital. *Business Horizons*, *47*(1), 45–50.

Myślińska, A., Śliwak, J., & Partyka, J. (2016). Types of hope and action styles of adolescents. The person and the challenges. *The Journal of Theology, Education, Canon Law and Social Studies Inspired by Pope John Paul II*, *6*(1), 179–206.

Neuwirth, L. S., Jović, S., & Mukherji, B. R. (2021). Reimagining higher education during and post-COVID-19: Challenges and opportunities. *Journal of Adult and Continuing Education*, *27*(2), 141–156.

Park, S., & Avery, E. J. (2019). Development and validation of a crisis self-efficacy index. *Journal of Contingencies and Crisis Management*, *27*(3), 247–256.

Perez, G. (2023). *Pathways to resilience*. Saint Peter's University.

Quing, K. A., & Baudin, J. S. (2021). The roles of internal locus of control and grit in managing the academic stress of senior high school students in southern Luzon state university. *Journal of Education, Management and Development Studies*, *1*(1), 1–9.

Rammstedt, B., Lechner, C. M., & Weiß, B. (2021). Does personality predict responses to the COVID-19 crisis? Evidence from a prospective large-scale study. *European Journal of Personality*, *36*(1), 47–60.

Roslan, N. S., Yusoff, M. S. B., Morgan, K., Ab Razak, A., & Shauki, N. I. A. (2022). Evolution of resilience construct, its distinction with hardiness, mental toughness, work engagement and grit, and implications to future healthcare research. *Education in Medicine Journal*, *14*(1), 99–114.

Schmiedeberg, C., & Thönnissen, C. (2021). Positive and negative perceptions of the COVID-19 pandemic: Does personality play a role? *Social Science & Medicine*, *276*, 113859.

Schwarzer, R., & Jerusalem, M. (1995). Generalized selfefficacy scale. In R. Schwarzer, M. Jerusalem, J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio. Causal and control beliefs* (pp. 35–37). Nfer-Nelson.

Schwarzer, R., & Jerusalem, M. (2010). The general self-efficacy scale (GSE). *Anxiety, Stress, and Coping*, *12*, 329–345.

Schyns, B. (2004). The influence of occupational self-efficacy on the relationship of leadership behavior and preparedness for occupational change. *Journal of Career Development*, *30*(4), 247–261.

Snyder, C. R. (1995). Conceptualizing, measuring, and nurturing hope. *Journal of Counseling & Development*, *73*(3), 355–360.

Snyder, C. R., Rand, K. L., & Sigmon, D. R. (2002). Hope theory: A member of the positive psychology family. In C. R. Snyder & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 257–276). Oxford University Press.

Snyder, C. R., Shorey, H. S., Cheavens, J., & Wiklund, C. (2002). Hope and academic success in college. *Journal of Educational Psychology*, *94*, 820–826.

Soto, C. J., & John, O. P. (2017). Short and extra-short forms of the big five inventory–2: The BFI-2-S and BFI-2-XS. *Journal of Research in Personality*, *68*, 69–81.

Storen, R., & Corrigan, N. (2020). *COVID-19: A chronology of state and territory government announcements (up until 30 June 2020)* (pp. 1–103). Parliment of Australia.

Terry, D., & Peck, B. (2020a). Factors that impact measures of grit among nursing students: A journey emblematic of the Koi Fish. *European Journal of Investigation in Health, Psychology and Education*, *10*, 564–574. https://doi.org/10.3390/ejihpe10020041

Terry, D., & Peck, B. (2020b). Academic and clinical performance among nursing students: What's grit go to do with it? *Nurse Education Today*, *88*, 104371. https://doi.org/10.1016/j.nedt.2020.104371

Terry, D., Peck, B., & Biangone, M. (2023). Changes in grit and psychological capital at the time of major crisis: Nursing students' perseverance, resources, and resilience. *International Journal of Nursing Education Scholarshi*, *20*(1), 20220114.

Terry, D. R., Peck, B., Smith, A., Stevenson, T., & Baker, E. (2019). Is nursing student personality important for considering a rural career? *Journal of Health Organization and Management*, *33*(5), 617–634. https://doi.org/10.1108/JHOM-03-2019-0074

Widiger, T. A. (2009). Neuroticism. In *Handbook of individual differences in social behavior* (pp. 129–146). The Guilford Press.

How to cite this article: Terry, D., Peck, B., & Biangone, M. (2024). The mechanisms of student grit at the height of a major crisis: Identifying key predictors when times get really tough. *Nursing Open*, *11*, e2069. https://doi.org/10.1002/nop2.2069