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**Understanding the pathways to resilience
in university students in a UK-based
higher education setting:
A socio-ecological approach**

By

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희망이 있는 곳엔 반드시
절망이 있네

Wherever there's
hope, there's a
despair

우린 절망해야 해 그 모든
시련을 위해

We have to despair
for all those trials

바다 (Sea)
방탄소년단

Lyrics translation credits: <https://doolsetbangtan.wordpress.com/?s=sea>

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To Ma and Baba

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Abstract

Background: The mental health and well-being of university students has been deemed a global concern due to the rising prevalence of poor mental health and psychosocial functioning. The thesis's impetus was drawn from the increased advocacy for resilience promotion in university students by higher education-based policies. A review of resilience literature within the higher education context illuminated several discrepancies in the conceptual and operational enquiry of resilience for this specific population. Specifically, the study of resilience within the higher education setting has primarily been individual-focused which has discounted the risk or protective role of family and social factors. Additionally, a review of the resilience-based interventions for university students indicated the need for a systematic theoretical and empirical delineation of the complex construct.

Objective: The thesis proposed and examined the prospective validity of a socio-ecological model of resilience. The influence of a within-individual (i.e., perceived stress), familial (i.e., dysfunctional parenting styles), and social (i.e., perceived social support) risk and protective factors on a multidimensional construct of resilience (i.e., psychological, social, and emotional resilience) were examined. The underlying mechanism of cognitive reappraisal and the potential variations in this mechanism due to the gender and ethnic identities of the university students were also examined.

Methods: A two-phase study design with baseline and 5-month follow-up assessments were conducted. A sample of undergraduate students (79.72% female students, 81.44% White/White British students, mean age = 20.74 years) from all years of study completed a self-report survey at the start of their first term (baseline, n = 775) and again at the end of their second term (follow-up, n = 376). Confirmatory factor analyses were performed to establish longitudinal measurement invariance of the measures used in the self-report survey. Path analyses examined the direct associations, mediation effects, and moderated mediation effects on the data from a final matched sample (n = 362).

Results: Longitudinal path models indicated that perceived stress was a significant predictor of psychological (i.e., mental well-being and psychological distress), social (campus connectedness), and emotional (i.e., positive and negative affect) resilience. Cognitive reappraisal partly conveyed the causal relationships between perceived stress and mental well-being, psychological distress, and positive affect across time. Perceived social support from friends was associated with mental well-being and campus connectedness, and these relationships were partly conveyed by cognitive reappraisal. Perceived social support from significant others was associated with mental well-being, psychological distress, and positive affect. Experiences of maternal dysfunctional parenting styles had direct relationships with mental well-being, psychological distress, campus connectedness, and negative affect. Perceived social support from family and paternal dysfunctional parenting styles were not associated with the outcomes of resilience. Gender and ethnicity did not moderate the underlying mechanism of cognitive reappraisal in the pathways of resilience in the longitudinal models.

Discussion: This thesis's findings support the need to examine social and family-based factors as predictors of resilience. Specifically, the results suggest that early adverse experiences of poor family functioning can have a cascading effect on psychological, social, and emotional adaptation later in life. The partial support for cognitive reappraisal suggests that the ability to downregulate emotional responses in the face of stressors can be beneficial when perceived social support is low, and perceived stress is high. These findings have significant implications on the development of resilience-based interventions that provide opportunities for the formation of long-lasting social support networks and cultivating stress-management skills. Overall, the findings offer a useful socio-ecological framework for the conceptualisation and operationalisation of university students' resilience within the higher education context.

List of Abbreviations

BOS	Bristol Online Survey
CBT	Cognitive Behavioural Therapy
CFI	Comparative Fit Index
CCS	Campus Connectedness Scale
CFA	Confirmatory Factor Analysis
CORE-GP	Clinical Outcomes in Routine Evaluation – General Population
ERQ-CR	Emotion Regulation Questionnaire (cognitive reappraisal subscale)
EM	Expectation Maximisation
EPC	Expected Parameter Change
FIML	Full Information Maximum Likelihood
FMOP	Measure of Parenting Style (Father)
GDPR	General Data Protection Regulation
HEFCE	Higher Education Funding Council for England
HESA	Higher Education Statistics Agency
ML	Maximum Likelihood
MLR	Maximum Likelihood Estimation with Robust Standard Errors
MCAR	Missing Completely at Random
MHPC	Mental Health Policy Commission
MI	Modification Index
MOPS	Measure of Parenting Style
MMOP	Measure of Parenting Style (Mother)
MSPSS	Multidimensional Scale of Perceived Social Support
NHS	National Health Service
NUS	National Union of Students

ONS	Office for National Statistics
PSS-10	Perceived Stress Scale (10 items)
PANAS	Positive and Negative Affect Scale
RMSEA	Root Mean Square Error of Approximation
RCP	Royal College of Psychiatrists
SGIC	Self-Generated Identification Codes
SRMR	Standardised Root Mean Square
SEM	Structural Equation Modelling
SU	Students' Union of the University of Nottingham
SPSS	Statistical Product and Service Solutions
TLI	Tucker-Lewis Index
UoN	University of Nottingham, UK Campus
UK	United Kingdom
UUK	Universities UK
VIF	Variance Inflation Factors
WEMWBS	Warwick-Edinburgh Mental Well-being Scale
WHO	World Health Organisation
WLSMV	Mean and Variance adjusted Weighted Least Squares

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Chapter 1 Introduction and thesis overview

1.1 The mental health and well-being of university students

The pursuit for higher education in the United Kingdom (UK) has shifted from an endeavour of the elite to a student population that is largely reflective of the nation's diverse population (Denovan & Macaskill, 2017b; Universities UK (UUK), 2019). 93% of young people in the UK transitioning to higher education settings after state school (Higher Education Statistics Agency (HESA), 2020). The peak age of onset for most psychiatric conditions, such as schizophrenia and eating disorders, is approximately by the mid-20s (De Girolamo, Dagani, Purcell, Cocchi, & McGorry, 2012; Kessler et al., 2010; Perre, Wilson, Smith-Merry, & Murphy, 2016), making emerging adults, i.e., most of the university students, an at-risk population for poor mental health (Bruffaerts et al., 2018; Royal College of Psychiatrists (RCP), 2011). The estimates from the World Mental Health Survey held in 21 countries by the World Health Organisation (WHO) indicate that between 25% - 33% of university students would have experienced a common mental health disorder in the last 12 months during their time at university (Auerbach et al., 2016, 2018). Large global epidemiological, as well as cross-sectional studies, have found elevated levels of psychological distress, anxiety, mood disorders, and family and academic-related distress in university students (Arias-De la Torre et al., 2019; King et al., 2020; Larcombe et al., 2016; Xiao et al., 2017).

In the UK, the prevalence of poor mental health and well-being in university students has been gradually increasing and not returning to pre-university levels (Bewick, Koutsopoulou, Miles, Slaa, & Barkham, 2010; Macaskill, 2013). Psychological distress in university students is reported to range between 29% and 40% (Harris, 2019; RCP, 2011), with 21% of university students from 140 universities self-reporting as having been diagnosed with a mental health condition (The Insight Network and Dig-In, 2019).

Additionally, university students are reported to have low satisfaction and

happiness, and higher levels of anxiety and depression as compared to age-matched peers (Office for National Statistics (ONS), 2018). These estimates of poor mental health and well-being support in the UK are in line with the findings of global studies comparing university- and non-university going students (Cvetkovski, Jorm, & MacKinnon, 2019; Ibrahim, Kelly, Adams, & Glazebrook, 2013; Larcombe et al., 2016). Compared to the general population, a study by McManus and Gunnell (2020) found that the prevalence of common mental disorders among female university students in the UK almost doubled from 17.5% to 35.5% between 2007 - 2014, compared to the female non-university attending peers.

The impact of university students' poor mental health and well-being is wide-ranging, affecting physical, emotional, social, mental, and interpersonal aspects of well-being (Baik, Larcombe, & Brooker, 2019; Bruffaerts et al., 2018; Salzer, 2012). These include absenteeism, low academic motivation, poor academic performance (Lipson & Eisenberg, 2018; Storrie, Ahern, & Tuckett, 2010), and ultimately high drop-out rates (Hartley, 2010; Thorley, 2017). Mental health problems have been reported to be the reason for 1,180 students dropping out of university during the academic year of 2014/2015, a 210% increase from 380 students in 2009/2010 (Thorley, 2017). The poor mental health of university students is also associated with health-harming behaviours, such as excessive alcohol consumption and risky sexual activity (Sarmiento, 2015), and on the extreme end, with self-harm, suicidal thoughts, and suicide during university (Mortier et al., 2017; Mortier et al., 2018). Loneliness, academic stress, and childhood trauma have been reported to be key risk factors for distress among undergraduate students in the UK (McIntyre et al., 2018).

1.2 Resilience and mental health promotion in higher education

Over the years, researchers and policymakers have begun to acknowledge that while for some students, the time at university is associated with poor mental health outcomes and the onset of mental health conditions, for most students, the pursuit of education is a time for self-growth and thriving (Arias-De la

Torre et al., 2019; Auerbach et al., 2016; Dickinson, 2019; Larcombe et al., 2016; Orygen, 2017). There has been a paradigm shift in research and public policy towards the cultivation of resilience and the promotion of mental health and well-being in young people to effectively navigate through the unique stressors associated with higher education (Barrable, Papadatou-Pastou, & Tzotzoli, 2018; Harris, 2019; National Health Service (NHS) England, 2015; Public Health England, 2016). The need for competent and productive members of the current diverse socio-cultural and neoliberal political contexts is driving the innovations in resilience research to increase social capital and healthy development in the population (Masten, 2014a, 2014b).

Resilience, commonly defined as the process of positive adaptation to adversities, has gained popularity for its emphasis on the development of strengths and resources among university students, such as self-regulation skills and enhanced social support (Hughes & Spanner, 2019; Piper & Byrom, 2017; YouGov, 2016). Studies have indicated that a deficiency of resilience among university students can manifest in vulnerabilities, such as dropout, psychological distress, helplessness, and anxiety (e.g., McGowan & Murray, 2016; Slatyer, Cramer, Pugh, & Twigg, 2016; van Hoek, Portzky, & Franck, 2019). Conversely, a higher level of resilience is associated with positive mental health outcomes, such as valued living, subjective well-being, and positive emotions (Ceary, Donahue, & Shaffer, 2019; Hu, Zhang, & Wang, 2015; Wu, Sang, Zhang, & Margraf, 2020).

For these reasons, it has been argued that universities in the UK should be investing in the prevention of poor mental health and the creation of mental health-promoting opportunities to foster a “*resilient generation*” (Hughes & Spanner, 2019; Mental Health Policy Commission (MHPC), 2019; UUK, 2020). Higher education settings support emerging adults through two critical transitional phases of their lives, i.e., from school to university, and from university to the work environment (Hewitt, 2019). Considering this, there has been a call for innovative approaches to bolster the positive mental health and resilience of university students by creating supportive environments that value the diversity of lived experiences; organising

activities that strengthen community bonds; and improving access to culturally competent and evidence-based services to develop self-regulation and self-care skills (e.g., Baik et al., 2016; Came & Tudor, 2020; Duffy et al., 2019; Levin, Rixon, & Keating, 2019; UUK, 2017). A whole-university approach is in line with the recommendations by resilience researchers for the investigation of ecological models of resilience that account for the influences of family, community, culture, and contexts (Hamby, Grych, & Banyard, 2018; Luthar, Cicchetti, & Becker, 2000; Ungar, 2011).

Much of the higher education sector research has investigated the prevalence and causes of poor mental health conditions in university students. The conflation of mental health conditions and well-being has impacted the understanding of resilience within the higher education context (Hewitt, 2019). Well-being emphasises on the ability of the students to “*fully exercise their cognitive, emotional, physical, and social powers, leading to flourishing*” (Hughes & Spanner, 2019, p.9); while mental health encompasses the symptoms of mental health conditions as well as optimal mental well-being which is determined by a range of individual, interpersonal, social, and environmental factors (Hughes & Spanner, 2019; Mind, 2017; UUK, 2020). A reform focusing on resilience within the higher education contexts is only possible by expanding the evidence base beyond the knowledge of psychopathology and rather, complementing this knowledge with understanding the potential pathways to resilience and well-being among university students. This notion is supported by recent policy recommendations for higher education settings. For example, *Stepchange*, a whole-university framework developed by UUK and the Student Minds University Mental Health Charter (2020) has emphasised on the prevention and early intervention for mental health conditions as well as the promotion of positive mental well-being for the whole university population.

1.3 Purpose of the thesis and overview of the chapters

Given the urgency to promote resilience among university students, this thesis addresses the discrepancies encountered in understanding the nature of

resilience and explores the potential pathways contributing to resilience in university students. As such, the thesis explores three key questions by proposing and examining the prospective validity of a novel theoretical model of resilience for university students: i.e., what individual, social, and familial resources predict resilience in university students? What kind of resilience-promoting process underpins the trajectories to resilience in university students? Do the socio-demographic characteristics of university students influence the process of the development of resilience? To this end, a self-report two-phase study examines a socio-ecological multidimensional model of resilience to disentangle the dynamic nature of the pathways to resilience in university students.

This first chapter has introduced the emerging need and advocacy towards the cultivation of resilience in university students within the higher education context in public policy. To fully understand the complexity of the construct of resilience and the source of the significant discrepancies within the literature, Chapter 2 of this thesis provides a brief overview of the history of the construct. This chapter informs the conceptual and operational basis of resilience as adopted in this thesis. Chapter 3 critiques the existing resilience research and resilience-based interventions specific to the higher education context and identifies the knowledge gaps which the thesis aims to address. Chapter 4 discusses specific well-established theoretical frameworks that have been deemed pertinent for the higher education context. The chapter provides a rationale for developing a novel theoretical model of the multidimensional construct of resilience specifically for university students within the higher education context. Chapter 5 presents the proposed novel theoretical model of resilience and provides evidence to support the model's components. Chapter 6 justifies the study's methodology; the study design, the analysis strategies, the measures used, and elucidates the hypotheses. Chapter 7 presents the study results, and finally, Chapter 8 critically interprets the results and the validity of the proposed socio-ecological theoretical model of resilience. The chapter discusses the theoretical and empirical implications of the novel model on higher education-based resilience research and explicates the strengths and limitations of the thesis.

Chapter 2 Resilience

This chapter provides an overview of the conceptualisation and operationalisation of resilience over the years. The nature of resilience belies its current application in research as a personality trait or a capability, and in policymaking as a public health concern (Ecclestone & Lewis, 2014). To fully appreciate the construct's complexity, it is essential to understand the historical perspectives and evolution of resilience research across different contexts and populations. This chapter discusses the defining features of resilience and the impediments on its measurement due to conceptual discrepancies. The chapter concludes by delineating the recommendations for resilience research as proposed by pioneering resilience theorists. The next chapter, Chapter 4Chapter 3, critically reviews the extant resilience literature involving university students to refine further the operational and conceptual basis of resilience in this thesis.

2.1 History of resilience research

Resilience emerged as a concept from the seminal and systematic studies into child development conducted by pioneers in the field such as Emmy Werner, Norman Garmezy, and Michael Rutter in the early 1970s (Johnson & Wiechelt, 2004). Rather than emerging from theory, the enquiry into resilience resulted from the phenomenological observations of survivors of immense trauma, such as poverty and war (Richardson, 2002). Over the years, the interest in the study of resilience grew due to a shift away from the deficit models of psychopathology and ill health and towards the investigation of the assets and processes that promote mental health and well-being (Fletcher & Sarkar, 2013; Meza, Aguayo, Cevallos, & Zambrano, 2018; Resnick, 2018).

The conceptualisation (i.e., specification and refinement of a concept) and operationalisation (i.e., measurement of the concept) of resilience have

evolved numerous times and continue to evolve with advancements in technology and methodological refinements. Resilience was initially conceptualised as an unwavering and stable attribute of an individual in the face of adversity (Block, 1993; Block & Kremen, 1996; Sagone & Elvira De Caroli, 2014); however, the evolution in research has shifted towards dynamic and context-specific definitions (Fletcher & Sarkar, 2013; Vanderbilt-Adriance & Shaw, 2008). To understand this progression, a glimpse into the history of resilience research is required. The advancement of resilience science in the last 50 years has often been summarised to have occurred – and is still occurring – in four waves of research (Luthar et al., 2000; Masten, 2014a; Masten & Obradović, 2006; Wright, Masten, & Narayan, 2013).

The **first wave** of resilience research is often attributed to World War II, which brought attention to the survivors of war, primarily children, facing the dangerous consequences of the devastation (Masten, 2014b). Some of the pioneers of resilience research were directly affected by the war; Norman Garmezy was an American soldier, and Emmy Werner and Michael Rutter were child survivors (Masten, 2014a). Later as researchers, they noticed that some children appeared to be “*invulnerable*”, i.e., they seemed to have evaded the aftereffects of adverse circumstances, such as parents with severe mental illness (Anthony, 1974; Garmezy & Rodnick, 1959). Researchers began to view these children as the key to understanding risk evasion and competency in the face of adversity (Anthony, 1974; Masten & Coatsworth, 1998; Masten & Obradović, 2006; Rutter, 1979). Several longitudinal studies were conducted in the 1980s to examine the factors that led to the “*invulnerability*” to risks, such as psychopathology and delinquency in children (Anthony, 1974; Masten & Coatsworth, 1998). These studies did not directly examine resilience, but rather, the factors that appeared to predict successful adaptation and coping with the difficulties in life. Some of these studies are briefly described below.

A landmark longitudinal study by Werner and Smith (1982) in Kauai, Hawaii, followed the life trajectories of 698 children born in 1955 for thirty years. Many of these children were raised in deprived conditions. They found that children raised in similar environments turned out to have drastically different lives as adults. While many of the children succumbed to the

stressors in their lives, some, i.e., one out of three high-risk children, were able to deal with their challenging upbringing effectively. They identified common characteristics of children who were ‘resilient’ and categorised these as being protective in nature. Some of the internal factors they identified were being female, adaptable, having good communication skills, and being socially reliable. Some of the external factors identified were caring environments, both in the family and in the community (Johnson & Wiechelt, 2004; Werner & Smith, 1982).

Similar studies, such as the Newcastle Thousand Family Study (Kolvin, Miller, Fleeting, & Kolvin, 1988), The Rochester Longitudinal Study (Sameroff, Seifer, Zax, & Barocas, 1987), and an 18-year longitudinal study by Egeland, Carlson, and Sroufe (1993), were conducted to study children who were associated with adverse risks or disadvantages, e.g., a parent with a severe mental illness, abuse, delinquency, poverty, and natural disasters. They identified a range of risk and protective factors, both internal and external, to the individual. Family functioning, such as poor maternal care and quality of parenting (Kolvin et al., 1988), individual’s perceptions of the environmental stimuli (Egeland et al., 1993), and social factors like poor education and poverty (Sameroff et al., 1987) were some of the identified risk and protective factors.

As systematic research expanded, the first wave became largely descriptive and focused on the attributes of “*invulnerable*” and “*resilient*” children (Werner, 2000). Three sets of crucial factors were delineated based on an ecological perspective – those arising within the individual and characteristics of their family and their social environment (Masten & Garmezy, 1985; Masten & Reed, 2002). Eventually, the first wave’s early efforts into the conceptualisation of resilience as the presence of invulnerability or as an unchanging personality trait were challenged (Luthar et al., 2000; Masten & Garmezy, 1985). Particularly researchers like Suniya S. Luthar (1991) started questioning the reliance on the evasion of externalising behaviour and psychopathology as indicators of resilience. In her study, she found that children who were “*resilient*” were also more likely to be depressed and anxious as compared to “*competent*” children from low-stress backgrounds. The findings of the study alluded to the fact the resilience was a much more

complex construct. To complement the study of risk and protective factors, successive research asked questions of *how*, rather than *what*, shifting the focus to understand the processes that ameliorated the effects of adverse circumstances, and if these could be cultivated in individuals (Masten et al., 1990; Richardson, 2002).

The **second wave** of resilience research refocused to examine the processes and regulatory systems through which protective factors transact with each other in different contexts (Masten & Obradović, 2006; Rutter, 2006; Windle, 2011). The notion of invulnerability was dismissed for being too absolute (Rutter, 1993, 2013). Resilience researchers began to recognise that individuals differ in their capacity to deal with stress and adverse events, and their environments differ in resources, which can all collectively impact resilience (Gallo, Matthews, Bogart, & Vranceanu, 2005). The characteristics identified in the first wave appeared to nourish resilience processes, allowing individuals to successfully cope and thrive after difficulties (Meza et al., 2018).

In an epidemiological study on the Isle of Wight and London, Rutter and colleagues (1976) found that the type of risk and adaptation to the risk also changed with changing circumstances. This triggered Rutter to study the process of risk and vulnerability and the context-specific nature of resilience. He recommended the study of processes that engage with risk and adversities over the singular focus on the identification of factors which, on their own, may not prevent adverse outcomes (Rutter, 1989, 1993). Such an empirical examination of the transactional interactions between the resilience-promoting processes underlying the risk and protective factors were recognised to have implications on the theoretical refinement of resilience (Cicchetti & Curtis, 2006; Fergus & Zimmerman, 2005; Luthar et al., 2000; Masten & Cicchetti, 2010).

Both the first and second waves provide evidence for the influential role of early developmental experiences, such as attachment to caregivers and the family environment, on positive adaptation across communities and cultures (Masten & Coatsworth, 1998; Masten et al., 1999; Werner & Smith, 1982,

2001). The second wave of resilience research clarified the limitations of the early conceptualisations of resilience.

- Resilience is multidetermined as several processes, including biological (e.g., neuroendocrine system), social (e.g., social support), cultural (e.g., gender roles), familial (e.g., quality of parenting), and environmental (e.g., positive universities), have been recognised to be factors which influence resilience (Cicchetti & Blender, 2006; Clauss-Ehlers, 2008; Masten & Barnes, 2018; Masten & Obradović, 2006).
- Resilience is context-dependent and a multidimensional construct (Fergus & Zimmerman, 2005; Ungar, 2008); i.e., an individual may express resilience in one context, e.g., interpersonal relationships, however, not in other circumstances or domains, such as in academics or in the face of financial challenges (Fergus & Zimmerman, 2005; Luthar et al., 2000; Martin & Marsh, 2008). As Rutter explicitly stated, “*if circumstances change, resilience alters*” (1987, p.317). Additionally, a pattern of resilience processes may be beneficial for specific adversity, but maybe maladaptive in another context or differ across cultures (Becker & Ferry, 2016). Such fluctuations do not necessarily signify an ephemeral construct; instead, longitudinal studies have shown that individuals can maintain a general state of resilience in salient domains over time (e.g., Egeland et al., 1993; Werner, 1995).
- Resilience resources and assets may be easily accessible in some contexts vs. others (McAllister & McKinnon, 2009), emphasising the temporal and dynamic nature of resilience.

The process of fostering and expressing resilience is embedded in diverse contexts and systems and results from a successful transaction with resources in a culturally and contextually appropriate manner (Masten & Coatsworth, 1998; Ungar, 2011). Such dynamic and transactional conceptualisation of resilience indicates that such adaptive profiles can be enhanced and cultivated (Gillespie, Chaboyer, Wallis, & Grimbeek, 2007; Luthar et al., 2000; Rutter, 2013), which has provoked an interest in resilience-based intervention sciences.

The **third wave's** central tenet was that resilience could be acquired (Chmitorz et al., 2018; Resnick, 2018). Over the years, it has become evident that cultivating resilience is an important facilitator of psychological, social, and emotional development (Masten, 2015). The focus of the third way has been on the development of preventive and promotive interventions and changes in policy recommendations to include the fostering of resilience in the community to mitigate the effects of adversity (Luthar, Sawyer, & Brown, 2006; Wright et al., 2013; Zolkoski & Bullock, 2012). The key approaches that are considered while designing interventions can be understood as: i) risk-focused, ii) asset-focused, and iii) process-focused (Masten, 2001; Masten & Coatsworth, 1998). Risk-focused interventions aim to prevent or eliminate the presence of risk factors; asset or resource-focused interventions aim to add or improve access to assets and resources that enhance resilience, and; process-focused interventions aim to influence the mechanisms that appear to promote and foster resilience. These interventions have relied on the study of mediated influences (i.e., the study of underlying processes), such as emotion regulation, self-efficacy, which provide evidence for why an asset facilitates positive adaptation in the face of threatening circumstances (e.g., Akeman et al., 2019; Barrable et al., 2018; Chandler, Kalmakis, Chiodo, & Helling, 2019).

The three waves integrate with the **fourth wave** which explores the contributions of epigenetic and neurobiological factors and processes on resilience by using the latest technology and statistical computing software (Cicchetti & Blender, 2006; Shonkoff, 2010). The neurobiological focus on resilience is propelled by the evidence of the impact of adverse events on brain structure and function (Wu et al., 2013). The advancements in the fields of genetics, statistical modelling, brain imaging, and neuroplasticity have led to the study of resilience from an experimental and neurobiological lens (Cicchetti, 2013; Cicchetti & Curtis, 2006; Luo et al., 2012; Masten, 2014b). For example, the role of emotion regulation as a resilience-promoting process is being substantiated by the advancements in neuroscience that has increased precision in the study of the physiology and functioning of the brain (e.g., Hunter, Gray, & McEwen, 2018; Rezapour, Assari, Kirlic, Vassileva, & Ekhtiari, 2020). Additionally, developments in statistical and computational

modelling have made possible the robust examination of multiple linkages and pathways to resilience, track the stability and dynamic nature of these pathways longitudinally, and examine the influences of protective and vulnerability factors and processes in complex models (Baratta, Rozeske, & Maier, 2013; Grimm, Ram, & Hamagami, 2011; Masten, 2014b). The fourth wave brings forth a progressively holistic and comprehensive understanding of within- and between- individual differences in resilience (Masten, 2014b; Masten & Obradović, 2006).

The four waves of resilience research have led to the conception of resilience as being generated by multiple systems that interact at various levels (e.g., genetics, social networks, family backgrounds, personality characteristics) (Bacon, Brophy, Mguni, Mulgan, & Shandro, 2010; Ecclestone & Lewis, 2014). Contexts afford the individuals specific resources and systems to bolster resilience and responses to adverse circumstances (Ecclestone & Lewis, 2014; Friedli, 2009). The thesis adopts the key lessons from each of the four waves to inform an ecologically-based conceptual enquiry of resilience. Considering the context-dependent nature of adversities and resilience to these adverse circumstances, the thesis aimed to contextualise the process of resilience within a specific population, i.e., university students, and account for the role of their demographic characteristics, i.e., their gender and ethnicity. With the advancements in statistical analytical strategies and software, the thesis aimed to study the pathways to resilience within the higher education context using advanced statistical modelling. These are discussed in greater depth in the following chapters.

Considering the constant evolution of resilience research, the conceptualisation of resilience is not devoid of discrepancies related to its defining features and how it has been measured. The following sections address the discrepancies related to the conceptualisation and operationalisation of resilience and describe the recommendations that the thesis has adopted for a nuanced and comprehensive conceptual modelling of resilience.

2.2 Conceptualising resilience

2.2.1 Definitions of resilience: Issues and clarifications

Resilience research has produced a range of definitions and examined a myriad risk and protective factors in different groups of people and contexts, without reaching a consensus on a universal definition of resilience (Davydov, Stewart, Ritchie, & Chaudieu, 2010; Windle, 2011). To highlight the range of definition of resilience in the literature, a review by Pangallo (2014) categorised the definitions in the following groups: i) trait, ii) psychological state, iii) process, and iv) positive outcome. The discrepancies in the conceptualisation of resilience are primarily due to its use as a personality trait vs. an outcome or a process (Luthar et al., 2000) and the diversity of historical, socio-cultural contexts and populations which have been examined (Fletcher & Sarkar, 2013). Additionally, the interchangeable use of resilience with related constructs, such as coping and thriving, has led to a conflation of information about resilience across populations (Fletcher & Sarkar, 2013).

When defined as a **trait**, resilience assumes that it is the individual's internal attributes that allow them to cope with adversity (Rutter, 1987). For example, Werner and Smith (1992) described resilience as an innate self-righting and steeling mechanism. Such a definition posits that resilience is primarily a result of intrinsic and stable characteristics, such as hardiness (Connor & Davidson, 2003; Connor, Davidson, & Lee, 2003; Ong, Bergeman, Bisconti, & Wallace, 2006). It implies that an individual who does not have this characteristic does not have the competency or ability to cope with adverse events (Luthar et al., 2000). Personality characteristics, instead, have been recognised to be one of many risks or protective factors that impact resilience (Luthar et al., 2000; Masten, 2014a). Technically, terms such as “*resiliency*” and “*resilient*” can appear to connote a trait, i.e., an absolute characterisation is made about the individual (Luthar et al., 2000; Masten & Powell, 2003). The individual-focused conceptualisation of trait resilience has also been

scrutinised on its role in blaming the individual for not coping with the adverse circumstances (Masten, 2001; Webster, 2017).

Instead, resilience is recommended to be conceptualised as a process and an outcome (Fletcher & Sarkar, 2013; Luthar et al., 2006; Rutter, 2006). Such a conceptualisation highlights its context-specific, temporal, modifiable, and multidimensional nature (Luthar & Cicchetti, 2000; Masten, 2001). When defined as a **process**, resilience emphasises the transactional interactions between the characteristics and factors within the individual and their environment and the adverse circumstances (Hobfoll, Stevens, & Zalta, 2015; Luthar et al., 2000; Masten & Tellegen, 2012). Processes and regulatory systems that aid the relationships between the risk and protective factors and domains of resilience, such as emotion regulation strategies and mindfulness, are recognised to be resilience-promoting processes (Luthar & Cicchetti, 2000; Masten, 2001). When viewed as an **outcome**, resilience makes a distinction between individuals who positively adjust in specific ways in the face of adversity vs. those who are unable to cope under the same conditions (Kaplan, 2002). These can be conceptualised and measured as a different domain through which resilience processes and factors manifest for different individuals under different contexts in the face of adverse events. Such a conceptualisation of resilience reflects a crucial characteristic of resilience, i.e., an individual may or may not respond to stressors and threats the same way in their entire life span (Davydov et al., 2010). These outcomes of resilience are developmentally salient to the individuals under study (Luthar et al., 2000; Masten, 2001).

The process-outcome conceptualisation of resilience has led to definitions such as “*the process of, capacity for, or outcome of successful adaptation despite serious challenging or threatening circumstance*” (Masten et al., 1990, p.426), and “*the capacity of a dynamic system to adapt successfully to disturbances that threaten system function, viability, or development*” (Masten, 2014, p.6). Luthar and Cicchetti (2000, p.2) defined resilience as “*a dynamic process wherein individuals display positive adaptation despite experiences of significant adversity or trauma*”. The contextual and transactional nature of internal and external resources are also subsumed in

such resilience definitions. Ungar (2008, p.225) has defined resilience as the *“the capacity of individuals to navigate their way to health-sustaining resources, including opportunities to experience feelings of well-being, and a condition of the individual’s family, community and culture to provide these health resources and experiences in culturally meaningful ways”*.

The premise of such definitions of resilience is that the adversities trigger processes that lead to adaptive or maladaptive outcomes which are buffered by protective factors and moderated by the characteristics of the individual (Fletcher & Sarkar, 2013). These definitions have led to the study of different types of resilience, such as psychological resilience (Connor & Davidson, 2003; Tugade, Fredrickson, & Barrett, 2004), emotional resilience (Resnick & Inguito, 2011; Tranter, Brooks, & Khan, 2020), health resilience (Sanders, Lim, & Sohn, 2008), and so on, which can work together to maintain a positive equilibrium and endurance to adversities (Resnick, 2018, p.223). The process-outcome conceptualisation of resilience provides a robust basis for designing interventions that focus on targeting resilience-promoting processes within the individual and modifying their environment to increase access to supportive resources (Fletcher & Sarkar, 2013; Luthar & Cicchetti, 2000).

Apart from being conceptualised as a trait, another issue that has significantly impacted resilience research is the interchangeable use and conflation of resilience with distinct concepts, such as ego-resiliency, hardiness, recovery, thriving, and coping (Fletcher & Sarkar, 2013). Ego-resiliency is a set of personality characteristics and skills, such as resourcefulness and flexibility, with or without the exposure to a threat (Block & Block, 1980). Hardiness is a personality trait that is conflated with resilience as it can act as a buffer to extreme stress (Bonanno, 2004; Kobasa, Maddi, & Kahn, 1982). Unlike resilience, these traits are the endurance to adversity with or without any positive adaptation, do not presuppose adversity (Earvolino-Ramirez, 2007), and are not a dynamic process (Luthar et al., 2000). Concepts like thriving and flourishing refer to significant growth within the individual in terms of skills, confidence, or knowledge after surpassing the exposure to adversity (Carver, 1998). Recovery constitutes as the long-term gradual return to adaptive functioning after a period of psychopathology (Bonanno, 2004). In

turn, resilience does not require superior functioning to adversity and is characterised by a homeostatic return to equilibrium (Fletcher & Sarkar, 2013; Windle, 2011). Resilience and coping are also conceptually distinct as the latter refers to the specific strategies used when faced with a threat or challenge (Campbell-Sills, Cohan, & Stein, 2006; Van Vliet, 2008). Additionally, coping does not necessarily mean a positive response to the threat or adversity, which is another core distinction from resilience (Fletcher & Sarkar, 2013; Van Vliet, 2008).

To summarise the challenges related to the definitions of resilience, Gordon and Song (1994, p.30) stated that “*resilience may not be a single construct, but, a complex of related processes that deserve to be identified and studied as discrete constructs.*” It appears that while a standard definition across different groups of people seems elusive, there is no need for an all-encompassing definition of resilience for all contexts and populations (Rutter, 1999). This is primarily because there is no single trajectory that leads to resilience, rather there are multiple possible trajectories that contribute to the development of resilience (Luthar, Doernberger, & Zigler, 1993; Rutter, 1987). As such, the definition of resilience depends on contextual and temporal variations in the protective factors and the type of adversity (Davydov et al., 2010).

2.2.2 Core components of resilience

Despite the discrepancies in the definitions of resilience over the years, there are notable features common to most definitions, namely, adversity, positive adaptation, and risk and protective factors (Cosco et al., 2017; Fletcher & Sarkar, 2013; Windle, 2011). Researchers are required to make two judgements — if there is a demonstrable risk that threatens the individual’s development, and which developmentally salient outcomes should be examined as a positive adaptation to the risk. The former involves the identification and investigation of risk factors and adverse events that predict undesirable mental health outcomes, while the latter refers to the identification of positive adaptation in salient domains based on internal

(such as mental well-being) and/or external criteria (such as academic achievement).

Protective factors and **resilience-promoting processes** augment the likelihood of positive adaptation to challenging circumstances (Masten et al., 1990; Rutter, 1979; Wright et al., 2013). These are assets or resources which can ameliorate the effects of adversities on the individual (Luthar et al., 2006; Rutter, 1987; Sameroff, 1995). These can be derived from within the individual, their community, and/or their family background (Masten, 2001; Werner & Smith, 2001). These factors and processes facilitate the capacity to resist stressors and negotiate with the environment or context to achieve positive adaptation (Olsson, Bond, Burns, Vella-Brodrick, & Sawyer, 2003). They do not necessarily produce resilience, especially if the adversity is immensely overwhelming to the system (Masten et al., 1990). Whether a factor is protective against or increases vulnerability to the adversity is dependent on the context of the individual, and similarly, the contextual variations can lead to different outcomes (Luthar & Cicchetti, 2000; Walsh, 2003). This can explain why some individuals can positively adapt under risk, and others do not (Masten, 2001). In a seminal paper in resilience research, Rutter (1987) highlighted that vulnerability and protection could lie on a spectrum. For example, social support can be protective if an individual has significant and meaningful relationships with a person or people. At the same time, a lack of social support has been identified as a risk factor that can exacerbate the effects of a stressor.

Adversity is understood as “*disturbances to the function or viability of a system; experiences that threaten adaptation or development*” and is the primary antecedent to resilience (Earvolino-Ramirez, 2007; Wright et al., 2013, p.17). It is a necessary feature that distinguishes resilience as a construct from concepts and traits like coping and ego-resiliency (Windle, 2011). Adversities can be challenges, threats, turning point events, or changes in any aspect of an individual’s life (Earvolino-Ramirez, 2007; Fletcher & Sarkar, 2013), and can exacerbate or increase the likelihood of poor adaptation to challenging circumstances (Ungar, 2004). They can be proximal, i.e., those that directly impact an individual’s development, such as parental

psychopathology; or distal, i.e., those that have indirect influences on an individual's functioning, such as cultural values (Clauss-Ehlers, Yang, & Chen, 2006). Adversities can be acute stressors, such as natural disasters, terrorism, emotional abuse, and trauma (Pangallo, Zibarras, Lewis, & Flaxman, 2015; Vanderbilt-Adriance & Shaw, 2008), as well as disruptions and hassles in our daily lives (Davydov et al., 2010; Kuntz, Näswall, & Malinen, 2016; Neff & Broady, 2011). The amassment of risk-exposure over time or at a point in time has been found to result in a range of poor outcomes later in life, termed developmental cascades (see Masten & Cicchetti, 2010).

Consequences in resilience are the successful outcomes to adversity, such as **positive adaptation** (Windle, 2011). Positive adaptation is understood as “*competence in salient developmental tasks*” (Masten, 2014, p.13), and the achievement of positive outcomes and emotional recovery (Luthar et al., 2006). What constitutes as positive adaptation is often a subjective judgement made by researchers. Often, several domains are considered, such as physical, psychological, emotional, social, cognitive, behavioural and so on (Bonanno, 2004; McCormick, Kuo, & Masten, 2011; Resnick, 2018). While Tolan (1996) posited that resilience requires an individual to adapt positively to multiple domains, Luthar et al. (2000) emphasise on the variable nature of resilience and stipulate the average or exceptional reintegration to at least one domain. Positive adaptation to different domains will continue to fluctuate as circumstances and contexts keep changing (Luthar et al., 2000; Masten & Coatsworth, 1998). This is primarily because the process of resilience results from negotiations and counter interactions between the individual and the environment.

2.3 Operationalising resilience

The conceptual issues (e.g., trait vs. process and outcome) discussed in the previous sections reflect how resilience has been measured over the years (Luthar et al., 2000; Windle, Bennett, & Noyes, 2011). Resilience has been measured through scales and checklists, for example, using the Connor-Davidson Resilience Scale (Connor & Davidson, 2003) and Brief Resilience

Scale (Smith et al., 2008). A single measure of resilience is perceived to be useful to estimate the prevalence of resilience in the population under study. However, several measures of resilience are based on varied conceptualisations of resilience, leading to concerns about whether the same construct is being measured across these studies. Additionally, there are no methodological guidelines to advise researchers on which measure of resilience to choose (Windle et al., 2011). The limitations of the existing resilience measures are discussed in the sub-section 2.3.1 of this chapter.

Another strategy for operationalising resilience stems from the conceptualisation of resilience as an unobservable construct that cannot be directly measured (Luthar et al., 2000). Instead, it is examined as levels of competence and positive adaptation in one or more domains, such as social and emotional well-being (Windle et al., 2011). Some studies have measured positive adaptation in one or multiple salient domains of mental well-being as the indicators of resilience (e.g., Galante et al., 2018; Hamby et al., 2018). The consequences of such differences in the operationalisation of resilience are the disparate results and high variability in the conclusions drawn, thereby requiring researchers to use validated and reliable measures of theoretically-driven constructs as indicators of resilience (Pangallo et al., 2015).

2.3.1 Measures of resilience

Windle and colleagues (2011) conducted a methodological review to examine how the existing measures of resilience have conceptualised resilience along with their psychometric rigour (e.g., content and criterion validity, reliability, and interpretability). They identified 15 measures of resilience but cautioned against the use of these measures for several reasons. These reasons have been briefly summarised below.

- i. Much of the scales define resilience as a trait with high and low scores indicating the presence or absence of resilience (e.g., Ego Resiliency — Bromley, Johnson, & Cohen, 2006; Resilience Scale — Wagnild & Young, 1993).

- ii. Some of the scales are theoretically derived from personality traits and correlated highly with traits, such as hardiness (e.g., Connor-Davidson Resilience Scale – Connor & Davidson, 2003; Dispositional Resilience Scale – Bartone, 1991).
- iii. Most of the scales focus only on individual-level factors (e.g., Psychological Resilience – Windle, Markland, & Woods, 2008).
- iv. Most of the scales are developed to generate a profile of resilience for a specific time. Only one scale provided preliminary support for stability as a measure in test-retest conditions (i.e., Resilience Scale for Adults - Friberg, Barlaug, Martinussen, Rosenbinge, & Hjemdal, 2005).
- v. The scales are developed for diverse populations and used across settings despite not being specifically designed for that context.

Considering resilience has a multidimensional orientation, only five scales examined resilience across the individual, social, and family levels. These scales examined a range of protective factors, such as self-esteem, optimism, peer support, family support, and cohesion. For example, the Resilience Scale for Adults is a validated measure of process resilience in adults (Friberg et al., 2005). The scale examines a range of internal factors (such as the perception of self, social competence) and external factors (such as family cohesion, social resources). However, there was high variation in the factors examined and inconsistencies in the justification of why these specific protective factors were being assessed as indicators of resilience among these scales.

The concerns about the existing measures raised by Windle et al. (2011) were supported by Pangallo et al. (2015) who evaluated 17 measures of resilience for their construct validity and the conceptualisation of resilience. Most measures operationalised resilience to be trait-like, and items across the scales were highly varied, leading to concerns regarding whether they measure the same construct. The authors demonstrated that the four most commonly reported measures, including the Connor-Davidson Resilience Scale, overlap and correlate strongly with measures of personality traits, such as hardiness. The most common themes measured in these resilience scales included adaptability, positive emotions, and social support. However, the absence of the influences of social contextual factors and demographic characteristics

was noted. For these reasons, both reviews by Windle et al. (2011) and Pangallo et al. (2015) do not recommend any existing scales as an appropriate measure of resilience.

A new 15 item self-report resilience scale titled, Resilience at University, has been developed by Turner, Holdsworth, and Scott-Young (2017). The authors adapted the Resilience at Work scale developed by Winwood, Colon, and McEwen (2013) for the university context and examined the reliability of six factors: living authentically (i.e., level of emotional awareness and regulation); finding one's calling (i.e., managing negativity); maintaining perspective (i.e., managing stressors); interacting cooperatively (i.e., seeking advice and supporting others); staying healthy (i.e., physical health); and building networks (i.e., maintaining social support networks). The six-factor structure was replicated in the student population apart from the lack of construct differentiation between living authentically and interacting cooperatively. It is important to note that the sample of students for the development of the new measure was primarily male (75%) undergraduate students in Australia. They did not report any psychometric characteristics of the scale and instead, recommended future research to conduct confirmatory factor analyses on different samples of undergraduate students. At the present moment, there is limited information on the validity of this scale for university students.

More recently, Teng, Brannick, and Borman (2019) have developed a situations judgement test of resilience to address the limitations of existing Likert-type resilience scales which do not account for responses influenced by characteristics of the context as well as the adversity (Rothstein, McLarnon, & King, 2016; Wolfson & Mulqueen, 2016). The authors have conceptualised resilience to be process-focused, i.e., the process of successful adaptation due to the interaction between individual-level factors (e.g., personality traits, self-regulation) and the adversity. They have conceptualised adversity to include daily hassles along with severe adverse events. They have developed a situational judgement test with a series of vignettes and response structures which taps into five domains: adaptability, emotion regulation, optimism, self-efficacy, and social support. This novel test to measure resilience requires

further psychometric evaluation across different university student populations to establish its validity and reliability for future research.

2.4 Recommended approaches to conceptualise and operationalise resilience

To define and measure resilience, there are three key concepts to consider (Windle, 2011): i) what is the risk? ii) what are the factors and processes that can counteract or exacerbate the risk? iii) what outcomes should be expected for the population under examination? To answer these questions, ecological models are the recommended approach to examine the dynamic transactional relationships between the individual and their environment in the face of adversity (Masten, 2001).

Garmezy (1991) developed the triadic framework of resilience wherein he posited that resilience was influenced by a triad of salient risk and protective factors stemming from the i) individual (e.g., personality traits), ii) the family (e.g., cohesion and maltreatment), iii) and the community (e.g., social support systems). This has been an influential theory of resilience in support of the ecological systems' theory by Bronfenbrenner (1979, 1989) which has been vital for the study of child development (Iizuka, Barrett, Gillies, Cook, & Marinovic, 2014; Macedo et al., 2014). As per an ecological perspective, the family, peer group, friends, and faculty members can be perceived as nested contexts that nurture university students' resilience. The study of individual-focused protective factors by themselves do not explain how resilience develops. Therefore, the study of interactive ecologically-based factors and processes is recommended to highlight the influences of context- and population-specific characteristics (Cicchetti & Lynch, 1993; Ungar, 2011). The ecological perspective is discussed further in Chapter 4 of this thesis as the rationale for a novel socio-ecological model of resilience for university students as proposed and examined in this thesis.

The socio-ecological study of resilience can be pursued using a variable-focused or a person-focused approach (Masten, 2001; Masten & Reed, 2002).

Variable-focused resilience research utilises multivariate statistics to test hypotheses and linkages between adversity, protective factors, and outcomes (Masten & Obradović, 2006). These models aim to explain the processes through which protective factors counterbalance the risk and identify linkages between outcome domains and the specified predictors (Masten et al., 1999). The presence and magnitude of the direct and indirect effects of these factors are examined through multivariate statistics, such as multiple regression or structural equation modelling (Windle, 2011). These include path models and interaction models that can predict the changes in variables over time as well as additive, mediating, and moderating effects (Masten, 2001). These models are robust sources of evidence for the development of interventions (Masten & Powell, 2003).

Person-focused resilience research examines single case studies to detect unique trajectories of positive adaptation to risk (Masten & Obradović, 2006). These models can compare high-risk groups of individuals to identify characteristics that influence resilience processes and differentiate one group from the other (Masten, 2001). Groups of individuals are identified on a pre-defined criterion and compared to other groups facing similar risks but differing in their responses (Masten & Powell, 2003). Techniques include case-studies, cluster analysis, or discriminant function analysis. While patterns of good vs. poor outcomes among groups of people can be identified, the explanatory mechanisms behind such outcomes are largely inexplicable with this approach (Shiner, Masten, & Tellegen, 2002). Generalisability of these findings are also often difficult (Masten & O'Connor, 1989).

Additionally, for operational clarity, resilience researchers have proposed the shift from a global entity of resilience to the study of resilience using a range of psychological outcomes measured at multiple time-points (Rutter, 2013). While it can be argued that more measures provide more information than a single measure of resilience, the rationale for using distinct indicators of positive adaptation across different domains is to establish resilience as a multidimensional construct. This can help gain a more precise understanding of how resilience outcomes can manifest differently for different people (Luthar et al., 2000; Ruggeri, Garcia-garzon, Maguire, Matz, & Huppert,

2020). Additionally, as Olsson et al. (2003) have noted, while the absence of psychopathology is often used as an indicator of resilience for prevention research, both positive and negative indicators of well-being should coexist in resilience research (Windle, 2011).

While one can argue that such counter-proposals against a universal conceptualisation and operationalisation of resilience can diminish the validity of the construct of resilience, the diversity of these findings is essential for the better understanding of such a complex and dynamic construct (Luthar et al., 2000). Among the multitude of studies across populations and contexts, there are synchronous themes that have emerged from decades of resilience research which have informed the breadth of resilience and its applications in policy and intervention sciences (Luthar & Cicchetti, 2000). With the absence and seeming implausibility of a standardised operationalisation of resilience, research relies on the accumulation of empirical evidence and commonality among studies to understand the development and the role of resilience across different populations.

This chapter has discussed the broader literature of resilience research and illuminated the complexities related to conceptualising and operationalising resilience. Following the recommendations by resilience researchers, the thesis aims to examine pathways to a multidimensional construct of resilience in university students from ecologically-based risk and protective factors, i.e., factors within the individual, their family background, and their social environment, by adopting a variable-based approach. The following chapter critically reviews how the extant resilience literature involving university students have defined and measured resilience to justify the gaps in knowledge that this thesis proposes to address.

Chapter 3 Resilience in higher education

The previous chapter provided an overview of the conceptualisation and operationalisation of the multidimensional and dynamic construct of resilience. This chapter critically reviews the extant literature on resilience and resilience-promoting interventions within the higher education context based on the recommendations for resilience research. Specifically, the conceptualisation and operationalisation of resilience for university students and the key components of resilience (i.e., the risk and protective factors, resilience-promoting processes and outcomes of resilience), commonly identified among university student populations.

3.1 A review of resilience research involving university students within the higher education context

As described in the Introduction (Chapter 1), a student's journey within a higher education context is a period of immense change with exposure to unique stressors that can precipitate poor adjustment and ill health (Bales, Pidgeon, Lo, Stapleton, & Magyar, 2015; Coiro, Bettis, & Compas, 2017). Academic, financial, and social stressors are compounded by the pressures related to transitioning to university and transitioning out of university to the workplace (Hancock & Walsh, 2016; Turner et al., 2017). The response to these unique stressors can determine a student's adjustment during university; their career outcomes (Goldman-Mellor et al., 2014); their ability to cope with the inevitable challenges in the future (Holdsworth, Turner, & Scott-Young, 2018); and the health of their interpersonal relationships (Kerr & Capaldi, 2011). Resilience has been recognised to be crucial for mental health-promotion for university students (Hughes & Spanner, 2019; Johnson, Willis, & Evans, 2019; Thomas & Asselin, 2018). Resilience can build psychological, social, and emotional capacities by cultivating social networks and self-management skills to cope with the unique adverse circumstances

associated with university settings, and better prepare students for future work environments (Piper & Byrom, 2017; YouGov, 2016).

While researchers are increasingly investigating the multidimensional and process-outcome conceptualisation of resilience, most of the resilience research within the context of higher education is individual-focused and conceptualises resilience as a trait. For example, high self-esteem (Matel-Anderson, Bekhet, & Garnier-Villarreal, 2019), stress perceptions (Eaves & Payne, 2019), emotional intelligence (Sarrionandia, Ramos-Díaz, & Fernández-Lasarte, 2018), cognitive reappraisal (Zarotti, Povah, & Simpson, 2020), and social competence (Santos & Soares, 2018) are some of the within-individual factors that have been identified as predictors of trait and outcome-resilience. While there is some evidence on the influence of early adverse family experiences and family support on resilience in students, there is a lack of integrated ecologically-based predictive models of resilience in university students, i.e., models which account for risk and protective factors from within the individual, their family, and their social environment. Such an investigation is important considering the scant evidence reporting that fewer experiences of early adverse experiences, such as poor parent-child relationships (Edwards, Catling, & Parry, 2016; Kelifa, Yang, Herbert, He, & Wang, 2020; Robbins, Kaye, & Catling, 2018; Yang, Li, & Lin, 2019), higher levels of family and peer support (Hall et al., 2020; Krautscheid et al., 2020), ethnic identity (Clauss-Ehlers et al., 2006), and shared experiences (Liu & Dong, 2019) are predictors of resilience among university students.

Additionally, most of these studies have focused on the pathways from risk and protective factors to trait resilience or outcomes of resilience, without investigating the resilience-promoting processes that underpin these relationships. Where these have been examined, they have included a range of constructs, such as cognitive reappraisal (Thomas & Zolkoski, 2020; Wang, 2019), positive emotions (Denovan & Macaskill, 2017b), social support (Lin, Wolke, Schneider, & Margraf, 2020), mindfulness (Zarotti et al., 2020), and self-esteem (Kapıkıran & Acun-Kapıkıran, 2016). These constructs have often been interchangeably investigated as predictors or moderators of resilience, leading to a variety of conceptual models. Additionally, much of this evidence

for resilience is limited to cross-sectional or correlational study designs. This has led to limited information about the temporality and causality between the relationships. Crucially, considering the developmental and contextual nature of resilience, there is little investigation of the potential moderating influence of socio-demographic characteristics of university students. Such information is critical for the design of sensitive interventions. The discrepancies in the study of resilience in the university students' population have been illuminated by several systematic and scoping reviews which have examined the conceptualisation and operationalisation of resilience in the extant literature (e.g., Aburn, Gott, & Hoare, 2016; Amsrud, Lyberg, & Severinsson, 2019; Beltman, Mansfield, & Price, 2011; Brewer et al., 2019; Howe, Smajdor, & Stöckl, 2012; Li & Hasson, 2020; Reyes, Andrusyszyn, Iwasiw, Forchuk, & Babenko-Mould, 2015; Sanderson & Brewer, 2017).

Brewer et al. (2019) conducted an extensive review of the concept of resilience to include all students in higher education settings. Of the 72 studies reviewed, approximately one-third of the studies did not propose a definition of resilience. In the remaining studies, resilience was conceptualised and defined as the effective coping with stress or change (e.g., Flinchbaugh, Luth, & Li, 2015); the endurance of the stressors (e.g., Huang, 2015); the preservation of psychological well-being (e.g., Cuadra & Famadico, 2013); and the rebounding to the original state from threats (e.g., Mak, Ng, & Wong, 2011). Some studies included aspects of thriving and growing in the face of adverse circumstances (e.g., Maddi, Harvey, Khoshaba, Fazel, & Resurreccion, 2009). The transactional role between the individual and their environment was recognised to influence resilience (e.g., Mak et al., 2011; Tempiski et al., 2015), and the plausibility of the cultivation and strengthening of resilience in students was acknowledged (e.g., Eley & Stallman, 2014; Galante et al., 2018; Reyes et al., 2015). The authors of the scoping review found that there was a lack of unifying definition of resilience for this population and noted the diversity in the measures of resilience, most of which have been critiqued in the reviews by Windle et al. (2011) and Pangallo et al. (2015), discussed previously in Chapter 2, section 2.3.1.

The review notes that very few studies referenced any theoretical frameworks or models that guided the conceptualisation of resilience in their studies (e.g., Bacchi & Licinio, 2017; Kaloeti et al., 2019; Santos & Soares, 2018; Zarotti et al., 2020). Studies which do refer to theoretical frameworks have referred to primarily individual-focused theories, such as the broaden-and-build theory by Fredrickson (2001) (e.g., Denovan & Macaskill, 2017b, 2017a; Sharma, 2012) and the theory of self-determination by Deci and Ryan (2012) (e.g., Paul, Subalukshmi, & Mala, 2014). Some studies have adapted theoretical frameworks which account for the interactions with external resources, such as the transactional model of stress by Lazarus and Folkman (1984) (e.g., Li et al., 2019; Pan, 2011; Terzi, 2013; Willis & Burnett, 2016), the parental acceptance-rejection theory by Rohner (2008) (e.g., Yang, Li, & Lin, 2019), and the family communication patterns theory by Koerner and Fitzpatrick (2006) (e.g., Hall et al., 2020).

The discrepancies highlighted in the scoping review by Brewer et al. (2019) supports the review of recent resilience literature by the author of this thesis and previous reviews involving university students (e.g., Conley, Durlak, & Dickson, 2013; Sanderson & Brewer, 2017). Most of the studies evaluated in these scoping reviews examined resilience using a cross-sectional design and centred around correlation and regression analytical techniques. This limits their statistical power to provide meaningful information about the causal order and dynamic nature of these relationships. More recent studies are adopting complex statistical techniques to examine mediational and moderated mediational models of resilience, of which most are cross-sectional studies (e.g., Ceary et al., 2019; Du et al., 2020; Hall et al., 2020; Kelifa et al., 2020; Li et al., 2019; Lin et al., 2020; Zarotti et al., 2020) and a few are longitudinal in nature (e.g., Ríos -Risquez, García -Izquierdo, Sabuco-Tebar, Carrillo-Garcia, & Solano-Ruiz, 2018; Wu et al., 2020). These studies have operationalised resilience as an outcome (e.g., Zarotti et al., 2020), a predictor (Wu et al., 2020), a moderator (e.g., Yang et al., 2019), and a mediator (e.g., Hall et al., 2020; Lin et al., 2020) using different resilience measures.

Some of the recent studies, such as by Ceary et al. (2019) and Krautscheid et al. (2020), have adopted the recommendations of operationalising resilience

as a multidimensional construct with positive adaption being indicated by distinct domains (Luthar et al., 2000; Rutter, 2013). These studies use measures of social support, coping strategies, sense-making, positive and negative emotions, satisfaction with life, and meaning-in-life as indicators of a multidimensional construct of resilience. However, these studies are limited due to their cross-sectional and correlational design, and the lack of information on differences due to socio-demographic characteristics of the university students. Conversely, several recent studies continue to conceptualise resilience as a trait and as a unidimensional construct (e.g., Cam & Alkal, 2020; Kim, 2020; Lane, 2020; McDonnell & Semkovska, 2020), despite trait resilience being debunked in the broader resilience research (Masten, 2014a).

The need for a socio-ecological perspective in resilience research is amplified by qualitative and mixed-method studies, such as by Holdsworth et al. (2018) and Donohoe et al. (2020). Holdsworth et al. (2018) employed semi-structured interviews to examine i) how university students define resilience; ii) what strategies they use to develop their resilience; iii) and how universities can support their development of resilience. In response to the first question, students defined resilience with words such as “*enduring*,” “*coping*,” “*withstanding*,” “*bouncing back*,” “*managing*,” and “*adapting*” (p.1841). Interestingly, students at later stages of their study had more nuanced definitions of resilience. These included a personal capacity to regulate their emotions in the face of adversity, their ability to develop effective coping mechanisms, and their ability to learn from these difficult experiences. They also recognised the value of resilience in their post-university life. On the question of what attributed to their resilience, students identified three sets of valuable support networks: their peers at university, their friends outside of university, and their parents and siblings. They emphasised the importance of maintaining focus and control over their emotions to cope with stress. Along with physical activity, yoga, and sleep, they identified being positive as an important component of resilience. While they were cognizant of the role of their childhood experiences on their development of resilience, they recognised that nurturing resilience was a lifelong process that can be guided

by universities. Donohoe et al. (2020) also found that being with friends and family was reported to be the most effective way to alleviate stress along with exercise or sports and resilience-promoting interventions.

To summarise, the resilience literature within the higher education context is inundated by variations in the definition and measurement of resilience across different groups of students. Despite the high variability in the theoretical orientation, the conceptualisation and the measurement of resilience, there is a growing evidence base of the common internal and external risk and protective factors that contribute to university students' resilience. For example, both self-report quantitative and qualitative studies have suggested the role of family, peer, and university staff, as valuable for adjusting to the university (e.g., Holdsworth et al., 2018). This final group includes departmental staff (Donohoe et al., 2020; Farquhar, Kamei, & Vidyarthi, 2018), welfare and disability staff, and those working in halls of residence (Coduti et al., 2016). Faculty members, including (and not limited to) professors, lab technicians, supervisors, and personal tutors, are often the first point of contact on behalf of the university for the students (Guzzardo et al., 2020). These university staff members frequently interact with students and have acknowledged that supporting student mental health is part of their job (Albright & Schwartz, 2017; Hughes, Panjwani, Tulcidas, & Byrom, 2018).

Additionally, the studies have highlighted the relevance of investigating stress-related growth (e.g., Dolbier, Jaggars, & Steinhardt, 2010; Erogul, Singer, McIntyre, & Stefanov, 2014; Thomas & Zolkoski, 2020). The next section examines if the divergent empirical evidence has impacted how the construct has been conceptualised and operationalised in the design of resilience-promoting interventions for university students. The chapter culminates with a discussion on how the thesis intends to address the knowledge gaps that have emerged in the extant resilience literature for university students.

3.2 A review of resilience-promoting interventions for university students within the higher education context

Prevention and promotion-focused interventions have been recognised for their ability to manage the poor mental health of students during university as well as to develop resilience to enhance their lives as productive members of the society (Cuijpers et al., 2019; Joyce et al., 2018; Reavley & Jorm, 2010). Resilience is conducive for intervention development since it is a multidimensional construct which is impacted by the availability or the deficiency of a range of resilience-promoting factors (Chmitorz et al., 2018; Holdsworth et al., 2018; Smith et al., 2008). Learning and enhancing these factors through interventions can promote positive adaptation in the face of adverse circumstances (Caruana, Clegg, Ploner, Stevenson, & Wood, 2011; Schiraldi, Jackson, Brown, & Jordan, 2010).

There have been several systematic reviews and meta-analyses that have examined the conceptualisation of resilience and the effectiveness of resilience-based and mental health-promoting interventions, specifically for university students (e.g., Brewer et al., 2019; Christensen, Pallister, Smale, Hickie, & Calear, 2010; Conley, Durlak, & Dickson, 2013; Conley et al., 2015, 2016; Davies, Morriss, & Glazebrook, 2014; Fernandez et al., 2016; Reavley & Jorm, 2010; Regehr, Glancy, & Pitts, 2013; Sanderson & Brewer, 2017; Winzer et al., 2018). These reviews have provided evidence for several conceptual and operational irregularities in the design of these interventions in addition to their inadequate and short-term benefits (Winzer et al., 2018).

Overall, the interventions differ in their target student population, including nurses and medical students, psychology students, and student-athletes (e.g., Delany et al., 2015; Onan, Karaca, & Barlas, 2018; Philippe, Dobbin, Ross, & Houle, 2018). Some interventions aim at the universal university student population (e.g., Akeman et al., 2019; Foster, Allen, Oprescu, & McAllister, 2014; Games, Thompson, & Barrett, 2020; Oehme et al., 2019). The sample sizes are mostly small (e.g., Byrom, 2018; Dyrbye et al., 2017; Kwon et al.,

2019) and are primarily female-biased (e.g., Houston et al., 2017; Onan et al., 2019).

The resilience-promoting interventions can be categorised as follows:

- Stress-management programmes targeting emotion regulation, cognitive strategies, self-efficacy skills and so on (e.g., Akeman et al., 2019; Flett et al., 2020; Games, Thompson, & Barrett, 2020).
- Psycho-educational and strengths-based interventions targeting the individual sense of autonomy, meaningful connections with others, positive emotions, optimism, effective coping, cognitive reframing, spirituality among others (e.g., Chandler et al., 2019; Enrique et al., 2019; Oehme et al., 2019; Stephens & Gunther, 2016).
- Individual-focused cognitive behavioural interventions targeting the identification and modification of maladaptive thinking, stress reduction, and cognitive reconstruction (e.g., Delany et al., 2015; Dolbier, Jaggars, & Steinhardt, 2010; Smith & Khawaja, 2014; Steinhardt & Dolbier, 2008).
- Mindfulness-based interventions including strategies such as yoga, meditation, and improvement in concentration (e.g., Clarkson, Heads, Hodgson, & Probst, 2019; Galante et al., 2018; Roulston, Montgomery, Campbell, & Davidson, 2018).

As found with the broader resilience literature, the definitions of resilience vary between the studies with the complex construct being conceptualised as a protective factor (e.g., Dolbier et al., 2010; Houston et al., 2017), a process of positive coping and evasion of negative outcomes (e.g., First, First, & Houston, 2018; Oehme et al., 2019), and the ability to experience positive emotions and thrive in the face of adversity (e.g., Gerson & Fernandez, 2013; Philippe et al., 2018). Some intervention studies did not clearly define resilience or offer any clarity on the conceptualisation of resilience (e.g., Flett et al., 2020; Wald, Haramati, Bachner, & Urkin, 2016), often conflating with other distinct constructs such as psychological capital and hardiness (e.g., Luthans, Avey, Avolio, & Peterson, 2010; Maddi et al., 2009).

As expected, the studies relied on self-report measures of resilience as well as measures of similar concepts, such as hardiness, wellness, and positive youth development (e.g., Hamilton, Murray, Hamilton, & Martin, 2015; Jameson, 2014; Maddi et al., 2009; Shek & Sun, 2012). The most commonly used resilience scale was a unidimensional and individual-focused measure, i.e., the Connor-Davidson Resilience Scale (e.g., Akeman et al., 2019; Chandler et al., 2019; Clarkson et al., 2019; Enrique et al., 2019; Herrero et al., 2019). A few studies relied upon qualitative feedback and descriptive vignettes to measure resilience (e.g., Delany et al., 2015; Kwon et al., 2019; Van der Riet, Rossiter, Kirby, Dluzewska, & Harmon, 2015). Some studies did not rely on the existing measures of resilience and used measures of psychological, social, and emotional well-being as indicators of resilience (e.g., Galante et al., 2018; Waddell et al., 2015; Wald et al., 2016). For example, the primary resilience outcomes for the mindfulness-based intervention by Galante et al. (2018) were psychological distress and mental well-being.

Several studies referred to theoretical models that are not directly related to resilience but are associated with the key components of resilience — adversity, protective factors, and positive adaptation (Brewer et al., 2019). These ranged from models of general wellness, informed by salutogenic perspectives and positive psychology (e.g., Delany et al., 2015; Enrique et al., 2019; Foster, Allen, Oprescu, & McAllister, 2014), stress management (e.g., Lazarus & Folkman (1984) – Dolbier et al., 2010; Erogul et al., 2014; First et al., 2018), persistence and motivation models (e.g., Graham et al. (2013)'s persistence framework – Daniels, Billingsley, Billingsley, Long, & Young, 2015), and cognitive models (e.g., Neuman Systems Model – Pines et al., 2012).

Considering the recommendations for the socio-ecological study of resilience, only two interventions, i.e., by Games et al. (2020) and Stephens and Gunther (2016), designed their interventions that accounted for a transactional nature between the individual and their family and social backgrounds. These interventions were based on the triadic model of resilience (Garmezy, 1991) and the Model of Adolescent resilience (Ahern, 2006), respectively. Additionally, Oehme et al. (2019) and Chandler et al. (2019) developed their

interventions to account for the cascading impact of early adverse experiences, which included dysfunctional family environments, on the development of resilience in university students. Oehme et al. (2019) conceptualised resilience using a positive and strengths-based approach that included a range of outcomes, such as positive emotions, sense of connectedness, cognitive reframing, among others.

Overall, researchers have overlooked the variation in the effect of the interventions due to gender, ethnicity, and other socio-demographic characteristics as highlighted by the systematic reviews of resilience and mental health-promoting interventions (Brewer et al., 2019; Conley, Durlak, et al., 2013; Conley et al., 2015, 2016; What Works Wellbeing, 2020). Considering the complexity of resilience, the interventions may be effective for a certain subgroup of students and inappropriate for others based on gender and cultural factors. Furthermore, Brewer and colleagues (2019) and Conley et al. (2013, 2015, 2016) have raised the need for interventions to be theoretically-driven to explain the processes and mechanisms through which they promote resilience in university students.

The concerns of the higher education-based resilience-promoting interventions are echoed by interventions for the non-clinical adult population, which include university students, as evaluated by systematic reviews and meta-analyses (e.g., Helmreich et al., 2017; Hetrick, Cox, Witt, Bir, & Merry, 2016; Leppin et al., 2014; Macedo et al., 2014). More recently, comprehensive systematic reviews by Chmitorz et al. (2018) and Joyce et al. (2018) have raised concern over the use of multiple definitions of resilience and unsuitable assessments along with significant limitations in the study designs. They recommend using a combination of measures that capture a range of competencies to adequately cover the different facets of resilience. They noted that gender and demographic related effects were not studied or reported, possibly because of the uneven distribution between groups. The sample sizes were small, over-represented by females, and the interventions often had no control group and long-term follow-up. The interventions were wide-ranging — from symptom-reduction approaches to strengths-based

programmes, with some evidence supporting the short-term benefits of cognitive-behavioural therapies (CBT) and mindfulness-based interventions.

3.3 Knowledge gaps in resilience research within the higher education context: Concluding remarks

The effects of mental health promotion are fundamentally beneficial not just to the individual and the community, but to commercial and healthcare organisations (Herrman, Saxena, & Moodie, 2005). A university is a complex system characterized by several sub-entities and dynamic networks with non-linear relationships (Pinheiro & Young, 2017). For example, faculty members and students are a part of a collaborative organisational culture and should be empowered to promote collective transformative action in the face of disruptions (Andersson, Cäker, Tengblad, & Wickelgren, 2019; Kunnari, Ilomäki, & Toom, 2018). To create a student community that is positive, productive, and confident, it is incumbent on universities to incorporate effective strategies with students as active partners (Sutherland, Lenihan-Ikin, & Rushforth, 2019).

The transition to university instigates a significant shift in responsibility for emerging adults and requires navigation through a range of unique challenges. The role of university is to ensure that there are systems in place to facilitate positive adaptation to these challenges within the higher education setting. This could be achieved by embedding mental health and well-being across all aspects of the students' educational experiences, such as assessments and social events (Dooris, Powell, & Farrier, 2019; Jones et al., 2020). The impetus for this is to increase the socio-ecological context to mental health which recognises that the influence of “*individual, interpersonal, community, environmental, and structural factors*” within the higher education setting (UUK, 2020, p.9). This need for collective responsibility and collaborative efforts for structural changes is reflected in recent policy recommendations for higher education in the UK, such as Stepchange (UUK, 2020) and the University Mental Health Charter (Hughes & Spanner, 2019).

While the extant resilience literature for students within the higher education context is informative, there is a lack of a comprehensive and nuanced conceptualisation beyond the trait and individual-focused definitions of resilience. By placing the focus on students to manage and maintain their well-being and resilience, the university is detached from its role of recognising relevant risk and protective factors. This also ignores the role of ethnic, social, and familial backgrounds and influences (Hughes & Spanner, 2019). There is a need to examine the predictive relationships of familial and social factors in conjunction with within-individual factors on a multidimensional construct of resilience to account for the cascading effects of students' early experiences. Additionally, much of the research is cross-sectional, and the lack of longitudinal exploration has generated limited information on the causal sequence and temporal order of the relationships. Furthermore, considering how gender and ethnic backgrounds pervade psychological, emotional, familial, and social factors that predict resilience, most of the studies do not examine the potential variations due to these demographic characteristics in the pathways to and from resilience in university students.

The resilience-based interventions reviewed in this chapter have been developed using empirical evidence across populations, including adolescents, and are not theoretically contextualised for the university student populations. The inconsistent and small beneficial effects of these interventions can be attributed to the poorly developed, or the lack of, theoretical base and understanding of the students' socio-demographic characteristics. A cogent theoretical basis can aid in disentangling the complex relations and interactions between factors, can facilitate the development of sensitive and effective interventions, and inform impactful university-wide policy changes. The development and refinement of such complex interventions require a firm theoretical understanding of the context and population-specific factors and mechanisms that underlie these pathways (Craig et al., 2008; Luthar et al., 2006; Palma & Balanon, 2007). Evidence of processes underlying the pathways to resilience is valuable to understand why

an intervention is effective, for whom it is most effective, and how it can be refined further (Oakley, Strange, Bonell, Allen, & Stephenson, 2006).

To develop a cogent theoretical framework for a novel model of resilience for university students, it is imperative to review the theoretical frameworks that have guided resilience literature as reported in this chapter and the broader resilience research. These include the salutogenic theory (Antonovsky, 1979), the transactional theory of stress (Lazarus & Folkman, 1984) and the broaden-and-build theory (Fredrickson, 2001), among others. The following chapter critically reviews these theoretical frameworks and provides the rationale for a novel socio-ecological model of resilience for university students.

Chapter 4 Theoretical frameworks of resilience

The role of theories is to elaborate, clarify, and provide a logical basis to predict complex processes and concepts (Klein & Zedeck, 2004). Theories are not permanent; rather, they are ephemeral and reflect a phenomenon observed at a specific time and context (Hebb, 1949). As the evidence base for resilience research develops, new questions are formulated, and theories are updated. The theoretical basis of resilience is rooted in psychological concepts of coping and stress (Harrop et al., 2006; Tusaie & Dyer, 2004), i.e., the salutogenic and pathogenic literature (Almedom & Glandon, 2007). As reviewed in the previous chapter, the theoretical frameworks that have been adapted to study the trajectories to and from resilience in university students have been based on a few diverging theoretical frameworks. These range from models of stress (i.e., transactional model of stress by Lazarus, 1993), positive psychology (i.e., broaden-and-build theory (Fredrickson, 2001) and salutogenic model (Antonovsky, 1987), cognitive psychology (i.e., the theory of emotion regulation by Gross, 1998), and developmental psychology (i.e., ecological systems' theory by Bronfenbrenner, 1979).

While it is not possible to present and review every model that has been referenced in resilience research in this thesis, the following sections critically appraise the selected theoretical frameworks that have been deemed pertinent to university students. The thesis proposes a confluence of their strengths to develop a comprehensive novel model of resilience for university students by illuminating their strengths and shortcomings in their application in resilience research.

4.1 Models of positive psychology

Theoretical models of positive psychology aim to supplement the study of the deficit models of psychopathology and embrace the scientific study of positive aspects of human experiences, emotions, personality characteristics, and positive interpersonal relationships (Huppert & So, 2013; Martin & Marsh, 2008; Seligman, Steen, Park, & Peterson, 2005; Youssef & Luthans, 2007). Like positive psychologists, resilience researchers regard individuals as active beings and beholders of the capacity to choose, cope with and master their lives (Kobau et al., 2011; Seligman & Csikszentmihalyi, 2000). The positive orientation of resilience aligns with models such as the broaden-and-build theory (Fredrickson, 2001) and the salutogenic model (Antonovsky, 1987), which have helped envision the mental health-promoting ability of resilience for long-lasting positive well-being in the face of adversity. These are briefly discussed below.

4.1.1 The salutogenic theory (Antonovsky, 1979, 1996)

The ‘salutogenic theory’ by Antonovsky (1979, 1996) has significantly influenced resilience research by highlighting the need for a shift in focus from a medically oriented model of “*disease*” towards an approach which supports health-promoting factors that are present within the individual and the society (Davidson, Feldman, & Margalit, 2012; Heiman, 2004). While pathogenesis attempts to explain how to reduce, eliminate, or manage illness, salutogenesis attempts to enhance and cultivate optimal health and well-being (Becker, Glascoff, & Felts, 2010). Antonovsky (1987) propounded the salutogenic approach to health, wherein health lay on a continuum between illness (disease) and wellness (ease). He believed that not all stressors lead to pathology and are natural occurrences in human lives (Antonovsky, 1987). Like salutogenesis, resilience is not the process of evading stress, but encountering and positively adapting to stress (Almedom, 2005). The salutogenic paradigm has also emphasised upon the role of personal resources and characteristics on well-being and positive health, similar to the role of risk

and protective assets and resources as predictors of resilience (Feldt et al., 2011).

The salutogenic framework assumes that the individual has a global capacity to cope with different kinds of stressors, control their environment, and that their environment privileges them with the resources to lead better lives (Harrop et al., 2006). It presumes the all-pervasive and consistent orientation to life due to early health-promoting experiences, like considerate parenting (Sagy & Antonovsky, 2000); however, this is not always true as one cannot be consistently achieving adaptive coping and adjustment in all aspects of their lives. Protective resources available for the individual, termed as generalised resistance resources (Wickens & Greeff, 2005), are not a constant and stable resource for health promotion. For example, a socio-economically well-off and educated individual with a sturdy network of friends may still succumb to stressors. Although the salutogenic framework is closely related to the health-promoting and empowering conceptual nature of resilience, resilience to stressors is dynamic and contextual and not a stable and global entity (Luthar & Cicchetti, 2000; Luthar et al., 2000). The thesis draws upon an important proposition of the salutogenic model, i.e., the investigation into factors which promote mental health and well-being. Additionally, the theory prompts the development of a novel model of resilience which acknowledges that resilience lies on a continuum, i.e., the positive adaptation to the effects of adversities is not devoid of poor outcomes.

4.1.2 The broaden-and-build theory (Fredrickson, 1998, 2000)

The ‘broaden-and-build theory’ by Fredrickson (1998, 2000) has influenced resilience research due to its theorisation of positive emotions as characteristics of optimal functioning (Fredrickson & Joiner, 2018). It proposes that positive emotions can accrue adaptive resources, build an individual’s repertoire, and modulate the negative effects of challenging circumstances (Fredrickson & Joiner, 2018). The experiences of positive emotions might be fleeting and momentary, but can have a long-lasting impact by “building” knowledge and important psychological and

interpersonal resources (Catalino & Fredrickson, 2011), and by cultivating an openness to experiences (Fredrickson & Joiner, 2002, 2018). The theory has led to bold propositions, such as resilient individuals are more likely to appraise and cope with adversity in ways that generate positive emotions and improve life satisfaction (Garland et al., 2010; Meneghel, Martínez, Salanova, & Witte, 2019; Tugade et al., 2004). One explanation for this was that positive emotions lead to self-expansion that enables individuals to develop meaningful relationships and empathy towards others which are health-promoting characteristics (Waugh & Fredrickson, 2006). Another reason could be that positive emotions beget positive meaning-making of circumstances (Folkman & Moskowitz, 2000). Such experiences then act as steeling effects and result in a growth of internal resources that the individual can use to manage the ill effects of future adversities (Reschly, Huebner, Appleton, & Antaramian, 2008).

The broaden-and-build theory has previously informed higher education-based resilience research (e.g., Arici-Ozcan, Cekici, & Arslan, 2019; Denovan & Macaskill, 2017a; Gloria & Steinhardt, 2016). However, this model's application in resilience research within the higher education setting has been primarily correlational, with resilience conceptualised as a trait, e.g., ego-resiliency (Denovan & Macaskill, 2017a; Gloria & Steinhardt, 2016; Ong et al., 2006). To advance resilience research, there is a need to account for the influences of socio-cultural factors and the impact of early adverse experiences on positive affect and positive appraisals over the lifespan. Additionally, there is a need to investigate the factors and mechanisms that promote positive emotions in a comprehensive model of resilience for university students (Fredrickson & Joiner, 2018; Keyes, 2007).

4.2 Models of stress

Models of stress have informed a large body of work on the interactions between adversity and coping. Models such as the diathesis-stress model (Monroe & Simons, 1991) and the transactional model of stress (Lazarus, 1993) have informed resilience research within the higher education setting

(e.g., Freligh & Debb, 2019; Kelifa et al., 2020; Li & Yang, 2016). The diathesis-stress model posits the role of stress on psychopathology but fails to capture the role of protective resources and assets (Hartley, 2012; Ingram & Luxton, 2005). In turn, the transactional model of stress emphasises on the interactions between internal and external protective assets and the sources of stress (Biggs, Brough, & Drummond, 2017). Due to this reason, the transactional model of stress holds more explanatory power in resilience research. This model is discussed briefly below.

4.2.1 Transactional model of stress (Lazarus & Folkman, 1984, 1987)

The ‘transactional model of stress’ proposed by Lazarus & Folkman (1984, 1987) focuses on cognitive, behavioural, and emotional factors which can influence the perception and appraisal of stress leading to adaptive or maladaptive coping responses (Zakowski, Hall, Klein, & Baum, 2001). Simply put, the model proposes that the individual, when faced with a stressor, engages in the appraisal of the stressor, deploys coping strategies to respond to the stressor, and experiences adaptive or maladaptive outcomes as a result of the interaction with the stressor (Biggs et al., 2017; Freire, Ferradás, Valle, Núñez, & Vallejo, 2016). The two central concepts within the model are cognitive appraisal and coping strategies (Crane & Searle, 2016; Pincus & Friedman, 2004). When the stressors are evaluated to be threatening, and there is a deficiency in the individual’s competency and resources, stress is experienced (Lazarus & Folkman, 1987).

For the study of trajectories to resilience, an important proposition derived from this theory is that the ill effects of adversity can be modulated by positive appraisals (Lazarus, 1991). Furthermore, positive appraisals can be influenced by within-individual factors and environmental resources (Lazarus, 1991), so the perception of the stressors as manageable can contribute to resilience. Positive appraisals of stressful circumstances can elicit positive emotions which can instil protective resources for the future (Folkman, 2008). This association between positive appraisal of stressors and the resulting positive emotions can enhance the psychological and emotional domains of resilience

(Fredrickson & Joiner, 2002). Therefore, resilience can be cultivated by promoting appraisal skills and building personal and social resources that can facilitate effective coping to stressors (e.g., Dolbier et al., 2010; First et al., 2018; Steinhardt & Dolbier, 2008). The transactional model identifies a range of individual-focused antecedents and resources that influence the appraisal, e.g., self-esteem, commitment, and so on (Lazarus & Folkman, 1984). However, it fails to account for the dynamic social, familial, and environmental factors that can potentially influence the transaction with the stressors and the subsequent appraisal of the stressor.

4.3 Models of cognitive psychology

Cognitive models of emotion regulation (Gross, 1998) have re-emerged as explanatory self-regulatory systems underpinning resilience due to the advancements in neuroscience and experimental research (Fink et al., 2017). Emotion regulation has been studied extensively in relation to positive mental well-being and resilience (Troy & Mauss, 2011; Tugade & Fredrickson, 2007), and the biological basis of neuroplasticity, such as the role of the amygdala and the pre-frontal cortex, is generating more support for its role in resilience (Martin & Ochsner, 2016). Considering emotion regulation strategies, such as positive reappraisals and cognitive restructuring, have been targeted by resilience-promoting interventions in university students (e.g., Chandler et al., 2019; Dolbier et al., 2010), the theory of emotion regulation was deemed important for contextualising the process-oriented conceptualisation of resilience in this thesis.

4.3.1 Emotion regulation (Gross, 1998)

The ‘theory of emotion regulation’ put forward by Gross (1998) intends to explain the facilitation and regulation of emotions, along with the intensity, duration, and the display of the emotions in response to threats and demands (Cole, Martin, & Dennis, 2004; Ochsner & Gross, 2005). It complements the transactional model of stress by Lazarus and Folkman (1984, 1987) discussed

in the previous section. Emotion regulation strategies that modulate, regulate, and manage the emotional response to stressful situations can have profound implications on an individual's well-being and adjustment (Aldao, 2013; Eftekhari, Zoellner, & Vigil, 2009; Gross & John, 2003; Livingstone & Srivastava, 2012; Troy & Mauss, 2011). Emotion regulation strategies have been associated with effective stress-management, positive socio-emotional outcomes, and reduction of psychopathology across the life-span (e.g., Compas et al., 2017; Crum, Jamieson, & Akinola, 2020; Dixon-Gordon, Aldao, & De Los Reyes, 2015; Harrington, Trevino, Lopez, & Giuliani, 2020). Among the many emotion regulation strategies, there is a large body of evidence for cognitive reappraisal strategies (see reviews by Augustine & Hemenover, 2009; Carl et al., 2013; Koole, 2009). Cognitive reappraisal is an adaptive antecedent-focused emotion regulation strategy to downregulate negative emotional and cognitive responses to the exposure to stress and adverse events (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Frederickson, Messina, & Grecucci, 2018). Cognitive reappraisal strategies are employed to enhance the emotional state by reconstruing and reframing negative cognitions and emotional responses in more adaptive and positive ways (Llewellyn, Dolcos, Jordan, Rudolph, & Dolcos, 2013).

There is evidence to suggest that it is a stronger predictor of adaptive mental health and resilience outcomes than maladaptive emotion regulation strategies, such as suppression (e.g., Augustine & Hemenover, 2009; Carl et al., 2013; Wang, Xu, Zhang, & Fang, 2017; Zarotti et al., 2020). Highly resilient individuals have been theorised to appraise threats and stressors in ways that regulate their psychological, emotional, physiological responses (Aldao et al., 2010; Beasley, Thompson, & Davidson, 2003; Tugade et al., 2004). The study of adaptive emotion regulation strategies and their process-oriented role has had implications on the development of strength-based interventions that generate positive emotions, positive meaning, and resilience (e.g., Brockman, Ciarrochi, Parker, & Kashdan, 2017; Gross, 2015; Troy & Mauss, 2011; Troy, Shallcross, & Mauss, 2013; Tugade & Fredrickson, 2007).

However, the theory itself does not explain how these manifest developmentally and does not account for the complex and multidimensional nature of resilience and its transactional relationship with emotions and cognitions (Masten & Cicchetti, 2010). The theory has primarily been tested in disease-focused models with stressed individuals or studies investigating its association with negative outcomes, such as depression and anxiety. Importantly, Gross (2015) has recently said that emotion regulation is dependent upon “... *the person, the situation, and the goal that person has in that situation*” (p.17), i.e., contextual factors play a role. Further research into the role of contexts, families, peers, culture, and social-cognitive processes on emotion regulation strategies is required to refine the theoretical implications of this model on resilience research within the higher education context (Aldao, 2013; Lindsey, 2020; Silk, 2019; Yu, Zhou, Zhang, & Xu, 2020).

4.4 Models of developmental psychology

Developmental psychology has influenced the conceptualisation of resilience by highlighting the cascading impact of early experiences on later life (Masten, 2001; Masten & Cicchetti, 2010). The seminal longitudinal studies (see Chapter 2) have demonstrated that early experiences of warmth, support, and caring family and community protect the individuals from maladjustment later in life (Masten et al., 1999; Werner & Smith, 2001). The ecological systems’ theory by Bronfenbrenner (1979) is an influential conceptual model in developmental psychology for its ability to explain complex psychological and sociological phenomena (Pittenger, Huit, & Hansen, 2016). The strengths of an ecological perspective, as proposed by this model, are briefly discussed.

4.4.1 Ecological system's theory (Bronfenbrenner, 1979)

The 'ecological system's theory' by Bronfenbrenner (1979) theorised that there exists a reciprocal interactive relationship between the individual and the context, and both interact to influence psychological development throughout one's lifespan. Bronfenbrenner emphasised the person-process-context approach to study complex constructs throughout the lifespan (Bronfenbrenner & Crouter, 1983). In an ecological model, contexts such as family, institution, and culture are conceptualised as concentric nested structures that influence the person's overall development. These structures, such as the immediate environment, the family and community factors, the laws and customs, and so on, vary by proximity around the individual (Byrd & McKinney, 2012; Goodman, 2017; Santos, 2012).

Over the years, resilience research has provided evidence for the cascading and cumulative effects of factors from individuals, their families, and their ecosystem (Masten, 2014a; Resnick, 2000). Adopting an ecological theoretical basis in resilience research suggests that we ask the question, "*within what contexts do particular processes cultivate resilience for particular people?*" (Harney, 2007, p.77). An ecological perspective is strength-focused and indicates that the ecosystems' protective influences can keep changing and growing throughout one's lifespan (ahmed Shafi et al., 2020; Luthar et al., 2000). Additionally, it decentralises the narrow conceptualisation of resilience from within-individual characteristics to include externally facilitated characteristics (Masten & Obradović, 2006; Ungar, 2011). Decentralisation of resilience is crucial to avoid "*victim blaming*" when an individual cannot positively adapt or cope with adversity (Masten, 2001; Ryan, 1971).

Specifically, for resilience research, an ecological approach has been influential for its conceptualisation and identification of factors that promote resilience across the lifespan (Macedo et al., 2014; Masten & Cicchetti, 2010; Rutter, 1987; Ungar, 2011). As previously discussed in Chapter 2, section 2.4, the pioneering resilience researcher Garmezy (1985) developed the triadic

framework of resilience wherein resilience was proposed to be influenced by a triad of salient risk and protective factors: i) individual (e.g., self-regulation); ii) familial (e.g., cohesion and maltreatment); iii) and communal (e.g., social support systems). Furthermore, as emphasised by Ungar (2011), a socio-ecological perspective underscores the dynamic and socio-cultural influence of risk and protective factors of resilience existing within the family and social systems in different contexts. However, the application of an ecologically-based study of resilience in the context of higher education settings has been limited (e.g., Games et al., 2020; Ozbay & Aydogan, 2020; Turner et al., 2017), and resilience research in adult populations continue to be individual-focused (Hu et al., 2015; Maltby, Day, Flowe, Vostanis, & Chivers, 2019; Oshio et al., 2018). This is supported by a review of psychological resilience literature by Bonanno, Romero, and Klein (2015) which emphasised on the lack of systematic and longitudinal examination of family and community factors, and recommended the identification of predictors across multiple levels (i.e., individual, family, and community).

4.5 The need for a novel model of resilience for university students

Resilience has been applied to a range of contexts and populations which has resulted in several different conceptualisations of the pathways to resilience. However, the current models of resilience are critiqued for their inability to capture the ecological, dynamic, and multidimensional nature of resilience (Liu, Reed, & Girard, 2017). With the growing evidence-base for a multidimensional conceptualisation of resilience, socio-ecological models of resilience can provide an inclusive, comprehensive, and contextually meaningful framework to understand the determinants of positive adaptation that enhance resilience across different contexts (Harney, 2007; Masten, 2014a; Ungar, 2008; Waller, 2001).

An emerging adult's life is influenced by early childhood experiences and supported by a range of interpersonal relationships that guide their adjustment and adaptation to the unique challenges within the higher education context (Ozbay & Aydogan, 2020). Therefore, an ecological

perspective that accounts for resilience-promoting processes and multiple outcomes of resilience has implications on a multilevel approach to build capacity not just within the individual, but in their overall community, through interventions (Ecclestone & Lewis, 2014; Harney, 2007; Luthar & Cicchetti, 2000). Additionally, it has implications on resilience policy and practice as it posits that protective factors can be introduced into the life of an individual in any of the nested levels anytime during their lifespan (i.e., family, workplace, education policies, social opportunities) to improve their lives (Ecclestone & Lewis, 2014; Waller, 2001).

The thesis proposes a model of resilience for university students based on the strengths of these well-established theoretical frameworks and empirical evidence that support resilience as a transactional process between within-individual and socio-ecological risk and protective factors. The thesis aims to advance the resilience literature within the higher education setting by proposing a novel way of conceptualising and operationalising resilience. The following chapter discusses the components of the novel socio-ecological model of resilience for university students, as proposed by this thesis.

Chapter 5 A novel socio-ecological model of resilience for university students

Considering the increasing advocacy for the promotion of mental health and resilience in the university students population in the UK (Hughes & Spanner, 2019; UUK, 2020), the thesis aims to delineate the pathways to resilience from a socio-ecological perspective and address the knowledge gaps in the resilience literature within the higher education context. This chapter provides an overview of the theoretically and empirically based components of the proposed socio-ecological model of resilience for university students. The methodology to examine the validity of the proposed model described in this chapter is presented in Chapter 6, and the findings are reported in Chapter 7 of this thesis.

The thesis adopts the recommended outcome-oriented and multidimensional conceptualisation of resilience (Banyard, Hamby, & Grych, 2017; Chmitorz et al., 2018), as well as the process-driven exploration of the pathways to resilience in university students (Banyard et al., 2017; Masten & Reed, 2002). The thesis adapts the recommended definition of resilience by Brewer (2018, p.6) for the higher education context: “*resilience is a dynamic process of positive adaptation in the face of adversity or challenge. This process involves the capacity to negotiate for and draw upon psychological, social, cultural, and environmental resources,*” as well as Masten’s definitions of resilience: “*the process of, capacity for, or outcome of successful adaptation despite serious challenging or threatening circumstances*” (Masten et al., 1990, p.426).

Not every student can demonstrate resilience to every stressor across all aspects of their mental health and well-being. So it is important to examine a range of outcomes that are affected by exposure to adversity and can be targeted to promote resilience (Hamby et al., 2018; Lenzi et al., 2015). The thesis conceptualises resilience as an outcome by examining positive adaptation in the psychological, social, and emotional domains of mental

health and well-being in university students. **Psychological resilience** refers to the extent to which university students can experience positive mental well-being in the face of adversity (Connor & Davidson, 2003; Galante et al., 2018). **Emotional resilience** refers to the university students' experience of positive affect as a response to stressors (Chow, Hamagami, & Nesselroade, 2007; Resnick & Inguito, 2011). And finally, **social resilience** refers to the degree to which university students can feel connected to their university despite its unique hardships and challenges (Hall & Lamont, 2013). As discussed in Chapter 2 section 2.3, in the absence of a reliable and valid measure that reflects the dynamic and multidimensional nature of resilience, measures of psychological, social, and emotional mental health and well-being have been used to operationalise the outcomes of resilience, i.e., measures of mental well-being and psychological distress (psychological resilience), positive and negative affect (emotional resilience), and campus connectedness (social resilience).

Additionally, based on the theoretical and empirical evidence reviewed in this thesis so far, the thesis aims to explore ecologically-based predictive pathways to resilience by including a within-individual factor (such as perceived stress), a social factor (such as perceptions of social support), and family-based factor (such as dysfunctional parenting), on the multidimensional construct of resilience. Furthermore, the thesis adopted a process-oriented definition of resilience by exploring the underlying role of a resilience-promoting process, i.e., cognitive reappraisal, on the pathways to resilience.

The validity of the pathways proposed in the novel model adopts a variable-focused approach (Masten & Reed, 2002). It is examined using advanced statistical modelling and software to explicate the direct, indirect, and moderating influences on the profiles of students' resilience within the higher education context. This allows for the investigation of the potential underlying role of a resilience-promoting process which is theoretically and empirically derived, i.e., cognitive reappraisal, and of demographic characteristics, such as gender and ethnicity, that can influence the development of resilience, thereby addressing the paucity of this knowledge in the extant literature within the higher education context.

The strength of the model lies in how resilience has been conceptualised, and the multiple components integrated within the model based on a range of evidence of key factors and processes (Luthar & Cicchetti, 2000; Masten, 2001; Rutter, 1987). The proposed model's intent is not to be dogmatic; instead, it wishes to propel resilience research towards socio-ecological models of resilience for university student populations. The pathways to resilience in this comprehensive multi-variable model consist of mostly malleable factors, apart from early experiences of maternal and paternal dysfunctional parenting styles, which are amenable to change while at university. The findings can provide information on which constructs can be targeted by mental health-promoting interventions for university students. To best of the author's knowledge, this study is the first comprehensive evaluation of the socio-ecological pathways to a multidimensional conceptualisation of resilience in university students in a UK based higher education setting.

5.1 Components of the proposed theoretical model of resilience for university students in a higher education setting

The thesis investigates the influences of an individual (i.e., perceived stress), familial (i.e., dysfunctional parenting styles), and social (i.e., perceived support from family, friends, and significant others) risk and protective factors on university students' psychological resilience (i.e., mental well-being and psychological distress), emotional resilience (i.e., positive and negative affect), and social resilience (i.e., campus connectedness). Additionally, the potential underlying role of an emotional regulation strategy (i.e., cognitive reappraisal), and the moderating effects of demographic characteristics (i.e., gender and ethnicity) on the mediating role of cognitive reappraisal are also examined.

The choice of predictors in the novel model is based on the ecological models (Bronfenbrenner, 1979; Garmezy, 1985) and the transactional model of stress (Lazarus & Folkman, 1984). The outcomes of resilience are guided by the salutogenic framework (Antonovsky, 1996) and the broaden-and-build theory

(Fredrickson, 2001), while the choice of the mediator is informed by the theory of emotion regulation (Gross, 1998) and the transactional model of stress (Lazarus & Folkman, 1984). Antonovsky’s theory of salutogenesis (1979) guided the conceptualisation of resilience that health lies on a continuum. Resilience is a dynamic capacity that does not require the student to flourish but exhibit optimal functioning in the face of adversity. Therefore, the inclusion of negative outcomes of resilience, such as psychological distress and negative affect, highlights that resilience is not the absence of poor mental health.

The components of the model, as depicted in Figure 1, are discussed at length in the following sections. The arrows represent the direction of the relationships between the components of the model as proposed by the thesis.

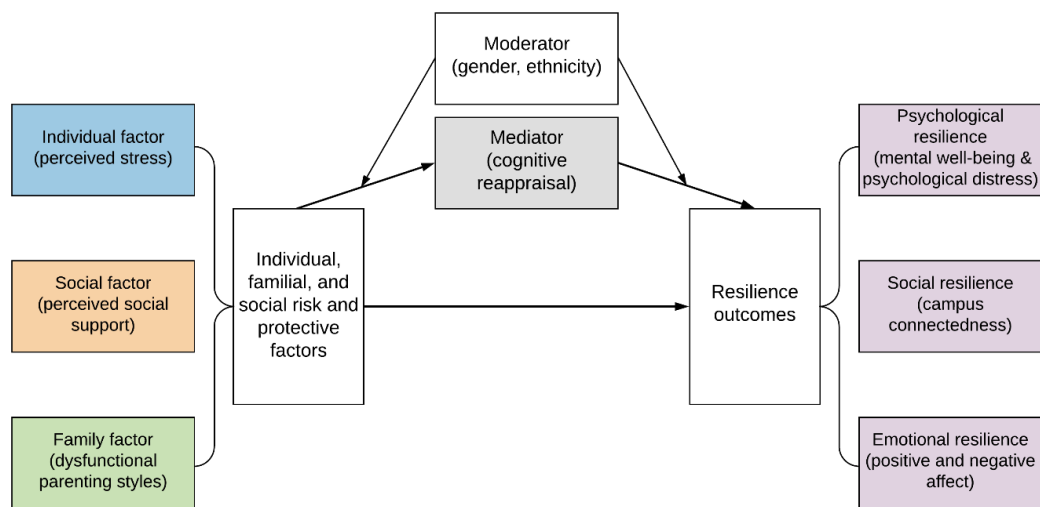


Figure 1 *Conceptual depiction of the novel socio-ecological model of resilience for university students within the higher education context as proposed by this thesis.*

5.1.1 Predictors of resilience

Within a university setting, a range of challenges and demands can disrupt a student’s functioning and resilience. Students’ perceptions of these stressors during university and their social networks can influence their capacity to

adapt to these stressors successfully. Furthermore, the cascading impact of poor parenting and lack of support from the family can impact their resilience during their time at university. Therefore, the thesis investigated the predictive role of perceived stress, perceived social support, and dysfunctional parenting styles on psychological, social, and emotional resilience of university students. To the best of the author's knowledge, these ecologically-based predictors on a multidimensional construct of resilience have not been systematically investigated in university students before.

5.1.1.1 Perceived stress and resilience

Stress is experienced when the demand and disruption to the individual are greater than their ability to respond successfully (Monroe & Simons, 1991; Rosiek, Rosiek-Kryszewska, Leksowski, & Leksowski, 2016). The transactional model of stress (Lazarus & Folkman, 1984) has been instrumental in understanding that the individual's perception of stress and their resources impacts their competency to adapt to the stressors. Resilience is one such process through which individuals cope with and positively adjust to the demands and stressors in one's life (Bonanno, 2004; Hoge, Austin, & Pollack, 2007; Luthar et al., 2000; Masten & Obradović, 2006; Rutter, 2006).

In this thesis, the perception of stress has been defined as the appraisal of stress as threatening to the student's psychological, emotional, and social well-being. Perceived stress has been identified as a personal risk factor for poor mental health in young people, including university students (Eaves & Payne, 2019; VicHealth, 2015). University students experience myriad of daily stressors, including a competitive university environment and unfamiliar social dynamics which can accumulate and make their time at university challenging (Beiter et al., 2015). Prolonged and frequent exposure to stressors is a well-documented predictor of poor physical and mental health as well as poor social and emotional well-being in university students (e.g., Gress-Smith, Roubinov, Andreotti, Compas, & Luecken, 2015; Sarrionandia et al., 2018; Yıldırım, Karaca, Cangur, Acikgoz, & Akkus, 2017; Zou et al., 2018). There is considerable research on the direct and negative impact of stress on well-

being, such as loneliness and increased symptoms of depression (Lee & Goldstein, 2016; Matud, Bethencourt, & Ibáñez, 2015).

Perceived stress has been found to predict trait resilience and hardiness (e.g., Beiter et al., 2015; Cheng & Catling, 2015; Li & Yang, 2016), i.e., university students with higher levels of perceived stress have lower levels of resilience (Denovan & Macaskill, 2017b; Innes, 2017; Willis & Burnett, 2016). Higher levels of stress perceptions have been found to reduce the experience of positive affect (Schiffirin & Nelson, 2010) as well as the student's sense of belongingness to the university (Lee, Keough, & Sexton, 2002). The range of these studies suggests that while the experience of stressors is required to bolster resilience, higher levels of stress perceptions by university students threaten their psychological, emotional, and social well-being (Sarrionandia et al., 2018; Shi et al., 2015; Thompson, Wrath, Trinder, & Adams, 2018).

Empirical evidence has suggested that the experience of stressors does not weaken resilience in everybody (Pereira, Campos, & Sousa, 2017). The experience of stress has been theorised to increase resilience more than the lack of experience of stress (Richardson, 2002). In other words, stressors can cultivate higher levels of resilience and deploy (even deplete) an individual's cognitive, behavioural, emotional, physical, and psychological assets more than no exposure to stress (McEwen & Gianaros, 2011; Pereira et al., 2017; Richardson, 2002). This is because a positive adaptation to stressors signifies that the individual can heal, grow, and recover from these disruptions (Richardson, 2002). In turn, the management and modulation of the effects of stress are deemed important. Stress management and reduction of perceived stress have been a target of resilience-promoting interventions and positive adaptation strategies (e.g., Akeman et al., 2019; Dyrbye et al., 2017; Galante et al., 2018; Houpy, Lee, Woodruff, & Pincavage, 2017; Onan et al., 2018). These interventions' short-term effectiveness indicates that reducing perceived stress can improve mental well-being and cultivate students' resilience. Overall, in the current literature, researchers have focused on resilience as operationalised by a single measure. It is unclear whether stress perceptions influence a multidimensional construct of resilience that includes social and emotional indicators of well-being. Considering that several potentially stress-

inducing circumstances mark university life, it is of benefit to explore the relationships between stress perceptions and a multidimensional conceptualisation of resilience within the higher education context.

5.1.1.2 Perceived social support and resilience

Social support is among the most identified social/community risk and protective factors for resilience in young people (Lin et al., 2020; VicHealth, 2015). It has been associated with physical, psychological, and emotional benefits (Hall et al., 2017) and plays a key role in an individual's appraisal of their ability to manage the stressors (Lindsey, 2020). University students have been found to lean on friendships and family support networks to maintain their well-being (Catling, Mason, & Jones, 2013; Donohoe et al., 2020; Laidlaw, McLellan, & Ozakinci, 2016), and therefore the predictive relationships of these external support systems on the multidimensional construct of resilience need to be clarified.

Perceived social support, in this thesis, is defined as the university student's subjective appraisal and perception of the availability of support of significant people, such as family members, friends, romantic partners, faculty members and so on, irrespective of the quantity of the support (Cobb, 1976; Ogrodniczuk, Joyce, & Piper, 2003; Taylor, 2011). A plethora of evidence exists associating the perceptions of social support among university students with psychological, social, emotional, academic, and health outcomes, including an aspiration to continue education, the sense of belongingness, reduction in negative affect and psychological distress, and increased resilience (e.g., Bore, Kelly, & Nair, 2016; Holdsworth et al., 2018; Zhang, Zhang, Zhang, & Feng, 2018). For example, Pidgeon and colleagues (2014) found that university students perceiving greater levels of support tend to have better psychological well-being, connectedness to the campus, and resilience towards adversity within a higher education context.

It appears that university students rely on family support networks at the start of their university journey, and over time, the support from family becomes less significant as compared to peer support networks (Taylor, Doane, &

Eisenberg, 2014). A longitudinal study by Friedlander and colleagues (2007) involving undergraduate psychology students found perceived social support to be an important protective factor leading to positive adjustment to university, with perceived support from friends to be a more consistent predictor of adjustment than perceived support from family. Conversely, university students who perceive social support from their families, have been reported to be more confident about their ability to adjust to university and are less likely to be distressed academically (Crombie, Brindley, Harris, Marks-Maran, & Thompson, 2013; Hall et al., 2017; Holt, 2014; Jones, Park, & Lefevor, 2018). A longitudinal study by Taylor et al. (2014) examined the relationships between depression, anxiety, perceived social support, and ego-resiliency over three time-points for young people transitioning from high school to university. They found that ego-resiliency predicted higher levels of perceptions of social support from family over time. In addition to family and friends, support from faculty members, such as professors and personal tutors, along with romantic partners have also been found to have a positive relationship with self-esteem and resilience among university students (e.g., Arnett, 2007; Clauss-Ehlers & Wibrowski, 2007; Eshbaugh, 2010; Hall et al., 2017).

The examination of a social factor, such as the perception of social support, decentralises the individual-focused research that has been examined so far in the resilience literature (Sippel, Pietrzak, Charney, Mayes, & Southwick, 2015). Additionally, the relational context of perceived social support, i.e., different sources of social support, is more beneficial than the examination of an aggregate index of social support (Gardner & Stephens-Pisecco, 2019). This is particularly relevant for emerging adults at university, considering that the perceptions of social support from different sources are empirically and theoretically different (Horwitz, Reynolds, & Charles, 2015; Lee, Goldstein, & Dik, 2018). The university creates the opportunity to develop multiple forms of relationships with peer groups, faculty members, accommodation staff, external visitors, and so on (Hartley, 2010). Therefore, the investigation into the perceived social support from different sources of support, i.e., from family, friends, or other significant people, on the cultivation of resilience is

warranted. There are resilience-promoting interventions that target the cultivation of social support (e.g., Kwon et al., 2019; Stephens & Gunther, 2016). Considering perceived social support is reportedly more valuable than participating in social events for university students (Karatekin & Ahluwalia, 2020), these interventions will benefit from an examination of this protective factor along with any potential variations due to specific characteristics of the students, such as gender and ethnicity.

5.1.1.3 Dysfunctional parenting styles and resilience

The family environment has been acknowledged to be a critical subsystem impacting the development and growth of an individual's psychological, social, and emotional health across the lifespan (Bronfenbrenner, 1989; Herman et al., 2011; Ozbay & Aydogan, 2020). Decades of resilience research has emphasised the role of family characteristics on resilience (Garmezy, 1985; Masten, 2001; Masten et al., 1990; Werner & Smith, 1992). Parenting style is among the most commonly identified family-based risk and protective factor which impacts a range of resilience outcomes in young people, including social and emotional adjustment (Khanlou & Wray, 2014; VicHealth, 2015).

In this thesis, early experiences of dysfunctional parenting styles, such as experiences of indifference, abuse, and over-control by university students have been hypothesised as a key risk factor for the multidimensional construct of resilience. Experiences of dysfunctional parenting styles in childhood and adolescence, particularly authoritarian, hostile, abusive, or emotionally distant parenting, have been consistently linked to subsequent mental health problems in adulthood (Afifi, 2018; Afifi & MacMillan, 2011). Adverse childhood experiences, including dysfunctional parenting styles, are reportedly prevalent in university students (Wiehn, Hornberg, & Fischer, 2018). In the UK, in a study by Hardcastle et al. (2018), one-in-ten adult participants (n = 2881) reported as having experienced more than four adverse childhood experiences in the first 19 years of their lives.

Dysfunctional parenting styles have been largely unexplored in the population of university students, but it has been investigated as one of the many early experiences of adverse events that impact well-being and resilience of the students (e.g., Brogden & Gregory, 2019; Forster, Grigsby, Rogers, & Benjamin, 2018; Gonçalves et al., 2017; Osborne, 2019). This is unsurprising, considering there is a strong relationship between family background and adverse childhood events and adverse events often occur within the family context (Scully, McLaughlin, & Fitzgerald, 2020). Additionally, family functioning is a complex and multidimensional construct (Schleider et al., 2015), and therefore, for a parsimonious model, the thesis focuses on one specific family-based risk factor of resilience, i.e., adverse parenting practices.

Dysfunctional parenting styles have been found to be related to poor mental health outcomes, including increased stress and adjustment to university (e.g., Forster et al., 2018; Karatekin & Ahluwalia, 2020; Körük, Öztürk, & Kara, 2016; Matalinares-Calvet et al., 2019; Rubin & Kelly, 2015; Tran, Dunne, Vo, & Luu, 2015). In some studies, university students who reported higher levels of dysfunction within the family, including poor parent relationship and conflict, were more likely to engage in risky behaviour (Forster et al., 2018; Osborne, 2019), experience symptoms of depression (Yu et al., 2015), and report poor academic motivation and achievement (Joshi, Ferris, Otto, & Regan, 2003; Silva, Dorso, Azhar, & Renk, 2007). In a qualitative study by Valdez et al. (2013) involving university students, stressors within the family had a cumulative effect on the ability of the students' management of stressors at university. While some students displayed resilience to such experiences, others reported feeling "*permanently damaged*" (p.1099). The lack of dysfunctions in the family background during the formative years appears to be a protective factor for the promotion of resilience outcomes in university students (Edwards et al., 2016). Conversely, young people with experiences of childhood adversities are reported to have fewer resilience factors, i.e., protective factors, and higher levels of distress (Fritz, de Graaff, Caisley, van Harmelen, & Wilkinson, 2018).

More recently, a systematic review by Yoon et al. (2019) examined the conceptualisation and operationalisation of resilience following childhood

maltreatment across the lifespan. Of the 33 studies that involved adults, 50% of the studies conceptualised resilience as a personality trait and 10% of the studies as a socio-ecological resource for resilience. The individual-focused conceptualisation of resilience, i.e., as a personality trait, highlights the assumption of detachment from family resources and towards greater autonomy and individuation (Aquilino, 2006). However, for emerging adults, adverse experiences within the family system during their formative years can have long-lasting implications in the future (Bellis et al., 2018; Chandan et al., 2020; Hardcastle et al., 2018; Tranter et al., 2020). Thus, the examination of family-based dysfunctions as a socio-ecological risk factor is critical for resilience research across the lifespan.

5.1.2 Outcomes of resilience

The proposed model of resilience integrates the recommendations for resilience research by drawing from the definitions of resilience as an outcome and a process. In the proposed socio-ecological model, resilience has been conceptualised to be multidimensional, encompassing theoretically and developmentally salient domains of mental health and well-being — psychological, emotional, and social — to indicate successful adaptation and adjustment by university students in a university climate (Luthar et al., 2000; Masten, 2014b). The model goes beyond the outcome-based definitions of resilience as the absence of symptoms of anxiety and ill health and integrates strengths-based indicators of positive psychological, emotional, and social mental health and well-being.

5.1.2.1 Psychological resilience

In this thesis, ‘psychological resilience’ is characterised by the capacity to experience positive mental well-being and reduce the vulnerability to psychological distress in the face of challenging and stressful circumstances (Connor & Davidson, 2003; Galante et al., 2018; Onan et al., 2019). It is based on the eudaimonic perspective wherein resilience is to realise one’s true potential and experience positive mental well-being (Reyes et al., 2015).

Psychological resilience has been operationalised as mental well-being and psychological distress to capture the continuum of the psychological responses to adversities. Keyes (2007) stated that mental health is the combined presence of positive states and the absence of psychopathology. Therefore, the measurement of both psychological distress and mental well-being can give a comprehensive understanding of the overall psychological resilience of university students.

The mental well-being of university students, in this thesis, is defined as the subjective experiences of well-being and positive psychological functioning (Bradshaw et al., 2007; Tennant et al., 2007). There is substantial evidence to suggest that resilience is associated with higher levels of mental well-being across populations, including university students (Bajaj & Pande, 2016; Freire et al., 2016; Ganguly & Perera, 2019; Ríos -Risqueiz et al., 2018). In university students, higher levels of mental well-being and resilience are associated with the increased use of health services (Keyes, 2003), academic persistence and success (e.g., Allan, McKenna, & Dominey, 2014; Bailey & Phillips, 2016; Yu, Shek, & Zhu, 2018), and active coping (e.g., Bhullar, Hine, & Phillips, 2014; Figueroa, Contini, Lacunza, Levín, & Estévez Suedan, 2005).

Psychological distress, another key component of ‘psychological resilience,’ is defined in the thesis as the distress resulting from symptoms related to depression, anxiety, and stress in university students. The proposed theoretical model explores psychological distress as a measure of vulnerability and is indicative of the student’s struggle to cope effectively with the stressors (Smith, Haight, Emerson, Mauldin, & Wood, 2020). Overall, university students with higher levels of trait resilience have lower levels of psychological distress and higher levels of mental well-being (Bore, Pittolo, Kirby, Dluzewska, & Marlin, 2016).

5.1.2.2 Emotional resilience

In this thesis, ‘emotional resilience’ is described as the experience and maintenance of positive affect while regulating the effects of negative affect experienced because of stressors (Boardman, Blalock, & Button, 2008; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Resnick & Inguito, 2011; Xing & Sun, 2013). Emotional resilience is not just the sustained feelings of joy and engagement among others as a consequence of positive adaptation to stressors, but also the experiences of negative emotions such as discontent, failure, and loss (Huppert, 2009; Suldo & Shaffer, 2008). The experiences of positive emotions are distinct from and complementary to negative emotions and the study of both requires attention (Carl, Soskin, Kerns, & Barlow, 2013; Fredrickson, 2001; Garland et al., 2010). Positive and negative emotionality has been targeted in mental health and resilience-promoting interventions for university students (e.g., Herrero et al., 2019; Steinhardt & Dolbier, 2008; Wald et al., 2016), and will benefit from a systematic investigation into the predictive role of socio-ecological risk and protective factors.

The capacity to experience positive emotions in the face of adversity has been well-established (Fredrickson, 2001; Tugade et al., 2004). Fredrickson’s broaden-and-build model (2001) emphasised on the role of positive emotions as a facilitator of the accrual of long-lasting personal resources that enable adaptive behaviour. Through cross-sectional and longitudinal studies, resilience has been indicated to be the capacity to experience positive emotions — such as joy, interest, amusement, humour — in adult populations, including university students (e.g., Folkman & Moskowitz, 2000; Fredrickson, 2013; Masten & Reed, 2002; Tugade & Fredrickson, 2004; Tugade et al., 2004; Waugh et al., 2008). Resilient individuals use positive emotions such as humour and love (Ong et al., 2006), positive reappraisal (Folkman & Moskowitz, 2000), goal-directed problem-solving skills, adaptive coping, and the development of a social network, which enhance their resilience to future disruptions to their lives (Fredrickson & Losada, 2005; Fredrickson & Branigan, 2005; Waugh et al., 2008).

In an influential study involving undergraduate students, primarily female students, Tugade et al. (2004) hypothesised that students with high levels of trait resilience will have greater positive emotionality, appraise a stressful task as less disruptive, and their cardiovascular recovery to the stressful task will be mediated by the experiences of positive emotions. They found that: i) highly resilient students were characterised by high positive emotionality; ii) positive appraisals of tasks generated positive emotions; iii) and positive emotions helped highly resilient students to achieve faster cardiovascular recovery than low resilient students with lower levels of positive emotionality.

Conversely, negative emotions, have been linked with vulnerability to maladjustment and emotional disorders in adult populations (Elwood, Wolitzky-Taylor, & Olatunji, 2012). Furthermore, higher experiences of negative emotions can inhibit the experiences of positive emotions (Williams, Peeters, & Zautra, 2004), with low levels of positive emotionality associated with depression (Watson & Naragon-Gainey, 2010). Interestingly, an experimental study conducted on a small sample of undergraduate students found that resilient students integrated negative events with positive memories. This can explain why people can self-generate positive emotions during adversities and reduce the effects of negative emotions (Philippe et al., 2018). This suggests that a balance of both positive and negative emotions exists for an individual to thrive (Fredrickson & Losada, 2005), with higher levels of positive emotions having the ability to minimise the effects of negative affect in the face of a stressor (Kobau et al., 2011).

The cultivation of positive emotions to guide mental health promotion has influenced the design of mental health-promoting interventions (Meneghel et al., 2019). The aim of these interventions is not to block out negative emotions, but to encourage the appraisal of stressors and regulate the negative emotions in a way that elicit positive emotions, such as pride, contentment, love among others (Fredrickson & Branigan, 2005; Garland et al., 2010; Tugade & Fredrickson, 2004).

5.1.2.3 Social resilience

‘Social resilience’ is defined as the appraisal of belongingness and integration to the university environment by undergraduate students (Hall & Lamont, 2013). Social resilience is the “*enduring and ubiquitous sense of interpersonal closeness with the social world in total*” (Lee & Robbins, 1995, p.355). It plays a key role in overall mental well-being (Keyes, 2002). Social resilience is operationalised as campus connectedness in this thesis. Campus connectedness is defined as the degree of belongingness and meaningful relationships that a student has with their fellow students, faculty, and their higher education institutions (Berkman, Glass, Brissette, & Seeman, 2000). A key aspect of adjustment to university is the concept of campus connectedness, which goes beyond perceptions and quality of social support, to belongingness and connectedness to university life (Bales et al., 2015; Pidgeon et al., 2014).

Campus connectedness is the subjective reflection of the degree to which one feels close to the environment and people around them (Berkman et al., 2000; Lee & Robbins, 1995). It encompasses social, emotional, and institutional aspects of belongingness that are important to facilitate adjustment to the demands of university life (Freeman, Anderman, & Jensen, 2007; Lee & Robbins, 2000). It differs from social support as it taps onto the perceived sense of fitting in within a higher education context (Lee et al., 2001). Students who feel like they belong at university are more likely to engage with their academics and with their faculty members and peers (Zumbrunn, McKim, Buhs, & Hawley, 2014). This sense of belongingness could also be an indicator of a healthy support system (Hamm & Faircloth, 2005), which can make university students less likely to be lonely and anxious (Qualter et al., 2015; Vanhalst et al., 2012). Pidgeon et al. (2014) explored the characteristics of resilience in university students (n = 214) from Australia, USA, and Hong Kong. They reported that higher levels of resilience were associated with higher levels of campus connectedness. No significant differences were found between the countries. However, these findings are primarily correlational

relationships and therefore, provide only preliminary evidence for the associations between resilience and campus connectedness.

Higher levels of belongingness and connection with the university are indicative of salubrious and adaptive social health and well-being of university students. The ability to construct an identity and a sense of belongingness while at the university requires the negotiation with several unique challenges, such as independent or shared living, academic tasks, networking events and so on. Therefore, successful social adaptation to the university is a key indicator of social resilience. To the best of the author’s knowledge, this is the first study to investigate campus connectedness as a resilience outcome in a comprehensive model of resilience for university students in a higher education setting in the UK.

5.1.3 Mediator and moderators of the pathways to resilience

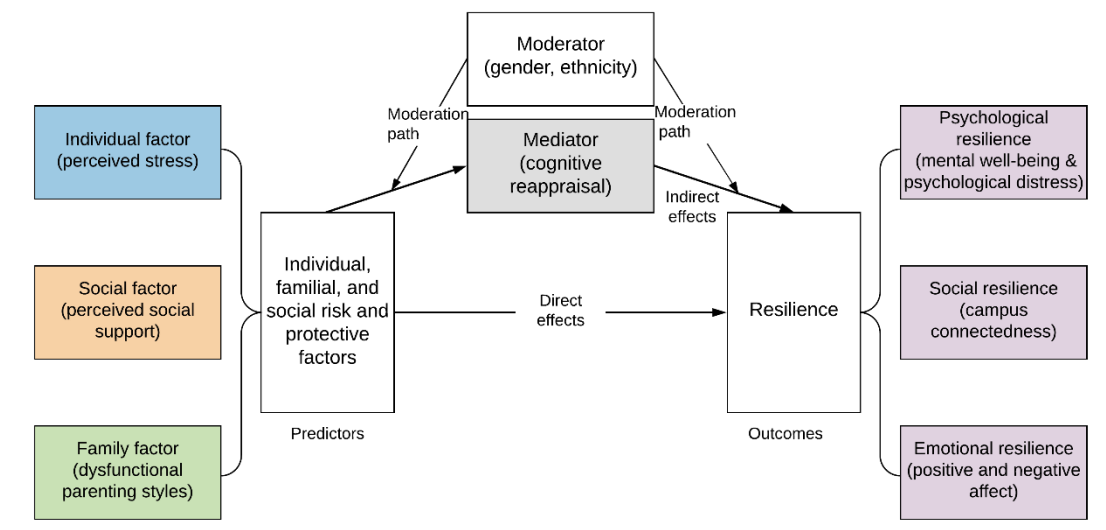


Figure 2 Mechanisms of the pathways proposed in the novel socio-ecological model of resilience for university students.

The process-based definition of resilience in this thesis integrates the pathways to resilience from multiple risk and protective factors and explores the underpinning role of cognitive reappraisal on these relationships. Mediators can help us understand how a predictor affects an outcome (Hayes,

2018). A deeper understanding of the underlying mechanisms of these relationships can elucidate upon when an effect is likely to occur. The investigation of underlying resilience-promoting factors has been the primary aim of the second wave of resilience research. While a diverse range of studies has explored the predictive role of perceived stress, perceived social support, and family-based characteristics on psychosocial outcomes of mental health and well-being in university student populations, the evidence for the potential mediators has been limited. The examination of mediators will provide more clarity to the conceptual model of resilience (Iacobucci, 2009), enriching the theorising of such a complex construct.

Moderators are qualities of variables that can influence the strength of a predictor variable's impact on an outcome variable (Baron & Kenny, 1986). Considering the complex nature of resilience and the transactional relationships between the individual and their environment, it is possible that the pathways to resilience can vary due gender, ethnicity, age, and other socio-demographic characteristics of the university students (Clauss-Ehlers, 2008; Harrop et al., 2006; Hu et al., 2015; Ungar et al., 2015; Ungar, 2011). Limitations of most of the current literature are the poor descriptions and lack of analyses to account for the possible impact of socio-demographic factors on (Brewer et al., 2019; Conley, Durlak, et al., 2013). It is important to systematically investigate the potential sources of variations in outcomes of resilience (Khanlou & Wray, 2014), as differences in ethnicity and gender have been shown to impact factors, such as parenting style, sense of belongingness, emotion regulation, and personality traits (e.g., Duarte, Matos, & Marques, 2015; Grigsby et al., 2020; Mo, Chan, Chan, & Lau, 2018; Ong, Zautra, & Reid, 2010; Rueth, Otterpohl, & Wild, 2017; Salguero, Extremera, & Fernández-Berrocal, 2012).

In this thesis, the moderating role of gender and ethnicity on the mediation effects of cognitive reappraisal has been explored. The intent of the thesis is to highlight the diversity across the different gender identities, i.e., beyond the binary classification of male and female, and across different ethnic identities. This is to recognise that there is an immense diversity in the student population in the higher education sector and their representation in research

is important (Zajacova, Hepper, & Grandison, 2019). At the moment, there is a paucity of research which has examined the relationships between emotion regulation strategies and resilience in gender minority university students, making it important to include identities beyond the male-female gender identification.

While socio-economic background is an influential covariate in behaviour and development (De Girolamo et al., 2012), this information was not sought by this thesis. Socio-economic information is usually obtained by asking for approximate parental income, occupation, or educational level, and/or postal codes (e.g., Deb, McGirr, & Sun, 2016; Ibrahim et al., 2013; Troy et al., 2017). Accurate information can be obtained for relatively homogenous samples, such as school students as they tend to come from local areas near the schools. However, this is difficult for a large university which attracts students from across the globe. Therefore, socio-economic related questions related to parental income can be diverse and could lead to inflated estimates. Additionally, the socio-economic background can be considered as private and sensitive information that could deter participants from divulging their family income, leading to large missing data (O'Neil & Penrod, 2001). Considering the issues related to measuring socio-economic status has highlighted its multifaceted and sensitive nature (Fotso & Kuate-Defo, 2005; Oakes & Rossi, 2003), further investigation into this potentially important moderator was not addressed in this thesis.

The moderation and mediation paths of the proposed model have been depicted in Figure 2. The following section justifies the exploration for the potential role of cognitive reappraisal as a mediator, and the investigation into the variations due to gender and ethnicity in these mediational effects to the pathways to resilience.

5.1.3.1 Cognitive reappraisal: A potential underlying mechanism to the multidimensional construct of resilience

As discussed previously in Chapter 4, section 4.3.1, the regulation of emotions, particularly, using adaptive emotion regulation strategies, such as cognitive reappraisal, have been theorised over the years as mechanisms with which individuals transact between stressful events and positive outcomes (Lazarus & Folkman, 1987; Tugade & Fredrickson, 2004, 2007). Cognitive reappraisal strategies, such as positive reappraisal and positive refocusing, are adaptive automatic processes which allow individuals to downregulate negative emotional responses and construe adverse events more positively (Garland et al., 2010; Giuliani, Drabant, & Gross, 2011; Ochsner & Gross, 2005; Ong, Zautra, & Reid, 2010). They allow the individual to adapt to the stressful situation without escaping from the situation or suppressing their emotional responses (Milyavsky et al., 2018). Although cognitive reappraisal has not been theoretically related to resilience, the appraisal of resources and successful coping aligns with the central tenets of resilience (Benight & Cieslak, 2011; McRae & Gross, 2020). People who reappraise more experience daily hassles with less negative emotions (Carlson, Dikecligil, Greenberg, & Mujica-Parodi, 2012; Gross & John, 2003), have positive social outcomes (English & John, 2013), and greater psychological and physical health (Aldao et al., 2010; Appleton, Loucks, Buka, & Kubzansky, 2014; Ford, Karnilowicz, & Mauss, 2017).

In the broader emotion regulation literature, there is a push towards the investigation of the interpersonal, situational, and contextual nature of emotion regulation to recognise that it is a dynamic process (Colombo et al., 2020; English & Eldesouky, 2020; Lindsey, 2020; Silk, 2019). The future directions that have been recommended include the investigation of differences in emotion regulation strategies for different types of relationships, such as parent-child relationships, friendships and romantic partners, and the role of different risk and socio-cultural contexts (Gross, 2015; Lindsey, 2020; Raver, 2004). [For example, for transgender and non-binary young people, the facilitation of emotional regulation and challenging](#)

negative cognitions and affect has been recommended as strategies for mental health promotion (Coyne, Poquiz, Janssen, & Chen, 2020). However, socio-ecological factors and gender and ethnic differences have been largely overlooked to establish the universality of the complex construct (Haga, Kraft, & Corby, 2009). This is despite the growing evidence supporting the variations in the choice of emotion regulation strategy and consequent display and expression of emotions due to the gender and ethnic backgrounds of individuals (Arens, Balkir, & Barnow, 2013), and the family and social backgrounds (Lindsey, 2020; Silk, 2019).

The development of cognitive reappraisal can be influenced by the quality of caregiving, early attachment, and early adverse experiences with parents or caregivers (Banyard et al., 2017; England-Mason & Gonzalez, 2020; Jin, Zhang, & Han, 2017). The importance of the family context in the development of emotion regulation has been emphasised in a review by Morris et al. (2007) who highlighted the long-lasting implications of early interactions between parent and child on emotional reactivity and regulation. For example, in adolescents aged 12- 18 years, cognitive reappraisal was found to partially mediate the relationships between a history of adverse childhood experiences and psychological distress (Boyes, Hasking, & Martin, 2015). A study by Hong et al. (2018) found that only in female students, suppression and cognitive reappraisal mediated the relationships between maternal and paternal emotional neglect and stress perceptions. Gender minority youth are at a high risk of experience family rejection, neglect and abuse (Mayer, Garofalo, & Makadon, 2014), which can impact their regulation of emotions and experiences of positive and negative affect (White, Moeller, Ivcevic, Brackett, & Stern, 2018).

Additionally, engaging in shared activities with peers and friends can also upregulate positive emotions (Lindsey, 2020; Nolen-Hoeksema, 2012; Shim et al., 2017). Inadequate levels of social support can lead to maladaptive emotion regulation strategies, and individuals with higher levels of perceived social support are more likely to use reappraisal to enhance their well-being (Li, Yao, & Liu, 2020). For example, among transgender youth, social support (from family, school, university, peers) and emotion regulation skills have

been found to protect against poor mental health and as a stress-coping strategy (Bry, Mustanski, Garofalo, & Burns, 2018; Russell & Fish, 2016).

Crucially, there are distinct differences in the emotional socialisation between males and females, such that females are encouraged to display more positive affect than males (Chen, Wu, & Wang, 2018), and are more likely to seek social support to regulate their emotions and benefit from it (Stoliker & Lafreniere, 2015; Zimmermann & Iwanski, 2014). Female students are reportedly more likely to experience higher levels of stress than male students (Bayram & Bilgel, 2008; Gitchel, Roessler, & Turner, 2011; Matud et al., 2015; Song et al., 2008) which can lead to differences in the use and benefits of cognitive reappraisal. While some studies suggest that men are more likely to use cognitive reappraisal strategies than women (Extremera & Rey, 2015), other studies have reported no gender differences in the use of reappraisal (Gross, Richards, & John, 2006), and some report that women are more likely to upregulate their emotions than men (e.g., Tamres, Janicki, & Helgeson, 2002). The differences in emotional socialisation can be more drastic for transgender individuals who have to switch between suppression and expression of emotions based on the social environment and implicit expectations (Sloan, Berke, & Shipherd, 2017). This can lead to emotional dysregulation which can disrupt the sense of self and modulations of painful stressors (Yang, Manning, Van Den Berg, & Operario, 2015). Understanding the differences in how social networks are sought and perceived by different gender identities can have implications on the use of cognitive reappraisal.

In relation to ethnic backgrounds, cultures which value introspection are reported to use reappraisal (Haga et al., 2009), while those which encourage the display of emotions are unlikely to suppress their emotions (Su et al., 2015). For example, East Asian individuals are more likely to dampen and inhibit their emotional experiences to maintain social bonds (Butler, Doherty, & Potter, 2007; Joshanloo et al., 2014), and therefore are not perceived to be a maladaptive emotion regulation strategy. However, no cultural differences have been found concerning reappraisal strategies in East Asian and Western cultures (Matsumoto et al., 2008; Nozaki, 2018). For example, a meta-analysis on the relationships between cognitive reappraisal and mental health

found no moderating effect of Eastern and Western cultural values (Hu et al., 2014).

There are wide-ranging evidence and potential sources of variations that can impact the mechanism of cognitive reappraisal, thereby on the promotion of resilience. This has provided the impetus for the systematic investigation of the moderating role of gender and ethnicity on the underlying effects of cognitive reappraisal in this thesis. Emotion regulation strategies, such as cognitive reappraisal and reconstruction have been used in resilience-promoting interventions for university students (e.g., Akeman et al., 2019; Smith & Khawaja, 2014), including a trauma-focused intervention that focuses on the cultivation of strengths and resilience in students with experiences of early adverse experiences (Oehme et al., 2019). Interestingly, a recent study involving non-clinical adult population (n = 219) in the United States of America reported the use of cognitive reappraisal for 67% of the days examined (Ford et al., 2017). Therefore, raising awareness of the beneficial use of cognitive reappraisal strategies to cope with daily hassles and cumulative risk of early adverse experiences can benefit university students (Haga et al., 2009). However, as discussed in Chapter 3, most of the existing interventions lack this examination in their theoretical delineation and their one-size-fits-all design. As such, a systematic investigation into the potential underlying mechanism of the pathways to resilience and the variations in the mechanism of cognitive reappraisal due to ethnicity and gender will increase the sensitivity of these interventions.

To conclude, this chapter has provided an overview of the theoretically and empirically-derived components of the proposed socio-ecological model of resilience for university students. The following chapter outlines the methodology utilised to examine the validity of this model in a representative cohort of university students at the University of Nottingham (UoN).

Chapter 6 Methodology and data processing

In this chapter, the methodology and analytical strategies used to investigate the aims of the study are elucidated and justified. The chapter positions the research questions from the perspective of post-positivism and justifies the appropriateness of a quantitative research methodology. The chapter presents the overall research design, including the description of the setting and the population of interest for the study and the method of data collection. The appropriateness of the measures used to obtain the relevant data from the participants is discussed and the characteristics of the sample obtained are reported. The chapter concludes with a presentation of the research hypotheses.

6.1 Research aim and questions

The main aim of the study was to empirically test the validity of the novel model of resilience — based on a socio-ecological approach — to understand how risk and protective factors predict psychological, social, and emotional resilience in a representative sample of UK based undergraduate students. The thesis had several key research questions which were explored cross-sectionally and longitudinally:

- a) Is there a direct relationship between perceived stress, perceived social support and maternal and paternal dysfunctional parenting styles and the outcomes of resilience, including mental well-being, psychological distress, campus connectedness, and positive and negative affect, in university students?
- b) Does the ability to downregulate negative emotional responses (i.e., using cognitive reappraisal) partly mediate the relationships between perceived stress, perceived social support and maternal and paternal dysfunctional parenting styles and the outcomes of resilience,

including mental well-being, psychological distress, campus connectedness, and positive and negative affect, in university students?

- c) Is the partial mediation role of cognitive reappraisal on the relationships between perceived stress, perceived social support and maternal and paternal dysfunctional parenting styles and the outcomes of resilience (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect) stronger for university students identifying with specific gender identity (male, female, transgender amongst others)?
- d) Is the partial mediation role of cognitive reappraisal on the relationships between perceived stress, perceived social support and maternal and paternal dysfunctional parenting styles and the outcomes of resilience (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect) stronger for university students of a specific ethnic background?

The thesis aimed to contribute to and enrich the sparse theoretical literature on resilience development in the university student population. The thesis proposed a novel socio-ecological model of resilience and examined the predictive role of perceived stress, perceived social support (from friends, family, and significant others), and maternal and paternal dysfunctional parenting styles on the multidimensional construct of resilience.

Furthermore, it examined the potential mediational role of cognitive reappraisal, and the potential moderated mediational effects of gender and ethnic identities of university students. The thesis also investigated whether these mediational and moderated mediational effects change across time, therefore exploring the prospective predictive capacity of these multiple relationships (i.e., through longitudinal mediation and longitudinal moderated mediation analyses). The findings of these research questions, as presented in Chapter 7, can be used to refine theoretical models of resilience specific to this population, the creation of multidimensional measures or indicators of resilience, and the design of evidence-based resilience interventions for university students within the higher education context.

6.2 Philosophical underpinning

Before embarking on a research study, it is recommended that the researcher understands what paradigm supports their research question and study design (Denzin & Yvonna, 2011). The ontology (i.e., the nature of reality) and the epistemology (i.e., the nature of knowledge) reflexively influence our research (Benton & Craib, 2011; Carter & Little, 2007), and how we attain knowledge about the world (Broom & Willis, 2007). They justify the research strategy that is used to structure, design, acquire, and report knowledge (Carter & Little, 2007; Morgan, 2007). The philosophical position of the thesis is based upon post-positivism and the reasons for this are briefly discussed below.

The positivist philosophy emphasises on the facts which can be scientifically observed and are stable and objective (Neuman, 2011). The ontology of positivism is the search for one true reality. Its epistemology assumes that research can produce objective, neutral, and unbiased truths about the social world (Broom & Willis, 2007; Bryman, 2016). The purpose of a positivist researcher is to only observe reality and detach themselves from what is being studied, rather than being immersed and participatory (Krauss & Putra, 2005). Research is devoid of subjective feelings and is to be reported in a neutral manner (Ponterotto, 2005).

The post-positivist paradigm is rooted in positivism and its position as a framework is that human functioning can be explored by empirically testing and verifying theory in a structured and systematic process (Crook & Garratt, 2005). A post-positivist paradigm often involves an experimental design where there are independent variables which may or may not impact certain dependent variables (Lewin & Somekh, 2005). However, unlike positivism, post-positivism employs a less reductionist view of human behaviour and acknowledges that the behaviour is complex and embedded in the current socio-cultural, economic, and political contexts. It also does not aim to arrive at an absolute truth (Eagleton, 2004), instead, recognises that knowledge obtained is prone to refutation and change, and cannot be perfectly measured

(Clark, 1998). Additionally, post-positivism recognises the importance of context and characteristics of the researchers which can influence how knowledge is perceived, interpreted, and explained (Clark, 1998; Schwab, 1962). The research aims to falsify rather than verify existing knowledge (Ponterotto, 2005).

This thesis sought to test a theoretically and empirically-based conceptual model of a dynamic and multidimensional construct, i.e., resilience. Measurable data were collected to examine the predictive validity of this model. A post-positivist paradigm acknowledges that the findings from such data are generalisable to the population from which the sample has been drawn. Hence, such a paradigm was recognised to be appropriate for the outcome-driven and variable-focused orientation of the study (Masten & Reed, 2002).

6.3 Research design and procedure

6.3.1 Study design

A two-phased study with baseline and 5-month follow-up assessments was conducted using a self-administered online survey at the University of Nottingham (UoN), UK campus. The target population was all the registered undergraduate students at UoN (i.e., international/European Union/home; full-time/part-time). The target population excluded postgraduate, diploma, foundation, and exchange students. The author recognises that the postgraduate student's experiences at university vary from that of undergraduate students. These might lead to different pathways to resilience that warrant independent research that is beyond the scope of the current research project (Evans, Bira, Gastelum, Weiss, & Vanderford, 2018; Sverdlik, Hall, McAlpine, & Hubbard, 2018). Additionally, diploma, foundation, and exchange students were excluded from the study since they are at university for a shorter amount of time than undergraduate students. It is possible that these students may not be a member of the UoN to be able to participate at both the two time-points. Additionally, undergraduate students are more

likely to transition to university right after school and, as discussed in Chapter 1, experience a unique set of challenges that are pertinent only to this population. No additional exclusion criteria were adopted (e.g., prior exposure to risk factors for resilience) to capture the diverse characteristics of the university student population.

Careful considerations for data collection were made based on the term schedules of the undergraduate students. To reduce over-burdening the students during their Easter holidays and their end-of-year examinations, a 6+ month follow-up was thought to be unsuitable. Previous two or more phased research studies have demonstrated significantly lower retention and the response rate for self-reported online surveys by undergraduate students during the spring and summer terms (e.g., Pittman & Richmond, 2008; Wei, Russell, & Zakalik, 2005; Wintre & Yaffe, 2000). Hence, to minimise any disturbance to the students during a potentially stressful exam preparation period as well as to ensure retention, the study opted for a 5-month follow-up design and kept the survey open for two months at each phase. Furthermore, due to time and resource constraints, a third phase was not considered. At each time-point, the survey was kept open for two months to increase the likelihood of getting a large number of responses. For the baseline phase, most of the responses were obtained within the first month (i.e., 51%) and 98% of the responses were obtained within 5 weeks. In the follow-up phase, 77.4% of the respondents completed the survey within the first month. This suggests that for most of the participants, there was a 5-month gap between the data collection.

6.3.2 Sample size and sampling strategy

For structural equation modelling (SEM), there is a range of guidelines regarding sample size requirements which are dependent on the statistical power, the magnitude of the regressive paths, the number of free parameters in a conceptual model among other considerations, such as missing data and the type of data (see Wolf, Harrington, Clark, & Miller, 2013). For this thesis, the recommended ratio of 15:1 was used, i.e., the ratio of the number of cases

to the number of free parameters in the model (Kline, 2016). To keep the risk of Type II errors in statistical inferences at an acceptable level, the study aimed for statistical power at a level of at least 0.80. In this thesis, the number of free parameters for the mediation model was approximately 42, indicating a recommended sample size of 630 university students. Prior longitudinal studies involving university students reported attrition rates (i.e., rate of students not completing all the phases of the study) ranging from 35% - 52% (e.g., Ceyhan & Ceyhan, 2011; Richardson et al., 2016; Ríos -Risqueuz et al., 2018), and a similar attrition rate was expected. Anticipating for at least a 40% attrition rate, a target sample of approximately 882 representatives of the undergraduate population of the university was sought by the study.

For recruitment, based on the regulations of the Data Protection Act (1998) at place during the study, simple random sampling was not feasible. A simple random sampling technique would require a list of all undergraduate students from which a group of subjects are to be randomly selected (Mullinix, Leeper, Druckman, & Freese, 2015). Instead, a non-probability convenience sampling technique was implemented, whereby all participants who viewed the survey and fit the inclusion criteria could participate in the study. This technique is often used to recruit participants from a large and easily accessible population such as university students (Bornstein, Jager, & Putnick, 2013; Etikan, Musa, & Alkassim, 2016). It is cost-effective and is dependent upon the voluntary participation by the university students.

The limitations of this technique stem from its voluntary nature which can impact the sample size and lead to a biased sample due to a lack of representation of certain groups of students, e.g., those from ethnic minority backgrounds. Survey studies involving undergraduate students which depend on voluntary participation tend to have more female students participating than males (e.g., Kiziela, Viliūnienė, Friberg, & Navickas, 2019; Santos & Soares, 2018; Stallman, Ohan, & Chiera, 2017). However, the practical and cost-effective advantages of this sampling technique were deemed most suitable for the thesis and helped to obtain representative data from a large and diverse population without breaching regulations placed by the Data Protection Act and the General Data Protection Regulation (GDPR, 2018).

While the study results might not be fully generalisable to all undergraduate students in the UK, or even in Nottingham, they could provide significant insights into resilience in university students within the higher education context.

6.3.3 Survey method

An online survey was created using Bristol Online Survey (BOS) and the data were collected and managed through a password-protected online account on a university computer. The online self-report method minimises the role of the researcher, increases the perceptions of privacy, and thereby reduces any potential deterrent feelings of shame or embarrassment or social desirability (Krumpal, 2013). For sensitive data, online surveys appear to elicit comparably more genuine responses (Knapp & Kirk, 2003) and have a relatively lower influence of social desirability and inhibitions (Hanna, Weinberg, Dant, & Berger, 2005) than paper-based questionnaires.

Additionally, web-based surveys are advantageous for data entry and analysis due to the ease of exporting responses and the subsequent transfer to statistical packages (Hanna et al., 2005). This minimises errors made due to manual data entry (Granello & Wheaton, 2004; Lefever, Dal, & Matthíasdóttir, 2007). Online surveys are also frequently and effectively used for multilevel modelling in mental health and resilience research with university students as participants (e.g., Thomas & Zolkoski, 2020; Wu et al., 2020; Zarotti et al., 2020). Therefore, considering the relative ease of contact with a large student population in a short amount of time, the use of self-administered online survey was considered to be an appropriate and cost-effective method for this thesis.

6.3.4 Recruitment strategy and procedure

Before the dissemination of the survey, the duration for completion of the survey, its visual appeal, usability, and completeness was assessed by 10 individuals, including UoN postgraduate students and the supervisory team.

The survey was piloted on multiple devices including mobile phones, iPads, tablets, and laptops. Minor typographical and grammatical amendments were made based on the feedback.

To optimise participation and visibility of the study, a multi-modal recruitment strategy was put in place (see Vincent et al., 2012), in which pre-planning and the development of a structured schedule for participant recruitment were considered to be crucial (Granello & Wheaton, 2004). Without direct access to personal contact details of the undergraduate students, potential facilitators were identified, and permissions were obtained for their assistance with the recruitment process. These included the Customer Insight Team of the Students Union (SU) of the UoN and administrators and head of departments of the various Schools at the UoN. The role of the Insight Team at the SU is to collate feedback from the students through qualitative and quantitative means to inform evidence-based change to improve students' experiences while at the university. They conduct online surveys aimed at all students at the university and use social media channels to make information about their surveys more accessible and visually attractive. This was felt to be a useful avenue through which non-response to a wide-scale electronic survey could be tackled (Levin, 2006). Additionally, almost 20 school administrators and heads of departments provided permission to share the survey link to their undergraduate students via their mailing lists (see Appendix A). These included a diverse range of schools such as Chemical Engineering, Economics, Health Sciences, Law, English, Geography, History, Music, Physics, Astronomy and more.

Participation in the survey was voluntary and participants were not compensated for their involvement. Instead, the students were given the opportunity to enter a prize draw totalling £150 provided by the SU. For completing the baseline survey, a chance to participate in a £50 online prize draw was provided. For those who completed both the baseline and follow-up surveys, there was an opportunity to participate in a £100 online prize draw after completing the follow-up survey. Cash incentives and prize draw such as these have often been used in studies involving university students to bolster recruitment of participants (e.g., Conley, Travers, & Bryant, 2013; Gloria &

Steinhardt, 2016; Wei, Liao, Ku, & Shaffer, 2011). While such monetary incentives can improve retention rate, they can introduce a bias by impacting the participants' intrinsic motivation to respond to the survey (Andrews, Nonnecke, & Preece, 2003; O'Neil & Penrod, 2001; Vincent et al., 2012). However, considering a lottery-based system with just one prize available for each phase was used, it was not expected to invoke any sense of obligation on the student to participate in the study (Edwards et al., 2003; Göritz & Wolff, 2007; Harris, Khoo, Young, Solomon, & Rae, 2008).

All registered students including undergraduate, postgraduate, foundation, and exchange students ($n \approx 33,000$) were sent a Welcome Survey by the SU in the autumn term in 2017. An introduction to the survey was provided on the first page and a link to the survey was provided at the very end. The SU also advertised the study through their various Facebook pages, which are followed by a large number of undergraduate students (see Appendix A). Considering the SU advertised the link to all registered students at the university, a more direct advertisement exclusively to the undergraduate students was undertaken by circulating the survey via mailing lists through various school administrators and heads of departments. Considering the invitation to the **baseline survey was circulated by administrators and the SU, it can be assumed that an estimated 23,000 undergraduate students received the invitation. Although, it is not possible to estimate the number of students who viewed the invitation to the survey, in light of wide distribution the response rate is low.** The last section of the survey extended an invitation to participate in the follow-up phase of the study and the £50 prize draw. The £50 prize draw winner was selected via a random number generator¹ and was contacted by the SU. All participants, regardless of whether they disclosed their email address for the follow-up phase and prize draw, were thanked for their participation by the author of this thesis.

A timeline was created to keep a record of when to send pre-notification and reminder emails during the follow-up phase. Pre-notification and reminder emails have been shown to improve response rates (Sheehan, 2006) better

¹ <https://www.random.org/integers/>

than a single email. Care was taken to ensure that the emails regarding the study could be set apart from other spam emails by adding a clear subject line (Vincent et al., 2012). Copies of the emails sent to the students can be found in Appendix A. Once the survey closed, the £100 prize draw winner was selected via the random number generator and was contacted by the SU. Data collection was completed by the first week of May 2018.

To match longitudinal data and to assign each participant a unique code, Self-Generated Identification Codes (SGIC) were used to assure anonymity of participation and avoid responses being associated with the participant's email address (Kristjansson, Sigfusdottir, Sigfusson, & Allegrante, 2014; Yurek, Vasey, & Havens, 2008). To formulate their unique codes, the participants responded to certain pre-constructed statements in the baseline survey (Diiorio, Soet, Marter, Woodring, & Dudley, 2000). A description of the instructions for SGICs can be found in Appendix C.

6.4 Ethical considerations

Ethical approval was sought and obtained with satisfaction from the UoN, Faculty of Medicine and Health Sciences Research Ethics Committee (Ref: 107-1709). There were no ethical issues that emerged during the study. For data protection, the online profile for the BOS was created using a UoN registered email address. Participants were provided with an online information sheet that clearly outlined the aims and objectives of the study, what participation involved, how the data will be used, analysed, stored, and protected (see Appendix B). The voluntary nature of the study was emphasised, and participants were informed that they could withdraw at any time. Consent was taken on a separate web-page to ensure that participants had read and considered all the information before proceeding to participate in the study. It was made clear that the participants did not need to respond to the questions in the survey. They could choose to skip items if they wanted. Responses to the online survey were anonymous and data were identified using participant-generated identification codes which could not be 'cracked' without great difficulty. Participants' disclosed email addresses for follow-up

and the prize draws could not be used to identify their responses as they were collected using a separate online survey. Disclosure of email address for follow-up survey and participation in the online prize draw was optional.

Any identifiable information, such as participant-disclosed university email addresses for follow-up survey and prize-draw, were stored in password-protected documents on a password-protected university computer. These files were deleted once the participants had been contacted and the data collection phase had ended. All study documents and data were accessible only for the author of this thesis and their supervisory team. The thesis also complied with the GDPR (GDPR, 2018). The study documents will be retained for at least 7 years at UoN facilities as per the ethical regulations. Any published data from the study will not contain personal data of the participants. Findings presented at conferences have not contained any identifiable personal data of the participants.

Some students in the population might have been had experiences of anxiety, distress, and depression before or during their participation in the study. The study asks potentially sensitive information, such as the recall of negative experiences of dysfunctional parenting styles, which could have caused some distress to the students. However, to maintain confidentiality, it was not possible to personally reach out to these students. Instead, key information of peer-led support organisations and university counselling services was provided in the information sheet and at the end of the survey. The participants were also encouraged to contact the author for any concerns and queries about the study.

6.5 Measures

Eight measures were used in this study to operationalise the different components of the proposed model of resilience. These measures have been validated in the current literature, and have been used in resilience research involving university students (e.g., Andreotti et al., 2013; Bajaj & Pande, 2016; Brockman et al., 2017; Matel-Anderson et al., 2019; Pidgeon et al., 2014;

Schroder, Dawood, Yalch, Donnellan, & Moser, 2015; Silberschatz & Aafjes-van Doorn, 2017; Thomas & Zolkoski, 2020; Thompson et al., 2018). Table 1 summarises the measures used in this thesis and a copy of the measures can be found in the Appendices (Appendix K - Appendix R). A short questionnaire was created to capture the socio-demographic characteristics of the students such as their gender identity, ethnicity (defined according to the ONS, n.d.), age (in years), and their year of study as an undergraduate student.

The factorial structure and longitudinal measurement invariance of the measures across time-points for the obtained sample were evaluated using confirmatory factor analysis (CFA) procedures on Mplus v.8.4 (Muthén & Muthén, 1998-2019). Longitudinal measurement invariance for each measure was estimated using the Mean-and Variance-Adjusted Weighted Least Squares procedure (WLSMV) (see sections 6.6.3 and 6.6.4.3. in this chapter for a discussion on longitudinal measurement invariance and the rationale for the choice of model estimation, respectively). Based on the guidelines in the Mplus User Guide v.8.4 (Muthén & Muthén, 1998-2019), three nested models, i.e., configural, metric, and scalar, in that order were examined for invariance (for a technical description of steps undertaken, refer to Appendix J).

Table 1 *Measures used in the thesis to operationalise the components of the novel socio-ecological model of resilience.*

Construct	Definition	Measure
Perceived stress	The degree to which a situation or an event is perceived to be stressful.	10-item Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983)
Perceived social support	The perceived adequacy of social support from family, friends, and significant others.	The Multidimensional Scale of Perceived Social Support (Zimet et al., 1988)
Dysfunctional parenting styles	An assessment of dysfunctional parenting styles including indifference, over-control, and abuse, in the first 16 years of life from a mother/female guardian, and father/male guardian.	Measure of Parenting Style (Parker et al., 1997)
Cognitive reappraisal	An assessment of the ability to use the emotion regulatory strategy of down-	The 6-item cognitive reappraisal subscale of Emotion Regulation

	regulating and mitigating an aversive experience or emotion.	Questionnaire (Gross and John, 2003)
Mental well-being	An assessment of an individual's mental well-being and psychological functioning.	Warwick-Edinburgh Mental Well-being Scale (Tennant et al., 2007)
Psychological distress	An assessment of psychological well-being and associated factors such as anxiety and depression.	General Population Clinical Outcomes in Routine Evaluation (Sinclair et al., 2005)
Campus connectedness	The subjective feelings of personal belongingness and connectedness to the university campus.	Modified Social Connectedness Scale (Lee and Robbins, 1995)
Positive and negative affect	An assessment of trait positive and negative affect.	Positive and Negative Affect Scale (Watson, Clark, and Tellegen, 1988)

a) Perception of stress: A 10-item scale of the **Perceived Stress Scale (PSS-10)** developed by Cohen, Kamarck, & Mermelstein (1983) was used to measure a student's appraisal of how often they felt stressed, overwhelmed, or not in control of situations over the last month. The scale instructed the students to rate the extent to which certain statements, e.g., "*In the last month, how often have you felt nervous and stressed?*" applied to them on a 5-point Likert scale (ranging from 0 = *never* to 4 = *very often*). Higher scores indicated a higher degree of perceived stress. In studies involving university students, PSS-10 has been found to have an adequate internal consistency, i.e., Cronbach's α values ranging from 0.57 to 0.91 (e.g., Denovan, Dagnall, Dhingra, & Grogan, 2019; Richardson et al., 2016; Thompson et al., 2018; Willis & Burnett, 2016). PSS-10 has been found to be a valid measure of perceived stress for use with undergraduate students (e.g., Cohen et al., 1983; Räsänen, Lappalainen, Muotka, Tolvanen, & Lappalainen, 2016; Richardson, Elliott, & Roberts, 2017; Shatkin et al., 2016; Shi, Wang, et al., 2015; Thompson et al., 2018). Additionally, Denovan et al. (2019) have found PSS-10 to be factorially invariant across male and female university students.

A review of the psychometric properties of the scale has recommended a further examination of the longitudinal stability of the scale (see Lee, 2012). For this thesis, the internal consistency of this measure was high, i.e., Cronbach's $\alpha = 0.89$. During CFA procedures, model modifications were made to improve the model fit of the baseline or configural model (see Appendix K, Table K-1). Item 7 (i.e., "*in your last month, how often have you been able to control irritations in your life*") was correlated with the latent factor, perceived stress, in an unexpected direction, and therefore was removed. The final scalar model was a one-factor model, with 9 items with an overall acceptable fit, with a significant WLSMV $\chi^2 (df, p) = 100.18 (26, p \leq .00)$, RMSEA = 0.08 (90% CI: 0.08, 0.09), SRMR = 0.05, CFI and TLI = 0.95. The evidence for scalar invariance suggests that the responses over time within the same level of perceived stress are expected to be equivalent. Figure 3 showcases the final measurement model for perceived stress with the standardised regression coefficients. The coefficients were significant at $p \leq .05$ and ranged from 0.54 - 0.87, indicating that each item moderately or strongly loaded onto the latent factor, i.e., perceived stress.

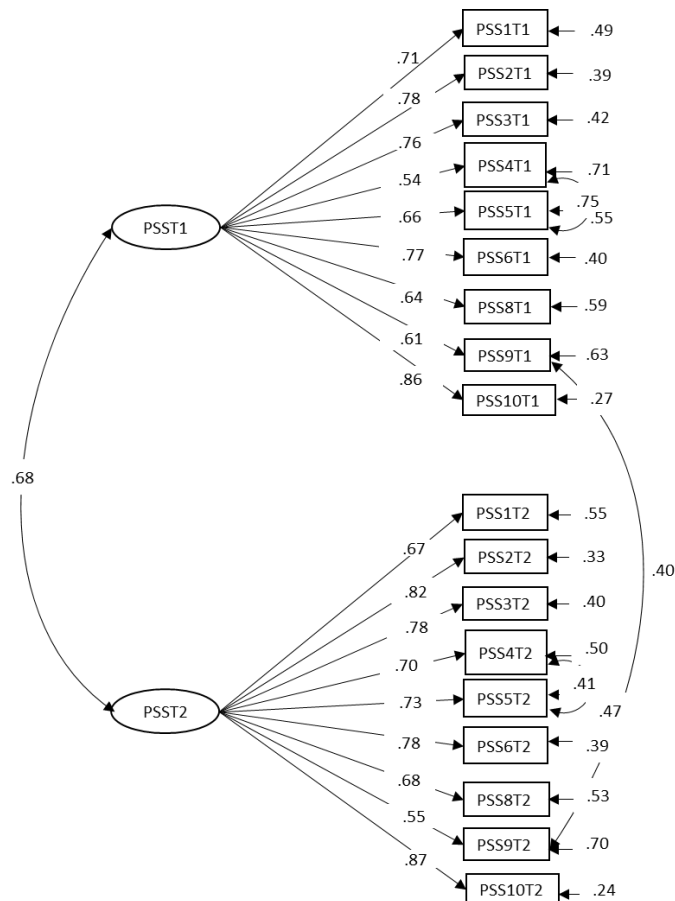


Figure 3 One factor scalar model across time-points with 9 items for the measure of perceived stress (PSS) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline assessment; T2: follow-up assessment. For a description of the items, refer to Appendix K.

b) Perception of social support: The **Multidimensional Scale of Perceived Social Support (MSPSS)** developed by Zimet, Powell, Farley, Werkman, & Berkoff (1988) was used to measure the perceived adequacy of support from family, significant other(s), and friend(s). The 12-item self-report scale is comprised of three subscales measuring support from friends (4 items), family (4 items), and significant others (4 items). The 4 items related to significant others, e.g., “*There is a special person who is around when I am in need*”, were not restricted to any one person, allowing the students to choose whom they perceived as significant (Canty-Mitchell & Zimet, 2000). Students rated their perception to the extent to which statements such as “*My family really tries to help me*”, applied to them on a 7-point Likert scale (ranging from 1 = *very strongly disagree* to 7 = *very strongly*

agree). A final score was obtained by averaging the scores ranging from 1 to 7, with higher scores indicating higher levels of the overall perception of social support (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). In previous studies, MSPSS has demonstrated sound internal consistency, i.e., Cronbach α value of 0.88 - 0.92 for a variety of populations which include university students (e.g., Li, Han, Wang, Sun, & Cheng, 2018; Matel-Anderson et al., 2019; Narayanan & Onn, 2016; Yıldırım et al., 2017; Zimet et al., 1990). Osman and colleagues (2014) found some evidence of factorial and theoretical invariance of MSPSS between gender groups in undergraduate students, however, they caution against making comparisons between men and women based on the subscales.

There is support for the confirmation of the 3-factor structure of MSPSS in the wider literature (Bruwer, Emsley, Kidd, Lochner, & Seedat, 2008; Canty-Mitchell & Zimet, 2000), and this was supported by the analyses performed in this thesis. For the thesis, the internal consistency of this scale was high, i.e., Cronbach's $\alpha = 0.91$. The inter-factor correlations (i.e., between the subscales) were moderate ranging from .43 - .50 at baseline and between .42 - .50 at follow-up. The results of configural, metric, and scalar invariance resulted in an overall good fit with a non-significant WLSMV $\chi^2 (df, p) = 73.60 (57, p \leq .07)$, RMSEA = 0.05 (90% CI: 0.05, 0.06), SRMR = 0.03, CFI and TLI = 0.99. Figure 4 showcases the final 3-factor measurement model for the measure of perceived social support with the standardised regression coefficients. The coefficients were significant at $p \leq .05$ and ranged from 0.82 - 0.96 indicating that each item was strongly related to its purported latent factor. See Appendix L, Table L-1, for a description of the items and goodness-of-fit indices of the nested models for this scale.

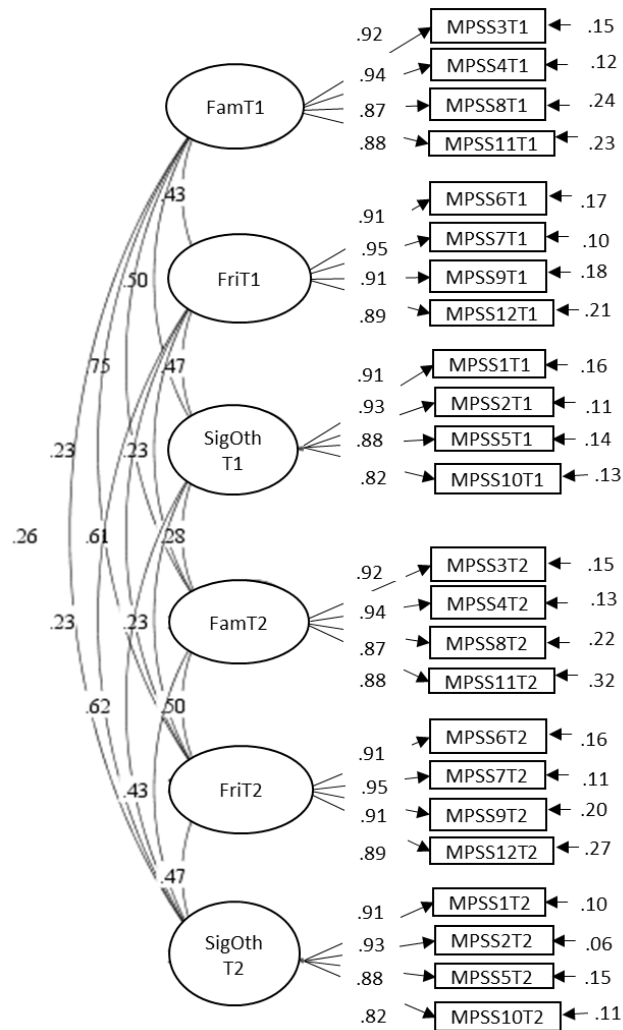


Figure 4 First-order three-factor measurement model for the measure of perceived social support (MPSS) with standardised parameter estimates statistically significant at $p \leq .05$. Fam: Family, Fri: Friends, SigOth: Significant other. T1: baseline assessment; T2: follow-up assessment. For a description of the items, refer to Appendix L.

- c) Dysfunctional parenting style: **Measure of Parenting Style (MOPS)** by Parker et al. (1997) is a retroactive self-report scale used to examine the perceptions about maternal and paternal parenting styles during the first 16 years of life. The MOPS is an evolved version of the Parenting Bonding Instrument (Parker, Tupling, & Brown, 1979) which measures the impact of perceived parenting style on the parent-child bond. The MOPS has 15 items with three subscales capturing indifference, abuse, and over-control. It is split into two with the same 15 items for mother/female guardian and father/male guardian and the items are scored on a 4-point Likert scale (ranging from 0 = *not true at*

all to 3 = extremely true). An example of the instructions is “During your first 16 years how true are the following statements about your mother/female guardian’s behaviour towards you?” The students were expected to recall the extent to which statements such as “overprotective of me,” “made me feel unsafe,” “physically violent or abusive of me” applied to them. A total overall score was obtained along with the total score for the three subscales with a possible score ranging from a minimum of 0 to a maximum score of 4. A higher score indicated more adverse early parenting experiences. Cronbach’s α values have been reported to range from 0.82 to 0.93 for all the three subscales (Parker et al., 1997). This scale has been used in clinical and non-clinical samples to examine dysfunctional parenting (Alanko et al., 2008; Penjor, Thorsteinsson, Price, & Loi, 2019; Picardi et al., 2013; Silberschatz & Aafjes-van Doorn, 2017).

Considering MOPS has not been extensively used in the university student population, unlike the Parenting Bonding Instrument (e.g., Anno et al., 2015; Betts et al., 2009), it was imperative to examine the validity of the factorial structure proposed by the authors of the scale for both father (FMOPS) and mother (MMOPS) subscales. For this thesis, the internal consistency of the maternal and paternal subscales for the measure was high, i.e., Cronbach’s $\alpha = 0.91$ and Cronbach’s $\alpha = 0.92$, respectively. A summary of the estimation and evaluation of the configural model with modifications, and the metric and scalar models for both subscales are presented in Table M-1, Appendix M. The configural model for the maternal subscale resulted in critical errors and a warning by Mplus. Sources of these errors were:

- High correlations between the latent factors (i.e., between over-control, abuse, and indifference) ranging from 0.77 - 0.91 at baseline and 0.73 - 0.93 at follow-up, suggesting a one-factor model rather than the original 3-factor model. This lack of support for the 3-factor model has been reported by some studies (e.g., Alanko et al., 2008; Silberschatz & Aafjes-van Doorn, 2017), but not in others (e.g., Picardi et al., 2013).

- High correlations between items 14 (i.e., “*made me feel in danger*”) and items 15 (i.e., “*made me feel unsafe*”) ($r_s = 0.99$, $p \leq .05$), which indicated that they could be measuring the same construct and wordings of these two items can result in similar responses by the participants. Two one-factor models were examined, one without item 15, and the other without item 14. Since the model results did not significantly differ based on which among the two were removed, item 15 was removed for all further analyses.
- Weak factor loadings for item 1 (i.e., “*overprotective of me*”) at both time-points. The factor loadings were 0.27 and 0.35 at baseline and follow-up respectively, as compared to the other items which ranged from 0.72 - 0.96 at both time-points, and therefore, was removed for all further analyses.

After multiple modifications to the configural model, evidence for metric and scalar invariance was established without further re-specifications. The final measurement model had an overall adequate fit with a non-significant WLSMV χ^2 (df, p) = 30.33 (25, $p \leq .21$), RMSEA = 0.07 (90% CI: 0.06, 0.07), SRMR = 0.08, CFI and TLI = 0.96. The factor correlation was statistically significant at $p \leq .05$ over time and the factor loadings ranged from 0.71 - 0.97 and were statistically significant at $p \leq .05$. Figure 5 showcases the final measurement model for maternal dysfunctional parenting styles with the standardised regression coefficients.

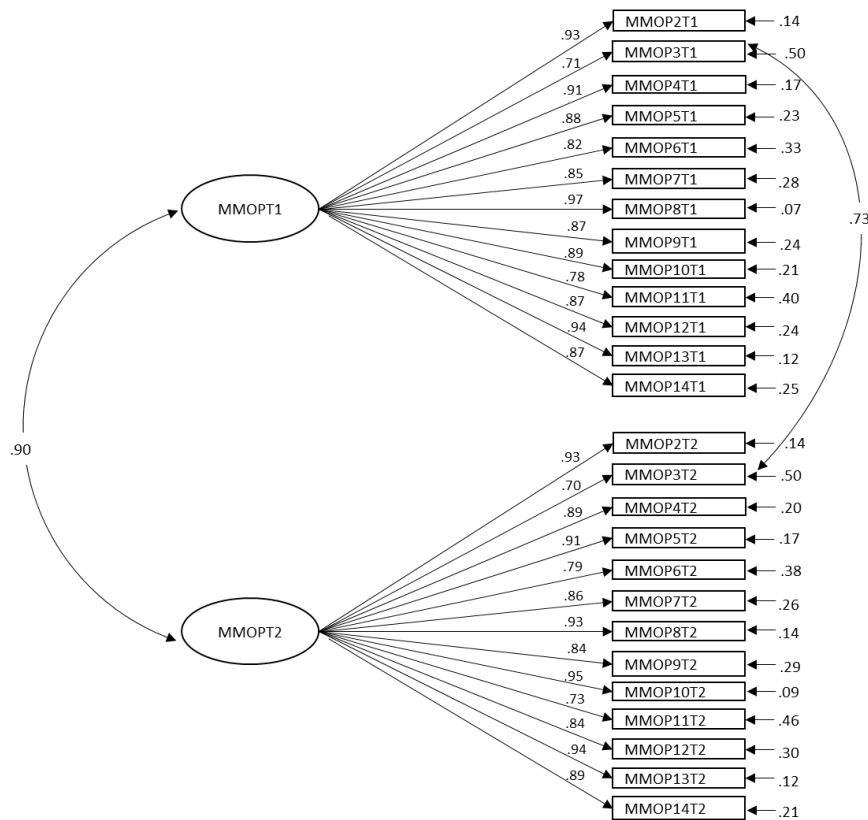


Figure 5 One factor model with 13 items for the measure of maternal parenting styles (MMOP) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix M.

For the paternal parenting styles subscale (FMOP) there were high inter-factor correlations, similar to the maternal parenting styles subscale, as indicated by warnings on Mplus. The correlation between the latent factors ranged from 0.60 - 0.92 at both time-points, and therefore the 3-factor model was not replicated for the current sample. Similarly, items 1 at both time-points were statistically non-significant and had significantly lower factor loadings (i.e., 0.19 - 0.23 at baseline and follow-up respectively), as compared to the other items. The scalar model produced an adequate model fit with a non-significant WLSMV $\chi^2 (df, p) = 32.66 (27, p \leq .20)$, RMSEA = 0.08 (90% CI: 0.07, 0.08), SRMR = 0.10, CFI and TLI = 0.96, and with statistically significant factor loadings, factor correlation across time, and factor variance at $p \leq .05$. Figure 6 showcases the final measurement model for paternal dysfunctional parenting styles with the standardised regression

coefficients ranging from 0.64 - 0.96. See Appendix M, Table M-1, for a description of the items and goodness-of-fit indices of the nested models.

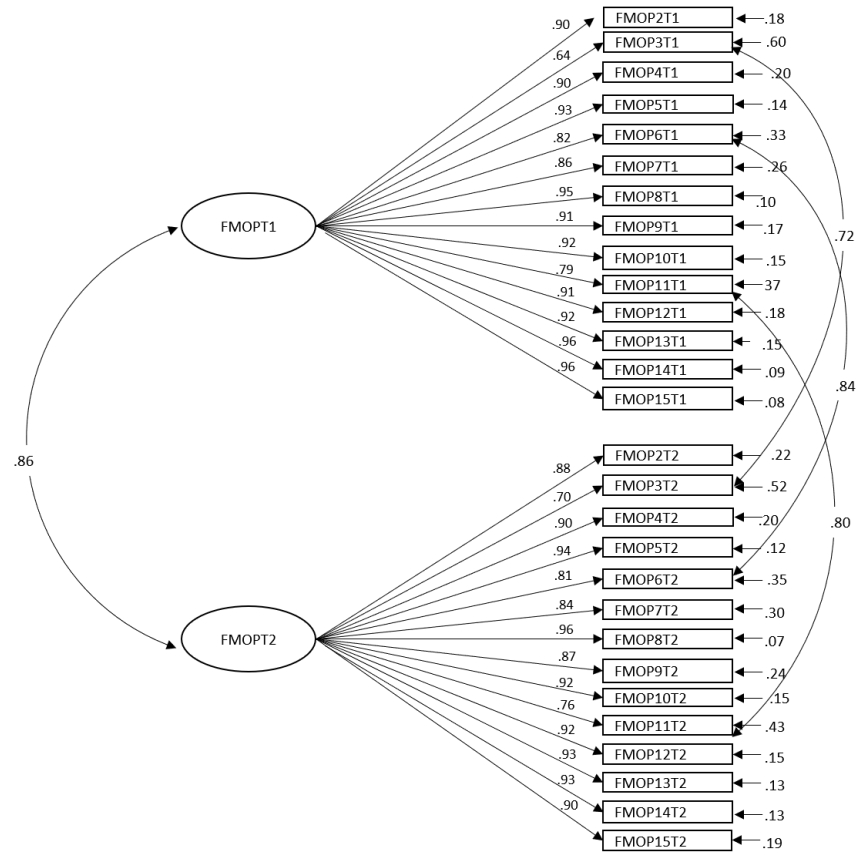


Figure 6 One factor model with 14 items for the measure of paternal parenting styles (FMOP) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix M.

- d) Cognitive reappraisal: The 6-item cognitive reappraisal subscale of the **Emotion Regulation Questionnaire (ERQ-CR)** by Gross & John (2003) was used to measure the students' tendency to use reappraisal as a strategy for emotion regulation in emotionally arousing situations. They responded to statements such as “*I control my emotions by changing the way I think about the situation I am in*” and rated their agreement or disagreement to the statements on a 7-point Likert scale (ranging from 1 = *strongly disagree* to 7 = *strongly agree*). Previous studies have suggested that Cronbach's α for the reappraisal subscale

are approximately 0.70 - 0.90 (e.g., Enebrink, Björnsdotter, & Ghaderi, 2013; Melka, Lancaster, Bryant, & Rodriguez, 2011; Nozaki, 2018; Yoshizu, Sekiguchi, & Amemiya, 2013). Adequate internal consistency (0.79), test-retest reliability (0.69) and validity have been demonstrated for the subscale in university student populations (e.g., Gross & John, 2003; Ioannidis & Siegling, 2015; Schroder et al., 2015; Waugh et al., 2008), and has been used with university student populations (e.g., Andreotti et al., 2013; Brockman et al., 2017; Nozaki, 2018; Schroder et al., 2015; Zarotti et al., 2020). Additionally, Melka et al. (2011) have reported invariance in the factorial structure of the Emotion Regulation Scale between genders (male and female) and ethnicity (European American and African American) using CFA procedures involving undergraduate students.

For this thesis, the internal consistency of the cognitive reappraisal subscale was high, i.e., Cronbach's $\alpha = 0.89$. The configural model of the cognitive reappraisal subscale had a poor fit, which improved with a correlation of the error terms of two items (see Appendix N, Table N-1). The final measurement model had an overall adequate fit with a significant WLSMV $\chi^2 (df, p) = 63.01 (29, p \leq .00)$, RMSEA = 0.07 (90% CI: 0.07, 0.08), SRMR = 0.03, CFI and TLI = 0.98. The factor loadings, factor correlations across time, and factor variance were statistically significant at $p \leq .05$. Figure 7 showcases the final measurement model for cognitive reappraisal with the standardised regression coefficients. The coefficients were significant at $p \leq .05$ and ranged from 0.66 - 0.89.

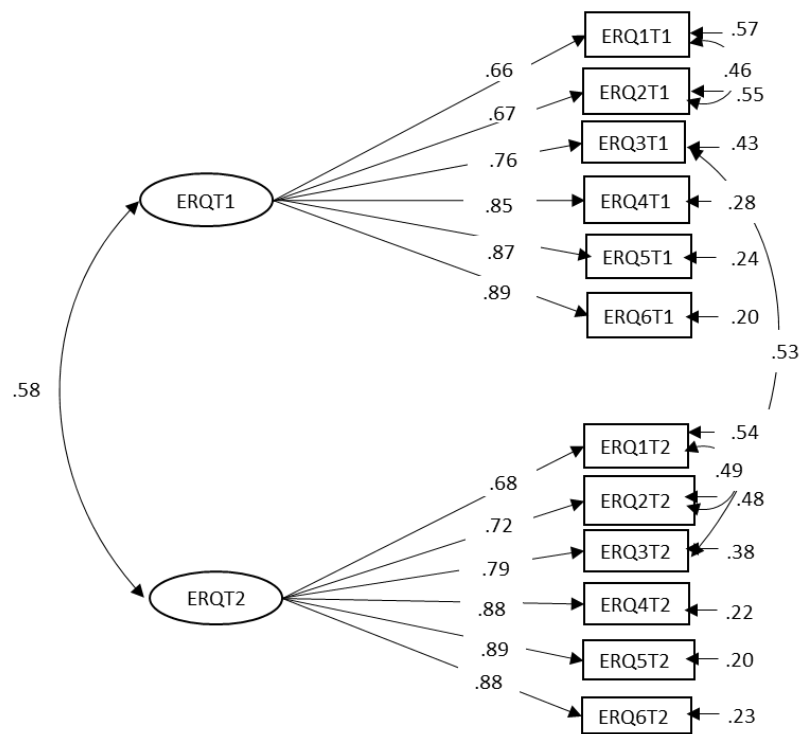


Figure 7 One factor model with 6 items for the measure of cognitive reappraisal (ERQ) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix N.

e) Mental well-being: The **Warwick-Edinburgh Mental Well-being Scale (WEMWBS)** developed by Tennant et al. (2007) was used to examine the hedonic and eudaimonic aspects of subjective mental well-being. Students rated 14 items such as “*I’ve been feeling optimistic about the future*” on a 5-point Likert scale (ranging from 1 = *none of the time* to 5 = *all of the time*). Higher total scores indicated higher levels of mental well-being. Previous studies have suggested that WEMWBS is a validated tool for UK university students and the general population, with an adequate internal consistency (0.89) and test-retest reliability (0.83) (e.g., Blasco et al., 2016; Byrom, 2018; Dong et al., 2016; Galante et al., 2018; McAneney et al., 2015; Soysa & Wilcomb, 2015; Tennant et al., 2007).

Dong et al. (2016) have found support for the single factor model of WEMWBS as proposed by the authors of the scale, with factor loadings $\geq .40$, and reported a Cronbach’s alpha of .94. For the thesis, the

internal consistency of this scale was high, i.e., Cronbach's $\alpha = 0.93$. Apart from the correlation of error terms of item 12 across time, there were no further modifications to the factorial structure, and the final scalar model had an overall adequate fit with a significant WLSMV χ^2 (df, p) = 113.05 (41, $p \leq .00$), RMSEA = 0.09 (90% CI: 0.08, 0.09), SRMR = 0.06, CFI = 0.94, and TLI = 0.95. As found in the analysis in this thesis, a significant Chi-square statistic (χ^2) for the factorial structure of WEMWBS has also been reported by the authors of the scale (Tennant et al., 2007). See Table O-1, in Appendix O for a summary of the model estimation and evaluation conducted for this thesis. Figure 8 showcases the final measurement model for mental well-being with the standardised regression coefficients. The coefficients were significant at $p \leq .05$ and ranged from 0.60 - 0.95.

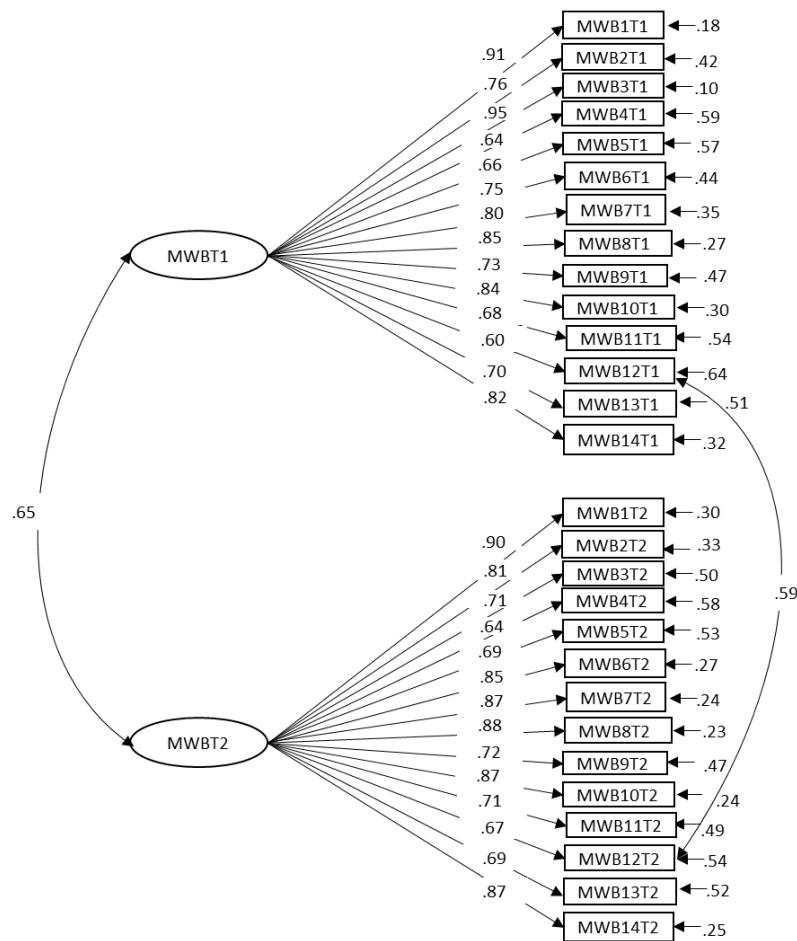


Figure 8 One factor model with 14 items for the measure of mental well-being (MWB) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix O.

- f) Psychological distress: The **General Population Clinical Outcomes in Routine Evaluation (CORE-GP)** was developed by Sinclair, Barkham, Evans, Connell, & Audin (2005) for the general population to assess levels of psychological distress, i.e., subsyndromal symptoms of anxiety, depression, and physical problems. Students rated the extent to which statements such as “*I have felt criticised by other people*” and “*I have had difficulty getting to sleep or staying asleep,*” applied to them on a 5-point Likert scale (ranging from 0 = *not at all* to 4 = *most or all the time*). Item scores were obtained by the summation of scores and dividing them by 14 to yield scores between 0 and 4. These scores when multiplied by 10 provided the final scores for the students, where a score above 10 indicated high levels of psychological distress. Lower

the score, better the mental health, and lower the levels of distress. CORE-GP has been found to be suitable for non-clinical and university student populations with high Cronbach's α values of 0.86 - 0.94 and sensitivity to change with time (Bewick et al., 2010; Richardson et al., 2016; Sinclair et al., 2005).

For this thesis, the internal consistency of this scale was high, i.e., Cronbach's $\alpha = 0.84$. To the best of the author's knowledge, there is a limited investigation into the factorial validity of the scale using CFA for the university student population, despite its use in this population (e.g., Richardson et al., 2016). In this thesis, the configural model did not have an adequate fit and the model fit was improved by correlating the error terms over time (see Appendix P, Table P-1). Evidence for metric and scalar invariance with no further modifications to the models was established. In the final scalar model, the parameter estimates for each factor loading was statistically significant and the model had an overall adequate fit with a significant WLSMV χ^2 (df, p) = 56.65 (41, $p \leq .00$), RMSEA = 0.08 (90% CI: 0.07, 0.08), SRMR = 0.07, CFI = 0.92, and TLI = 0.92. Figure 9 showcases the final measurement model for psychological distress with the standardised regression coefficients. The coefficients were significant at $p \leq .05$ and ranged from 0.22 - 0.85 indicating that some items had weak associations with the latent variable while others had strong associations.

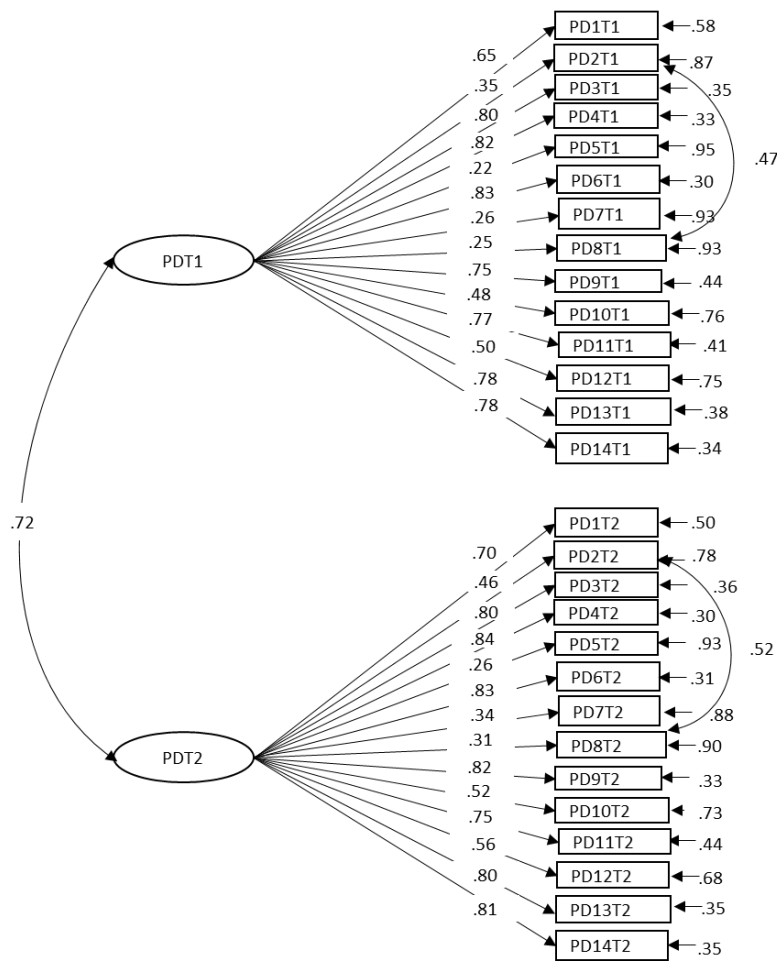


Figure 9 One factor model with 14 items for the measure of psychological distress (PD) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix P.

g) **Campus connectedness:** The wordings of items from the Social Connectedness Scale (SCS) by Lee & Robbins (1995) were modified to capture the students' experience of a sense of belongingness and connectedness to a higher education setting. This modified version of the SCS was termed as the **Campus Connectedness Scale (CCS)** for the purposes of this thesis (cf. Summers, Svinicki, Gonin, & Sullivan, 2002). Students rated the extent to which 8 negatively worded statements such as "I don't feel related to anyone on campus" applied to them on a 6-point Likert scale (ranging from 1 = *strongly agree* to 6 = *strongly disagree*). Higher scores indicated higher levels of connectedness to the campus. Previous studies have reported a Cronbach's α value of 0.91 - 0.93 for a university students' sample

indicating high internal consistency (e.g., Hendrickson, Rosen, & Aune, 2010; Lee et al., 2002; Summers, Beretvas, Svinicki, & Gorin, 2005; Summers et al., 2002; Yeh & Inose, 2003).

For this thesis, the internal consistency of this scale was high, i.e., Cronbach's $\alpha = 0.95$. A summary of the estimation and evaluation of the configural model with modifications, and the metric and scalar models are presented in Appendix Q (Table Q-1). The final scalar model had an overall adequate fit with a significant WLSMV $\chi^2 (df, p) = 55.34 (31, p \leq .00)$, RMSEA = 0.08 (90% CI: 0.07, 0.08), SRMR = 0.03, CFI = 0.99, and TLI = 0.99. The final measurement model, depicted in Figure 10, had regression coefficients ranging from 0.82 - 0.93 indicating that each item strongly loaded onto its latent factor, i.e., campus connectedness.

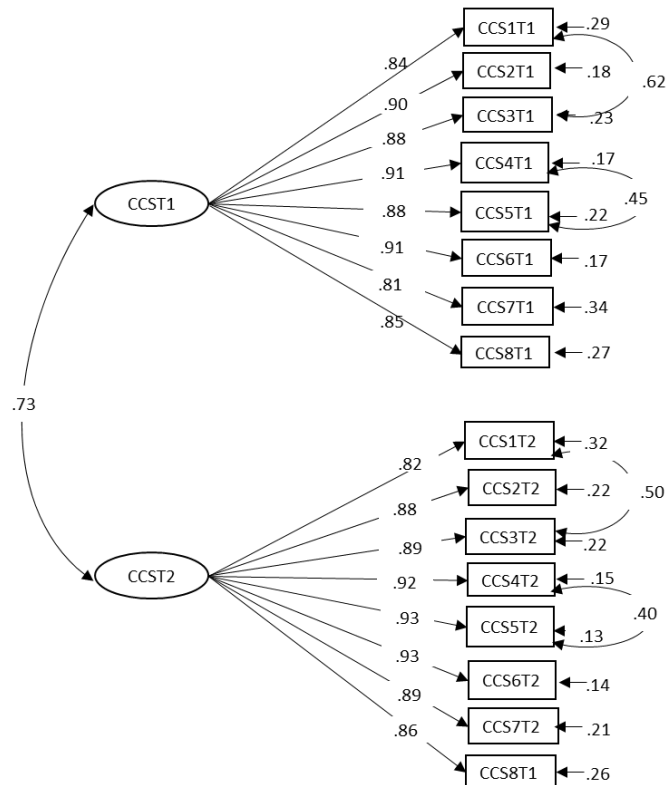


Figure 10 One factor model with 8 items for the measure of campus connectedness (CCS) with standardised parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix Q.

h) Positive and negative affect: **Positive and Negative Affect Scale (PANAS)** developed by Watson, Clark, & Tellegen (1988) was used to measure the students' global affective states. The PANAS has a total of 20 items with two distinct subscales – positive and negative affect – with 10 items in each. Students indicated the extent to which they experienced positive and negative affect, e.g., “*interested*,” “*upset*,” “*guilty*,” and “*inspired*,” listed in the scale in the past one week. These were to be rated on a 5-point Likert scale (ranging from 1 = *very slightly or not at all* to 5 = *extremely*). Scores ranged from 10 to 50 with higher scores indicating higher positive or negative affect. The scale has previously demonstrated good internal consistency reliability (0.86 - 0.90 for positive affect and 0.84 - 0.87 for negative affect; Watson et al., 1988), and has been used in university student populations (e.g., Brockman et al., 2017; Chang, 2017; Gunnell, Mosewich, McEwen, Eklund, & Crocker, 2017; Mayer, Polak, & Remmerswall, 2019; Rees et al., 2016; Satici, 2016).

For this thesis, the internal consistency of the positive affect and negative affect subscales was high, i.e., Cronbach's $\alpha = 0.91$ and Cronbach's $\alpha = 0.88$, respectively. While some studies, e.g., Lim, Yu, Kim, & Kim (2010) and Thompson (2007), have found evidence of poor fit for PANAS, other studies, e.g., Pires, Filgueiras, Ribas, & Santana (2013) and Terracciano, McCrae, & Jr. Costa (2003) have confirmed the validity and good fit of the two-factor model of PANAS. For the purposes of this thesis, the results of configural, metric, and scalar invariance provide further evidence to support the two-factor model of PANAS. The final scalar model presented with an overall good fit with a significant WLSMV $\chi^2 (df, p) = 76.66 (58, p \leq .05)$, RMSEA = 0.05 (90% CI: 0.05, 0.06), SRMR = 0.06, CFI and TLI = 0.94. Figure 11 showcases the final measurement model for the measure of positive and negative affect with the standardised regression coefficients. The coefficients were significant at $p \leq .05$ and ranged from 0.54 - 0.90 indicating that each item had moderate to strong loadings on their purported latent

factor. See Appendix R, Table R-1, for a description of the items and goodness-of-fit indices of the nested models.

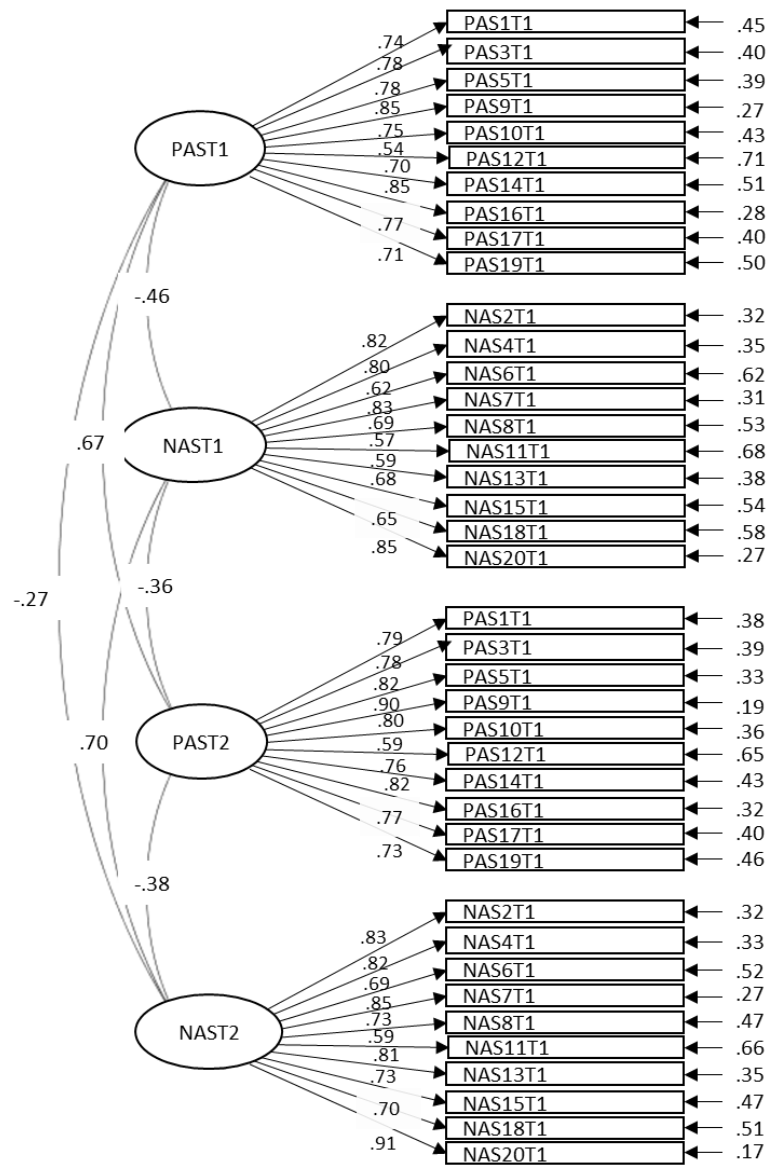


Figure 11 Two factor model with 20 items for the measure of positive affect (PAS) and negative affect (NAS) with standardized parameter estimates statistically significant at $p \leq .05$. T1: baseline phase; T2: follow-up phase. For a description of the items, refer to Appendix R.

6.6 Data screening and analysis strategy

All data were processed and analysed using Microsoft Excel, IBM SPSS Statistics v.26 (IBM Corp, 2019), and Mplus v.8.4 (Muthén & Muthén, 1998-2019). Univariate and multivariate assumptions were tested to identify potential sources of bias in the data (refer to Appendices for details about missing data (Appendix F), outlier detection (Appendix G), and tests of assumptions of normality, homogeneity of variance, and multicollinearity (Appendix H)). These were examined according to the recommendations by Field (2009) and Tabachnick & Fidell (2013).

6.6.1 Data source and sample characteristics

A total of 847 students responded to the survey at baseline (October – November 2017). Responses from ineligible participants ($n = 40$), such as postgraduate students and exchange students, were deleted. Incomplete surveys ($n = 4$) were removed. Finally, those who had attempted the survey more than once were also removed ($n = 28$). These duplicate responses were identified using their unique codes and the disclosed demographic information. Responses from a total of 775 participants formed the final dataset for the baseline phase. 403 students who had participated at the baseline phase responded to the follow-up survey (March – April 2018). Despite multiple requests to postgraduate students not to respond to the survey, there were 4 ineligible participants. Duplicate responses were removed ($n = 23$) based on SGICs and demographic information. There were 14 SGICs at follow-up that could not be matched with any participant at baseline; these 14 cases were removed from the dataset. Therefore, for all further analyses, the data from a matched sample of 362 participants was used.

The response rate could be considered to be low considering the number of undergraduate students ($\approx 23,000$) who had been emailed the link to the survey. A true response rate was difficult to estimate since it is difficult to

approximate how many students interacted with or even came across the invitation to the survey. Although the desired matched sample size was 630 (see section 6.3.2), logistical and time considerations precluded to extend data collection until that target sample size had been attained. The main purpose of explicating the desired sample size (even if that is not attained) is to alert the researcher to the inherent ambiguity of non-significant effects when desired levels of statistical power have not been realised (Rutterford, Taljaard, Dixon, Copas, & Eldridge, 2015). This is because low statistical power can exaggerate the observed effect sizes and fail to detect significant effects (Szucs & Ioannidis, 2017). In the case of any ambiguous situations, the author has flagged them explicitly in the results chapter (Chapter 7), e.g., in the case of multiple group analyses. It should be noted that the obtained matched sample size was adequate for computing the complex models using Mplus, i.e., the models were over-identified or just-identified (see 6.6.4.2 of this chapter). Nonetheless, the limitations of the sample are addressed in Chapter 8. The median age of the participants ($n = 362$) was 20 years, and most participants were first-year undergraduate students (36.94%). The study was gender-biased with more female students (79.72%) and White/White British (81.44%) participants (see Appendix D, Table D-1). Such gender and ethnic biases have been reported in previous self-report survey-based research involving university students conducted in UK higher education settings (e.g., Cassidy, 2015; Denovan & Macaskill, 2017b; Dhingra, Klonsky, & Tapola, 2019; Edwards et al., 2016; Lagdon et al., 2018; Zarotti et al., 2020). The obtained sample largely reflects the undergraduate student population in the UK, i.e., students are primarily female (57%), are between the ages of 20 and under (54%), and are of White ethnic background (75%) (HESA, 2020).

6.6.2 Attrition analysis

There was a high loss-to-follow-up with approximately 53.29% ($775 - 362/775$) % of the students participating at both time-points. The retention rate is consistent with previous mental health-related research involving university students (e.g., Ceyhan & Ceyhan, 2011; Richardson et al., 2016; Ríos -Risqueiz et al., 2018). According to the results of Mann-Whitney tests,

there were no significant differences in baseline scores, apart from the measure of positive emotions, between students who responded at both time-points ($n = 362$) and those who did not respond to the follow-up assessments ($n = 413$) (see Appendix E, Table E-1). A significant difference with small effect size was found between the two groups for the positive affect scale ($U = 65677.00$, $Z = -2.81$, $p \leq .00$, $r = -.10$). This suggests that students who completed assessments at both time-point reported lower levels of positive emotions ($n = 361$, *mean rank* = 362.93) than students who completed only baseline assessment ($n = 412$, *mean rank* = 408.09).

A series of chi-square tests for independence were conducted to determine whether there were any significant demographic differences between the students who participated at both time points ($n = 362$) and those who did not respond to the follow-up survey ($n = 413$) (see Table E-2, Appendix E). Students who participated at baseline differed from students who participated at both phases regarding gender ($\chi^2 = 18.27$, $p \leq .00$), ethnicity ($\chi^2 = 31.13$, $p \leq .00$), and year of study ($\chi^2 = 18.27$, $p \leq .00$). This finding indicated a sampling bias, i.e., a significant number of White/White British female undergraduate students in their first year of the study responded to the follow-up assessment.

6.6.3 Structural equation modelling

Structural equation modelling (SEM) is from a newer generation of multivariate analytical procedures which flexibly and comprehensively assists in testing and developing complex theoretical models (Anderson & Gerbing, 1988; Ullman, 2006). SEM is more advantageous than generalised linear models, such as regression and multivariate analysis of variance, due to its ability to model and estimate the random or measurement error variance in the observed variables, thereby removing the attenuation in the estimated coefficients that would have otherwise biased these coefficients (Bagozzi & Yi, 2012; Byrne, 2013; Marsh, Hau, & Wen, 2004; Ullman, 2006). SEM is particularly useful for testing multiple hypotheses simultaneously, i.e., as an entire model or a representation of a theory, rather than individual

hypothesised relationships between variables (Hair, Hult, Ringle, & Sarstedt, 2016; Kline, 2016). It examines the theory-defined causal relationships between latent variables and the relationships between latent variables and their indicator variables (Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007). SEM can assess the quality of the measuring instrument, the invariances of measuring instruments over time and across groups, estimate the model fit, direct and indirect relationships, and can handle various types of data, such as metric data, categorical and count variables, time series, and so on (Wang & Wang, 2012). It can also be used with different sources of data, including experimental, cross-sectional, longitudinal, among others (Lei & Wu, 2007).

SEM consists of two types of statistical modelling: 1) the measurement model and 2) the structural model. The **measurement model** relates the indicator variables to their underlying latent variables; and the **structural model** specifies the relationships among latent variables (Nachtigall, Kroehne, Funke, & Steyer, 2003; Schreiber, 2008). The first part lends to the fact that SEM is a confirmatory approach rather an exploratory one. The measurement models validate how the latent variables are measured (Nye & Drasgow, 2011), and examine the extent or lack of inter-factor relationships, i.e., inter-factor covariances, using confirmatory factor analysis (CFA) techniques (Bagozzi & Yi, 2012; Brown, 2006a; Schreiber, Stage, King, Nora, & Barlow, 2006). The aim of CFA is twofold: a) to obtain parameter estimates i.e., factor loadings, variances, and covariance between factors (or latent variables), the residual error variances of the indicator variables, and b) to assess the implied model fit against the observed data (Hox & Bechger, 1998). If the measurement models do not fit the sample data well, then it indicates that the validity of the measurement is not as intended for the current sample (Cole & Maxwell, 2003), and further structural parameters cannot be estimated.

CFA can also estimate refined factor scores — estimates of the scores of cases on the latent variables — which can be modelled further using path analysis in instances where an integrated estimation of the measurement model and the structural model is not possible (Skrondal & Laake, 2001). In this thesis, due to computational errors of the fully elaborated structural models (sources of

which can be the multivariate patterns of the dataset), factor scores were obtained for each of the measurement models for further path analyses.

Additionally, in CFA, a fundamental and prerequisite step is to test for measurement invariance of the measuring instruments (Maccallum & Austin, 2000). The test for measurement invariance examines the equivalence of the latent variable structures across occasions or subgroups – which are distinguished in this thesis by time (Brown, 2006a; Chen, 2007; Putnick & Bornstein, 2016; Willoughby, Wirth, & Blair, 2012). It identifies any discrepancies in the factor and parameter estimates that can potentially invalidate substantive conclusions about differences between the respective subgroups – in this thesis, this means conclusions about *changes* over time (Brown, 2006; Liu et al., 2017; Melka et al., 2011). If measurement invariance over time cannot be established, differences between different moments in time cannot be interpreted unambiguously or without bias (Horn & McArdle, 1992).

Testing of measurement invariance involves examining a series of hierarchically nested models where equality constraints (i.e., specified with an unknown but same value as another parameter in the model) are placed on different sets of parameters and each model is tested in a logical and increasingly restrictive manner (Bowers et al., 2010; Byrne & van de Vijver, 2010; Chen, Sousa, & West, 2005). In this thesis, measurement invariance was assessed at three levels: configural invariance, metric, or weak measurement invariance, and scalar or strong measurement invariance (Wang & Wang, 2012). These levels have been summarised in Figure 12.

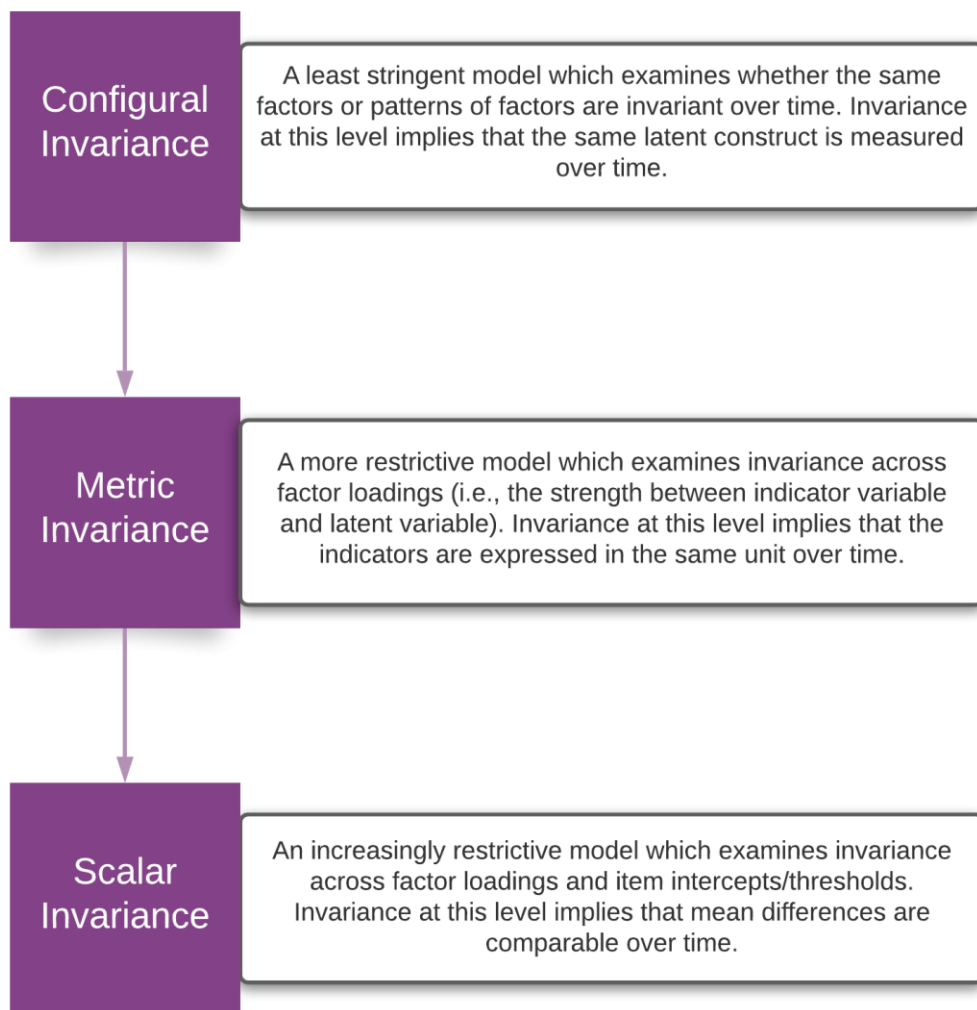


Figure 12 Steps to assess longitudinal measurement invariance (Chen, 2007; Liu et al., 2017; Putnick & Bornstein, 2016; Wang & Wang, 2012).

As reported in section 6.5 of this chapter, evidence for longitudinal invariance for each of the measures was established, thereby indicating the stability of the factor structures, and that the underlying latent variables were comparable over time (Wang & Wang, 2012).

6.6.4 Steps to conduct SEM

While multiple latent variables models can be estimated simultaneously in SEM, due to potential concerns of model misspecification and construct

validity, the thesis adopted the recommendations by Anderson & Gerbing (1988) to estimate the hypothesised measurement and structural models separately. In the two-step approach, the measurement models are specified and modified until an adequate fit has been established before proceeding with the examination of the structural paths. Therefore, for this thesis: a) measurement models were examined using procedures of CFA (results reported in section 6.5 of this chapter), b) factor scores were obtained from the CFA procedures for each measure, and c) path models were specified using the factor scores and direct relationship models, mediation models, and moderated mediation models were examined using path analytical techniques. The results of the path models have been reported in Chapter 7 of this thesis.

As depicted in Figure 13, the process of conducting SEM can be understood as having five key steps: model specification, model identification, model estimation, model evaluation, and model modification or re-specification (Mueller & Hancock, 2008; Ullman, 2006). Each of these steps is briefly described below. Recommendations by Byrne (2013) and Schreiber (2008) were used to conduct and report the findings of SEM.

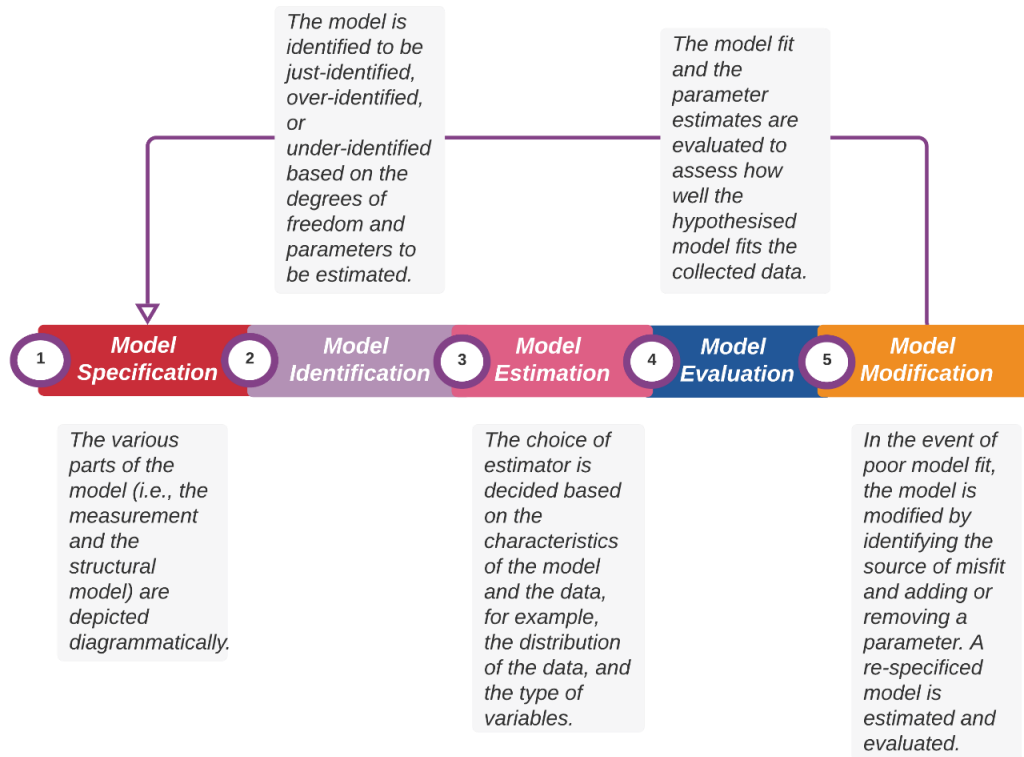


Figure 13 Summary of the steps to conduct structural equation modelling (Ullman, 2006).

6.6.4.1 Model specification

At this stage, the various parts of the model (i.e., measurement and structural model) are depicted diagrammatically based on a solid conceptual and theoretical foundation (Brown, 2006b; Ullman & Bentler, 2013). In measurement and structural models, an oval or circular shape represents the latent variable or the factor; the rectangles represent the indicator variables; a single-headed straight arrow pointing towards the indicator variables represent the measurement error (can also be represented by a small circle); double-headed curved arrows indicate correlations; single-headed arrows from one variable to another represent the direction of relationship; and the variable to which the arrow is pointing towards represents the dependent variable.

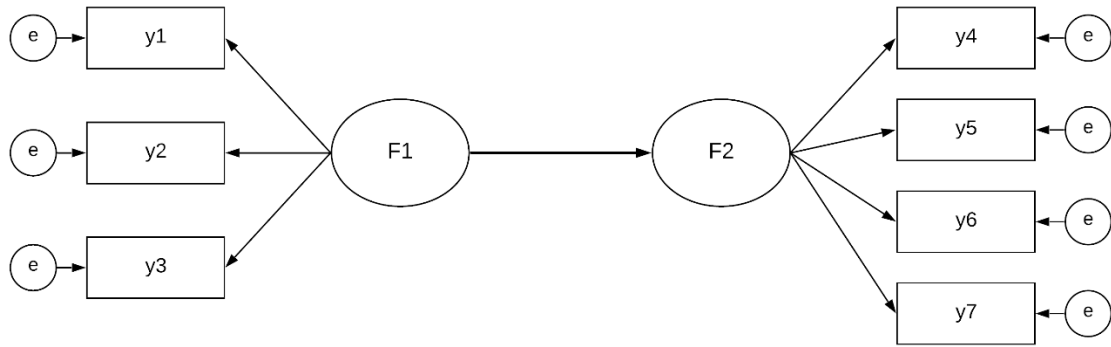


Figure 14 A general structural equation model with two latent variables, *F1* and *F2*, and their respective indicator variables.

In Figure 14, *F1* and *F2* are latent variables (or factors). *F1* is measured by 3 indicator variables which are variables *y1*, *y2*, and *y3*. Similarly, *F2* is measured by 4 indicator variables which are variables *y4* - *y7*. The above model hypothesises that *F1* predicts *F2* making *F1* the exogenous (i.e., the predictor) and *F2* the endogenous variable (i.e., the outcome). The items in the model represented by “e” are the error terms for the variables.

All the parameters in the model are specified to be either free (i.e., unknown and needs to be estimated), fixed (i.e., assigned a specific value which is usually 1 or 0) or constrained (i.e., specified with an unknown but same value as another parameter in the model). For this thesis, the path models were specified in Mplus based on results of the tests of longitudinal measurement invariance, as presented in section 6.5, and the substantive empirical research and hypotheses, presented in sections 5.1 and 6.7, respectively.

6.6.4.2 Model identification

For the parameters to be estimated, a hypothesised model needs to be identified to be testable, i.e., a unique value for every unknown parameter should be estimable from the given data points (Ullman & Bentler, 2013; Wang & Wang, 2012). A necessary condition for identification is a positive number of degrees of freedom (*df*) – the differences between the number of observed variances and covariances and the number of free parameters. A

hypothesised model is adjudged to be either just-identified (i.e., the same number of data points as the parameters to be estimated and degrees of freedom is zero), over-identified (i.e., more data points for the number of parameters to be estimated and positive degrees of freedom) or under-identified (i.e., fewer data points for the number of parameters to be estimated and negative degrees of freedom) (Byrne, 2013; Ullman & Bentler, 2013).

A model should be over-identified as it allows for more information to be made available to aid the process of parameter estimation of the model due to an increase in degrees of freedom (Bagozzi & Yi, 2012; Schumacker & Lomax, 2004). In an over-identified model, there is more information available that is required to assign a value to a parameter; this additional information allows estimation (i.e., assigning a best-fitting value to a parameter) and statistical inference (i.e., testing for significance of a parameter, or testing the fit of an entire model). In a just-identified model, the model fit cannot be tested however, the regression coefficients of the specified paths can be examined (Ullman & Bentler, 2013). Mplus checks for model identification and produces an error message in the case of under-identified models. In this thesis, as presented in Chapter 7, section 7.3.3, the moderated mediation models were just-identified, because of which model fit could not be evaluated, instead, the parameter coefficients were examined.

6.6.4.3 Model estimation

The primary focus of model estimation is to generate parameters wherein the difference between the sample statistics and the population statistics is minimal (Byrne, 2013). The most frequently used estimator is the maximum likelihood (ML) which assumes data to be continuous and have multivariate normality (Jöreskog, 1969; Li, 2016; Satorra, 1990). However, considering the variables operationalised in this thesis are based on Likert scales and, therefore, are ordered categorical data, a more appropriate estimation technique was used for measurement models, i.e., the mean and variance adjusted weighted least squares (WLSMV - Li, 2016; Muthén, du Toit, &

Spisic, 1997). WLSMV does not make any assumptions about the distribution of the observed variables, however, it does assume that the underlying latent distribution is continuous and normally distributed in the population. Currently, Mplus is the only software that has WLSMV as an option for estimation for categorical and ordinal data. Therefore, for CFA and longitudinal measurement invariance, WLSMV was used as a model estimator to evaluate the measurement models. The results of the CFA for each measure have been presented in section 6.5 of this chapter.

While robust weighted least square estimators perform positively for ordinal indicators, WLSMV has been found to have technical issues with small to moderate sample sizes and for large models with over 20 indicators (Flora & Curran, 2011). In this thesis, several technical issues were produced during path analyses when using WLSMV, such as, “*no convergence, the number of iterations exceeded*” or, “*the standard errors of the model parameter estimates could not be computed. The model may not be identified,*” and “*the latent variable covariance matrix is not positive definite.*” These could be due to the presence of non-normality of the dataset, as established by the Shapiro-Wilk test and visual inspection of histograms (see Appendix H), a moderate sample size, and the complexity of the model.

Instead, a more robust estimator of maximum likelihood, i.e., Maximum Likelihood Estimation with Robust Standard Errors (MLR) was used for analysing the path models. MLR allows for non-normality of continuous observed variables and is a recommended model estimation approach for data with missingness (Sass, Schmitt, & Marsh, 2014). In the obtained dataset, there were infrequent and negligible proportions of missing data, i.e., <5%, and these were mostly missing completely at random (see Appendix F). One of the ways to handle the missing values is through Expectation Maximisation (EM) techniques (Peugh & Enders, 2004). MLR uses a Full Information Maximum Likelihood (FIML), which is an EM technique to handle missing data without imputed data sets with accurate standard error estimates (Tabachnick & Fidell, 2006). Therefore, considering MLR is robust to non-normality and missingness, it was used as a procedure of model estimation for path analyses.

6.6.4.4 Model evaluation

Following model specification and estimation, the most important step is to assess how well the hypothesised model fits the collected data (Mueller & Hancock, 2008). This involves an inspection of the model fit and the parameter estimates (Hermida, 2015).

6.6.4.4.1 Evaluation of model fit

The overall model fit is the degree to which the model estimated variance/covariance matrix differs from the observed sample variance/covariance matrix (Bentler, 1990; Jöreskog, 1969). Conceptually, model fit represents how well the estimated model reflects the sample data (Hooper, Coughlan, & Mullen, 2008; Sardeshmukh & Vandenberg, 2017). If there is no statistical difference between the two, then the estimated model fits the data well. Several indices guide the assessment of how well the sample data 'fit' the model, i.e., its goodness-of-fit (Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011; Schreiber, 2008).

Goodness-of-fit indices can be broadly categorised as absolute and incremental fit indices. Absolute fit indices assess how well the estimated model fits the sample data and lower values indicate a good fit (Byrne, 2013; Heene et al., 2011). The most-reported absolute fit index, also used in this thesis, is the Chi-Square (χ^2) statistic which is a conventional null hypothesis significance test (Barrett, 2007). A non-significant value of χ^2 indicates that the model fits the data very well (Kelloway, 1995). However, the χ^2 test assumes multivariate normality and any deviation of normality can affect model fit (Byrne, 2013; Kline, 2016). The χ^2 test is also sensitive to the sample size of the data, with smaller sample sizes leading to a lack of power due to its inability to discriminate between a good-fitting and a poor-fitting model (Cheung, Rensvold, & Cheung, 2002; Hooper et al., 2008). Considering this limitation of the chi-square statistic and to avoid any bias and over-fitting of a model, the use of multiple indices to judge model fit is highly recommended (Kline, 2016; Maccallum & Austin, 2000).

For this thesis, the additional goodness-of-fit indices considered were: two absolute fit indices, i.e., Root Mean Square Error of Approximation (RMSEA – Steiger & Lind, 1980), the Standardised Root Mean Square Residual (SRMR – Hu & Bentler, 1998), and two incremental indices, i.e., Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) (Moshagen & Auerswald, 2018). The RMSEA evaluates the lack of fit of the hypothesised model as compared to a perfect model (Ullman, 2006). It is highly recommended as it favours parsimony, i.e., a less complex model, and a confidence interval can be calculated around its value which provides the possibility to test the RMSEA against a null-hypothesis (Hooper et al., 2008; Maccallum & Austin, 2000). The SRMR computes the average of the residual (i.e., the difference between the data and hypothesised model) and takes its square root (Iacobucci, 2010). Both indices are sensitive to sample size but not to the normality of distribution (Moshagen & Auerswald, 2018). The CFI is a normed index, i.e., the values range from 0 to 1 with smaller values indicating better fit while the TLI is non-normed, i.e., values can go beyond 0 - 1. TLI penalises models that are highly complex while CFI adjusts for model parsimony (Iacobucci, 2010; Moshagen & Auerswald, 2018). Both are relatively unaffected by sample size (Barrett, 2007; Bentler, 2007). CFI value has been suggested to give the most reliable evidence of measurement invariance (Cheung et al., 2002).

Therefore, the evaluation of goodness-of-fit in this thesis was judged using the following recommended indices: χ^2 , CFI, TLI, RMSEA (and its confidence intervals), and SRMR. Cut-off values for goodness-of-fit indices recommended by Hu & Bentler (1999) have been the gold standard for empirical research and were adopted for this thesis as well (see Table 2). However, it was noted that the interpretation of fit indices requires subjectivity, keeping in mind the sample size, the distribution of the data, and the complexity of the model which can influence these indices (Marsh et al., 2004; Nye & Drasgow, 2011; Tomarken & Waller, 2005). It was also acknowledged that good model fit does not indicate that the correct model has been established, but that the hypothesised model is one of the many causal models that represent the data (Hayduk et al., 2007). Generally, path models, including those hypothesised in this thesis, are approximations of reality

(Meehl & Waller, 2002), and goodness-of-fit indices do not guarantee that all pertinent variables have been accounted for in the model (Tomarken & Waller, 2005). Therefore, along with model fit indices, the evaluation of parameter estimates is imperative (Maccallum & Austin, 2000).

Table 2 Goodness of fit indices and their cut off values based on the recommendation by Hu & Bentler (1999).

Fit index	Name	Good fit	Adequate fit
χ^2	Chi-Square	Non-significant at $p \leq 0.05$	-
CFI	Comparative Fit Index	≥ 0.95	≥ 0.90
TLI	Tucker-Lewis Index	≥ 0.95	≥ 0.90
RMSEA	Root Mean Square Error of Approximation	≤ 0.05	≤ 0.10
SRMR	Standardised Root Mean Square Residual	≤ 0.05	≤ 0.08

6.6.4.4.2 Evaluation of parameter estimates

An evaluation of the model fit indicates the potential lack of fit of the hypothesised model with the collected data, while an examination of the statistical significance, magnitude, and directionality (i.e., positive or negative) of the parameter estimates can indicate the source of poor fit. Parameter estimates, such as path coefficients (or regression coefficients), residual variances, factor variances, and correlations, should be consistent with the *a priori* theory upon which the model specifications were based (Byrne, 2013).

Path coefficients indicate the relationships among constructs (e.g., among the latent variables), while factor loadings represent the relationship between the indicator and the latent variable. The standardised values of a path coefficient range between -1 and +1, with the latter indicating a strong positive relationship and vice versa. The factor loading of an item on its posited

underlying latent variable should be large and statistically significant (Hermida, 2015). The residual variances express the proportion of variance of the outcome variables or the dependent variables that are not accounted for by the hypothesised model. The values range from 0 to 1, with larger values indicating poor explanatory power of the hypothesised model. Conversely, the R^2 indicates the proportion of explained variance.

Mplus provides standardised and unstandardised path coefficients. To facilitate the interpretation of the analyses, the standardised values of the parameter estimates were reported for all models. The standardisation of variable accounts for the differences in the unit of measurement across the measuring instruments that would otherwise have made it difficult to interpret and compare the path coefficients (Ullman & Bentler, 2013). Standardised estimates have a mean of zero and a standard deviation of one. Therefore, the fit indices, the path coefficients, factor correlations, and the R^2 were examined to make a judgement about the measurement and path models.

6.6.4.5 Model modification

If the hypothesised model does not fit the data, model modification is the post-hoc approach available to improve its overall goodness-of-fit (Lei & Wu, 2007). This involves identifying the sources of misfit and by deleting parameters that are not statistically significant, thereby improving the overall fit. Model trimming, e.g., removing non-significant parameter estimates, and model building, e.g., correlating error terms, are only acceptable if the new model is shown to be statistically superior to the baseline model (Schreiber et al., 2006), and are theoretically meaningful, and not based on capitalisation or empirically-driven motivations to improve model fit (Cole & Maxwell, 2003; Cortina, 2002).

The level of misspecification is judged by two estimates in Mplus: the “Modification Index” (MI – Sörbom, 1989), which is the estimate of the decrease in the χ^2 statistic and 1 df if the parameter is added or removed in the new model; and the “Expected Parameter Change (EPC)” which predicts the

expected change in the parameter estimate value if the parameter is added or removed in the new model (Byrne, 2013). A high value of MI indicates incompleteness of the postulated model; adding the omitted parameter can remedy the poor fit via a large decrease in the χ^2 . Modifications to the measurement models were considered if the MIs reported a drop in χ^2 statistic drops by at least 10.

Conducting model modification makes the SEM more exploratory and data-driven rather than confirmatory (Hermida, 2015; Schreiber, 2008; Ullman, 2006). The re-specification and modification may fit the data of the specific sample and reduce the likelihood for replication (Kline, 2016; Schreiber et al., 2006). The re-specified model with the post-hoc modifications requires cross-validation, i.e., needs to be confirmed using fresh data (Hermida, 2015) to examine whether the re-specification is a departure from the true population model (Chou & Bentler, 1990). However, cross-validation and replication of the models were out of scope for the thesis. Instead, modified versions of the models were estimated, evaluated, and reported.

6.6.5 Mediation and moderated mediation

So far, the steps to conduct SEM have been discussed. Section 6.5 of this chapter has reported the evaluation of the measurement models for each measure used in this thesis. This was crucial to establish the factorial validity of the measures and obtain factor scores which were used to specify and evaluate the path models using path analyses. The next sections provide a conceptual background to mediation and moderated mediation. These models were specified and evaluated using the best practices recommended in the literature as discussed in this chapter. The results of the hypothesised path models have been presented in Chapter 7 of this thesis.

6.6.5.1 Mediation

A mediator (M) attempts to understand the “how” or “why” an independent or predictor variable (X) predicts a dependent or outcome variable (Y) (Frazier, Tix, & Barron, 2004; Jose, 2013; Little, 2013). By identifying a mediator for the relation between X and Y, information is obtained about the underlying mechanisms of that relationship (Pearl, 2014). These can impact how treatments or interventions are designed (Kline, 2015; Krull, Cheong, Fritz, & Mackinnon, 2016), as well as inform robust theoretical foundations (Judd, Kenny, & McClelland, 2001). Figure 15 depicts a direct relationship from a predictor (X) to an outcome variable (Y), and an indirect effect on the outcome (Y) through the mediator (M).

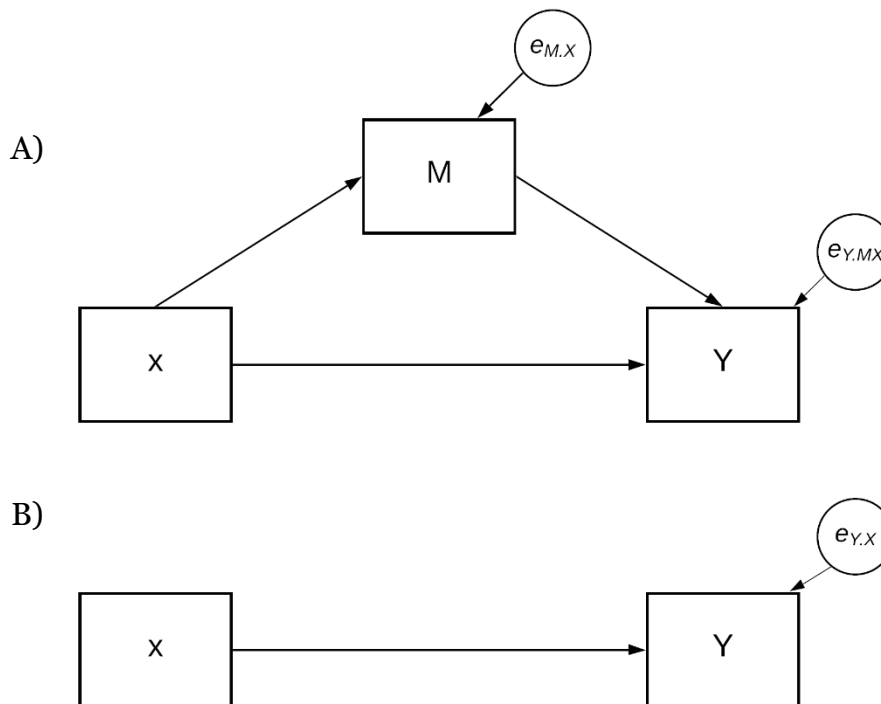


Figure 15 Diagrams of direct and indirect models. Panel A depicts the effects of the predictor X on the outcome Y mediated by the mediator M. Panel B depicts the direct relationships between the predictor X on the outcome Y which is not mediated by M (Preacher & Kelley, 2011). Rectangles represent the observed variables, circles represent the error terms, single-headed arrows represent the direction of the hypothesised paths.

To test for mediation, an unconstrained mediation model, i.e., without any equality constraints, was specified which consisted of a direct path from the predictor (X) to the outcome (Y), and a path from the predictor (X) to the outcome (Y) via the mediator (M). Following this, a full mediated model was examined which consisted of a constrained direct path from the predictor (X) to the outcome (Y) (i.e., constrained to be zero), and a path from the predictor (X) to the outcome (Y) via the mediator (M). A Chi-Square difference test was conducted to compare the constrained and unconstrained models using the Satorra-Bentler Scaled Chi-Square² test (Bentler & Satorra, 2010) to determine the final mediation model.

When there is mediation, the total effect of the predictor (X) on the outcome variable (Y) is divided into two: the indirect effect [i.e., the effect of the predictor (X) on the outcome (Y) through the mediator (M)] and the direct effect [i.e., the effect of the predictor (X) on the outcome (Y) controlling for the mediator (M)]. The total effect denotes the influence of one-unit change in the predictor variable (X) on the outcome variable (Y) during the course of the study, i.e., the overall effect of X on Y with or without the influence of a mediating variable (Cole & Maxwell, 2003). The indirect effect is the degree to which a change in the predictor variable (X) produces a change in outcome variables (Y) through an intervening variable (M). The direct effect is the effect on the outcome variable (Y) due to the predictor variable (X) without the presence of a mediator variable (M). The total effect is the sum of the direct and indirect effects (Maxwell & Cole, 2007).

The presence of the indirect effects was examined by inspecting the lower and upper bounds of the confidence intervals for the parameter estimates of the indirect effects (Cheung, 2009), as well as the examination of the total and direct effects parameter estimates (Selig & Preacher, 2009). If the 95% confidence intervals of the indirect effect's parameter estimate contained 0, it was evidence for no mediation. The magnitude and effect size of the indirect effects were identified as small (.01 to .08), medium (.09 to .24), and large (>.25) (Preacher & Kelley, 2011).

² <https://www.thestatisticalmind.com/calculators/SBChiSquareDifferenceTest.htm>

6.6.5.2 Moderated mediation

A moderator (W) specifies “when” or for “whom” the relationship between the independent or predictor variable (X) and dependent or outcome variables (Y) will occur (Frazier et al., 2004), as depicted in Figure 16. A moderator can explain the variability in such relationships by affecting their direction or strength (Baron & Kenny, 1986; MacKinnon, Fairchild, & Fritz, 2007). The choice of a moderator depends upon a theoretical understanding of why there might be some variability in the hypothesised relationships between the predictor and outcome variables. An examination of moderators such as gender can indicate whether a theoretical model or intervention varies for different gender identities. Therefore, ignoring the role of moderators can lead to inappropriate and incomplete inferences (Donaldson, 2001).

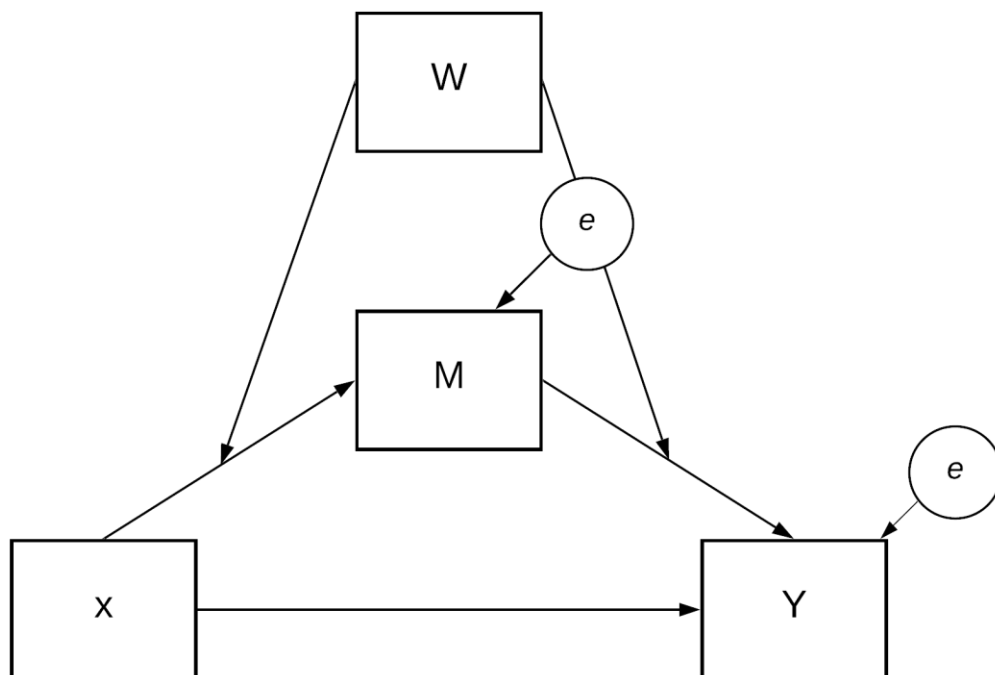


Figure 16 Diagram of moderated mediation in which the effects of predictor X on the outcome Y is mediated by the mediator M and the mediation effect is influenced by a value of the moderator W (Sardeshmukh & Vandenberg, 2017). Rectangles represent the observed variables, circles represent the error terms, single-headed arrows represent the direction of the hypothesised paths.

While a mediator (M) is a part of the causal relationship between two variables, that is not the case with a moderator (W) (MacKinnon et al., 2007).

The moderation framework emphasises on the contextual effects that can influence the hypothesised relationships. The combination of both moderation and mediation acknowledges that humans are complex systems with multiple variables influencing each other (Krull et al., 2016). The mediation models can explain why an effect takes place, while the moderated mediation models can investigate if the effect takes place for certain groups of people or conditions (Donaldson, 2001; MacKinnon & Fairchild 2009). It questions whether the mediator's mechanisms differ for different participants (e.g., across gender identities, years of study, ethnicity so on), or different experimental conditions (e.g., control group versus intervention group). The moderated mediation effects can be estimated using several approaches, including estimating an interaction term (i.e., product x moderator) or using a multiple group approach. For this thesis, a multiple group approach was utilised considering the moderators were dichotomous categories, i.e., male and female students, and White/White British students and students of other ethnic backgrounds.

6.6.5.3 Longitudinal mediation and moderated mediation

Theoretical development that is based on understanding how processes develop over time requires the study of mediation effects (Krull et al., 2016). Therefore, the validity of the novel socio-ecological model of resilience, proposed in this thesis, was examined longitudinally. Cross-sectional models assume that the causal relationships are contemporaneous and as happening instantaneously at the time of data collection (Selig & Preacher, 2009). This increases the likelihood of Type I errors (Cain, Zhang, & Bergeman, 2018), and problematic inferences about the causality or directionality of the relationships (Maccallum & Austin, 2000). Additionally, cross-sectional mediation analysis can over- or under-estimate the stability of the relationships over time (Maxwell, Cole, & Mitchell, 2011). It is possible that the relationships revealed in cross-sectional analyses, such as full mediation, may not exist any longer in longitudinal analysis. Therefore, these models can only provide information on expected patterns of correlations and covariances

at a specific moment in time (Maccallum & Austin, 2000; Maxwell et al., 2011).

In turn, longitudinal models can help to explicate causal and temporal relations between the variables and estimate the covariances between the repeated measurement of variables (Krull et al., 2016). Additional time-points allows for more accurate estimation of path coefficients and mediation effects (Cain et al., 2018; Cole & Maxwell, 2003). Mediation is characteristically a process that develops over time and therefore, a longitudinal examination is imperative to infer a causal relationship between variables (Kline, 2015; MacKinnon, 2012).

6.7 Research hypotheses

The objectives of the thesis are to examine whether: i) there are direct effects of the predictors (i.e., perceived stress, perceived social support, dysfunctional parenting styles) on psychological, social, and emotional resilience, cross-sectionally and longitudinally; ii) the effects of the predictors to psychological, social, and emotional resilience are conveyed partially by the mediator (i.e., cognitive reappraisal), cross-sectionally and longitudinally; iii) and the partial mediating effects are influenced by the gender and ethnicity of the students, cross-sectionally and longitudinally. The first objective was examined using direct effects models, the second objective was examined using mediation models, and the third objective was examined using moderated mediation models.

The specific hypotheses for the thesis are as follows:

- There will be a significant direct relationship between the ecologically-based predictors, i.e., perceived stress (within-individual factor), perceived social support (social factor), and maternal and paternal dysfunctional parenting styles (family factor), and the resilience outcomes, i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect at baseline (Figure 17).

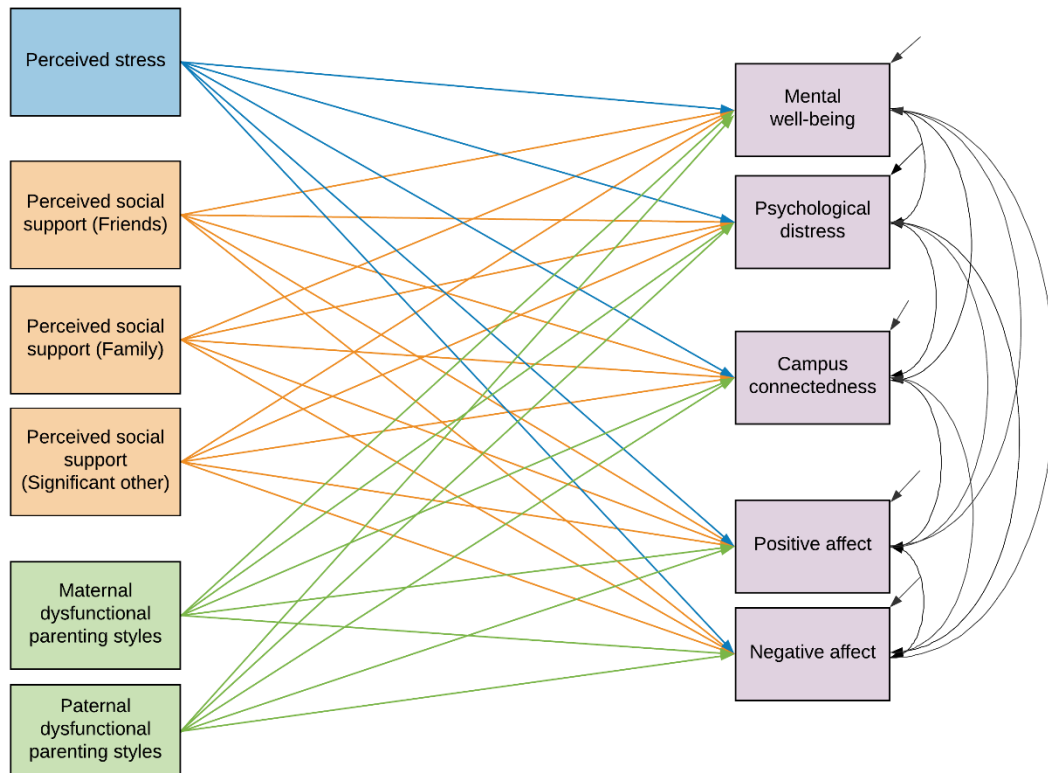


Figure 17 Direct effect from an individual (blue), familial (green), and social (orange) risk and protective factors to psychological, social, and emotional domains of resilience.

- Cognitive reappraisal will partially mediate the relationships between the ecologically-based predictors, i.e., perceived stress, perceived social support, and maternal and paternal dysfunctional parenting styles, and the resilience outcomes, i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect at baseline (Figure 18).

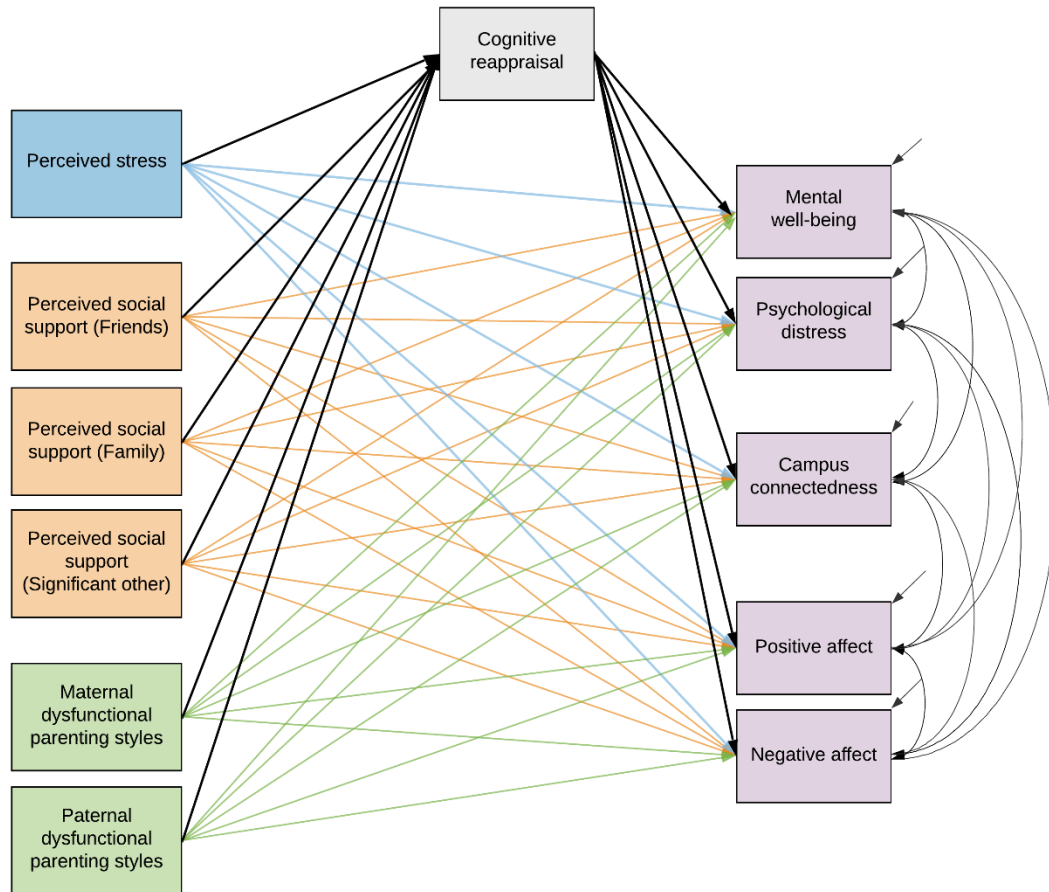


Figure 18 Cognitive reappraisal will have an indirect effect on the relationships between individual, familial, and social risk and protective factors and psychological, social, and emotional domains of resilience. Coloured paths represent the direct effects.

- Gender and ethnic identity will moderate the strength of the partial mediation effects of cognitive reappraisal on the relationships between the ecologically-based predictors, i.e., perceived stress, perceived social support, and maternal and paternal dysfunctional parenting styles, and the resilience outcomes, i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect at baseline (Figure 19).

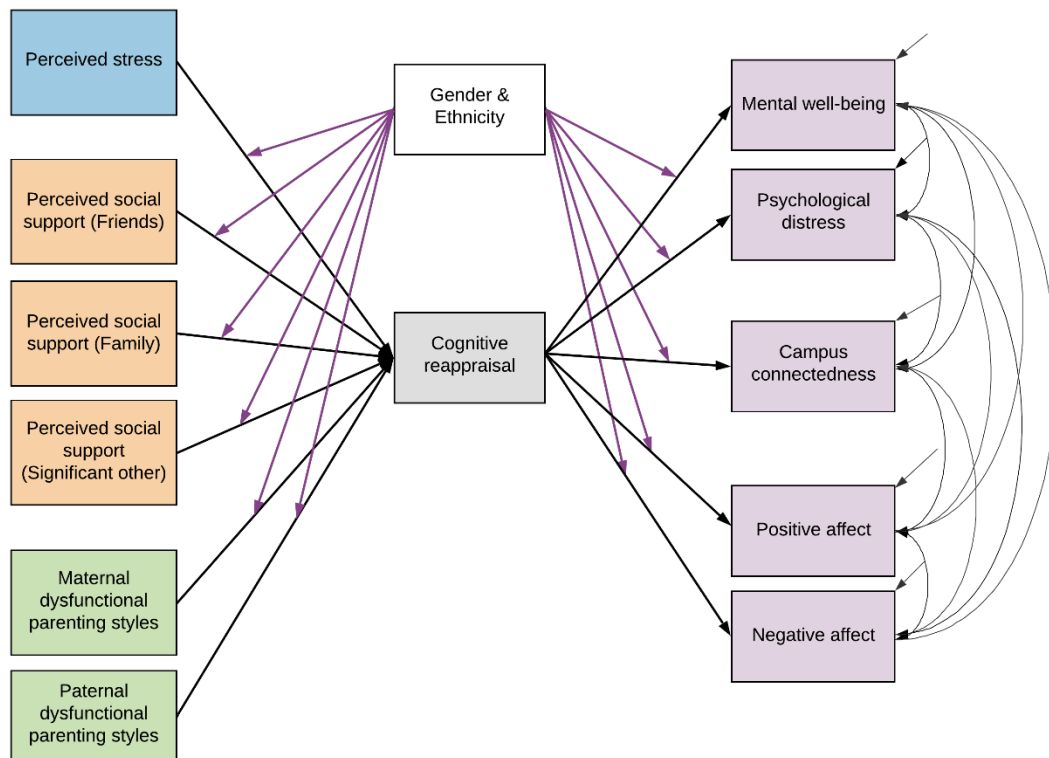


Figure 19 *Gender and/or ethnicity will moderate the mediation role of cognitive reappraisal on the predictive relationships between individual, familial, and social risk and protective factors and psychological, social, and emotional domains of resilience.*

Longitudinal analyses were conducted for the following hypotheses:

- There will be a direct relationship between the predictors reported at baseline, i.e., perceived stress, perceived social support, and maternal and paternal dysfunctional parenting styles, and the resilience outcomes reported at follow-up, i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect.
- Cognitive reappraisal reported at baseline will partially mediate the relationships between the predictor variables at baseline, i.e., perceived stress, perceived social support, and maternal and paternal dysfunctional parenting styles, and the resilience outcomes at follow-up, i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect.
- Gender and ethnic identity will moderate the strength of the partial mediation effects of cognitive reappraisal reported at baseline on the

relationships between the predictor variables at baseline, i.e., perceived stress, perceived social support, and maternal and paternal dysfunctional parenting styles, and the resilience outcomes at follow-up, i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect.

This chapter has presented the procedure of data collection and the analytical strategy to test the validity of the novel socio-ecological model of resilience proposed in this thesis. Descriptive statistics and findings of the path analyses are presented in Chapter 7 (Results) and substantive interpretations and a critical discussion of the findings are presented in the final chapter, Chapter 8 (Discussion).

Chapter 7 Results

This chapter reports the descriptive statistics and preliminary analyses and the results of the hypothesised path models (i.e., the direct effects, mediation, and moderated mediation models) which were analysed based on the steps of SEM discussed in section 6.6.4 of the previous chapter. Parameter estimates, such as path coefficients, significance values, and R^2 estimates are reported along with the goodness-of-fit indices, where relevant. Unless stated otherwise, significance testing was performed based on $\alpha = .05$ and all statistical tests were two-tailed. The substantive interpretation and theoretical implications of the results presented below are discussed in the following chapter (Chapter 8: Discussion).

7.1 Descriptive statistics and preliminary analyses

The descriptive statistics for each predictor, mediator, and outcome variables are presented in Table 3. The details regarding the scoring of the measuring instruments have been previously described in section 6.5 of Chapter 6. [Considering the evidence towards non-normality of the data \(see Appendix H\)](#), a series of Wilcoxon Signed tests were used to examine if the changes in median scores were significant from baseline assessment to follow-up assessment (see Table 3). Changes in cognitive reappraisal ($n = 362, Z = -2.30, p \leq .02$), mental well-being ($n = 362, Z = -3.82, p \leq .00$), campus connectedness ($n = 362, Z = -2.24, p \leq .02$), and positive affect ($n = 361, Z = -5.96, p \leq .00$) were statistically significant over time. The tests revealed that the participants reported a significantly lowered use of cognitive reappraisal, lowered levels of mental well-being, lowered levels of campus connectedness, and fewer experiences of positive emotions at the end of their second term as compared to the start of their academic year.

Table 3 Descriptive statistics data at baseline and follow-up (n = 362) and comparison of scores using Wilcoxon Signed Test, *p≤.05 **p≤.00.

Variable	Mean (SD)		Median		Wilcoxon Signed Test	
	Baseline	Follow-up	Baseline	Follow-up	Z	p
Predictor variables						
Perceived stress (PSS-10)	19.88 (7.18)	20.25 (5.90)	20.00	20.00	-1.14	.25
Perceived social support (MSPSS)	5.37 (1.59)	5.33 (1.09)	5.50	5.50	-.56	.58
MSPSS – Friend subscale	5.37 (1.58)	5.23 (1.24)	5.50	5.50	-.09	.81
MSPSS – Significant other subscale	5.34 (1.49)	5.42 (1.53)	5.87	6.00	-.24	.93
MSPSS – Family subscale	5.24 (1.32)	5.35 (1.37)	5.75	5.75	-.26	.79
Maternal dysfunctional parenting styles (MMOP)	5.55 (7.11)	5.80 (7.28)	3.00	3.00	-1.12	.26
MMOP – Indifference subscale	1.27 (2.92)	1.36 (3.03)	.00	.00	-1.33	.18
MMOP – Abuse subscale	1.10 (2.49)	1.16 (2.53)	.00	.00	-.99	.32
MMOP – Overcontrol subscale	3.17 (2.90)	3.27 (2.97)	2.00	2.00	-.99	.32
Paternal dysfunctional parenting styles (FMOP)	5.60 (7.80)	5.63 (7.83)	2.00	2.00	-.26	.79
FMOP – Indifference subscale	2.02 (3.92)	2.10 (4.11)	.00	.00	-.78	.44
FMOP – Abuse subscale	1.18 (2.57)	1.17 (2.55)	.00	.00	-.40	.69
FMOP – Overcontrol subscale	2.41 (2.60)	2.36 (2.65)	2.00	1.00	-.01	.99
Mediator variable						
Cognitive reappraisal (ERQ-CR)	4.4 (1.21)	4.56 (1.19)	4.50	4.66	-2.30	.02*
Outcome variables						

Mental well-being (WEMWBS)	46.06 (10.20)	44.33 (10.52)	47.00	45.00	-3.82	.00**
Psychological distress (CORE- GP)	16.42 (6.36)	16.87 (6.86)	15.71	17.14	-1.81	.07
Campus connectedness (CCS)	32.36 (10.99)	31.44 (10.67)	34.00	32.50	-2.24	.02*
Positive affect (PAS)	30.50 (8.35)	28.11 (8.72)	31.00	29.00	-5.96	.00**
Negative affect (NAS)	22.60 (8.31)	22.37 (8.85)	21.00	20.00	-1.01	.31

To explore the influence of gender and ethnicity on the variables, Mann-Whitney tests were conducted. The Mann-Whitney test at baseline revealed a statistically significant differences due to gender (i.e., between male and female undergraduate students) in the levels of perceived stress ($n = 359$, $U = 8017.00$, $Z = 2.57$, $p \leq .01$, $r = -.13$), with female students (*mean rank* = 186.86) reporting higher levels of perceived stress than male students (*mean rank* = 151.19). Female students (*mean rank* = 192.58) perceived higher levels of social support than male students (*mean rank* = 127.12), $n = 359$, $U = 6356.50$, $Z = -4.71$, $p \leq .00$, $r = -.25$. However, these effects were small (as indicated by the r statistic). Similar statistically significant differences in the levels of perceived stress and perceived social support between male and female students were found at follow-up assessments (see Appendix I, Table I-1).

In regards to ethnicity, a Mann-Whitney test at baseline revealed a statistically significant difference in maternal dysfunctional parenting styles between White/White British students and students of other ethnic backgrounds ($n = 362$, $U = 6923.00$, $Z = -3.73$, $p \leq .00$, $r = -.20$). Students of other ethnic backgrounds (*mean rank* = 224.61) reported higher levels of dysfunctional parenting styles by a mother/female guardian than White/White British students (*mean rank* = 171.89). Similarly, statistically significant differences of small effect in experiences of paternal dysfunctional parenting styles were found ($n = 360$, $U = 7877.00$, $Z = -2.41$, $p \leq .02$, $r = -.13$), with students of other ethnic backgrounds (*mean rank* = 208.15) reporting more experiences of dysfunctional parenting styles by a father/male guardian than White/White British students (*mean rank* = 174.29). Although it was anticipated that these findings would not change over time, significant differences were found only for maternal parenting style but not for paternal parenting style. In addition, at follow-up, the reported levels of social support in students of other ethnic backgrounds (*mean rank* = 167.76) significantly differed from White/White British students (*mean rank* = 184.56), $n = 362$, $U = 7315.00$, $Z = -3.19$, $p \leq .00$, $r = -.17$. This trend suggests that the non-White/White British students tend to perceive lower levels of perceived social support midway through their academic year (see Appendix I, Table I-2).

7.2 Evaluation of the measurement models

The results of the examination of longitudinal invariance and the factorial validity of the measures used to operationalise the latent variables of the model have been reported in Chapter 6, section 6.5. A measurement model with each of the latent variables was evaluated to confirm that they were associated with each other and fit the obtained data well. The cross-sectional measurement model at baseline fit the data well with a significant WLSMV χ^2 statistic of 8464.91 (5814, $p \leq .00$); CFI = 0.95; TLI = 0.95; RMSEA = 0.03 (90% CI: 0.03, 0.04), and SRMR = 0.07. The covariances between the latent variables were statistically significant and in the expected direction (Table 4). Weak associations with paternal dysfunctional parenting styles (FMOP) with the outcomes of resilience (mental well-being, psychological distress, campus connectedness, and positive and negative affect) suggest that this might not be a viable predictor for resilience in the path models. Perceived stress, on the other hand, had moderate to high associations with the outcomes of resilience suggesting that it might be a significant predictor in the path models.

Table 4 *The covariances of the latent factors in the baseline measurement model, statistically significant at $p \leq .05^*$, $p \leq .00^{**}$ ($n=362$).*

	Mental well-being	Psychological distress	Campus connectedness	Positive affect	Negative affect
Perceived stress	-0.75**	0.87**	-0.42**	-0.62**	0.80**
Perceived social support (Friend)	0.43**	-0.41**	0.30**	0.31**	-0.34**
Perceived social support (Family)	0.46**	-0.43**	0.45**	0.39**	-0.31**
Perceived social support (Significant other)	0.33**	-0.38**	0.16**	0.27**	-0.08**
Maternal dysfunctional parenting styles	-0.29**	0.30**	-0.30**	-0.18**	0.42**
Paternal dysfunctional parenting styles	-0.21**	0.24**	-0.18**	-0.12**	0.36**
Cognitive reappraisal	0.51**	-0.47**	0.37**	0.46**	-0.34**

7.3 Evaluation of the path models

The path models were specified to include 12 observed variables: 6 predictor variables (i.e., perceived stress, perceived social support from family, friends, significant others, maternal and paternal dysfunctional parenting styles); a mediator (i.e., cognitive reappraisal); and 5 outcome variables (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect).

First, a cross-sectional direct effects model was specified at baseline in which the predictive effects of the predictor variables on the outcome variables in the absence of the mediator were estimated. Additionally, the prospective validity of these relationships was examined, i.e., the direct relationships between the predictor variables as reported at baseline and the outcomes of resilience reported at follow-up.

Second, the partial mediation effects of cognitive reappraisal were examined cross-sectionally at baseline as well as longitudinally, i.e., the relationships between the predictor variables reported at baseline via the mediator reported at baseline to the outcome variables at follow-up.

Third, multiple group analyses were conducted on the mediational models to examine the moderating role of gender and ethnicity on the indirect effects of cognitive reappraisal, cross-sectionally and longitudinally.

The covariances between outcome variables were freely estimated and parameter estimates, such as path coefficients, significance values, and R^2 estimates, are reported along with the goodness-of-fit indices. The model fit was evaluated by using the MLR Chi-Square statistic (χ^2), CFI, TLI, RMSEA, and SRMR. For information about model evaluation, refer to section 6.6.4.4 (Chapter 6: Methodology and data processing).

7.3.1 Direct effects path models

The research questions explored were:

- a) Is there a direct relationship between perceived stress, perceived social support, dysfunctional parenting styles and the outcomes of resilience, including mental well-being, psychological distress, campus connectedness, and positive and negative affect, in university students?
- b) Do the predictors reported at baseline (i.e., perceived stress, perceived social support, dysfunctional parenting styles) predict the outcomes of resilience (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect) reported at follow-up?

7.3.1.1 Cross-sectional direct effects path model at baseline

The cross-sectional direct effects model at the baseline phase fit the data very well with a non-significant χ^2 statistic of 1.35 (3, $p \leq .72$); CFI = 1.00; TLI = 1.00; RMSEA = 0.00 (90% CI: 0.00, 0.06), and SRMR = 0.01. The standardised regression coefficients of the statistically significant paths of the baseline direct effects model are summarised in Table 5. The significant paths of the direct effects model for the baseline phase are depicted in Figure 20.

Table 5 Standardised path coefficients of the baseline direct effects model statistically significant at ** $p \leq .01$, * $p \leq .05$. ($n = 362$).

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.60	0.03	.00**
Perceived social support (Friend)	0.17	0.05	.00**
Perceived social support (Significant other)	0.14	0.04	.00**

Maternal dysfunctional parenting styles	-0.08	0.04	.03*
Psychological distress			
Perceived stress	0.71	0.25	.00**
Perceived social support (Friend)	-0.11	0.04	.00**
Perceived social support (Significant other)	-0.14	0.03	.00**
Maternal dysfunctional parenting styles	0.07	0.03	.02*
Campus connectedness			
Perceived stress	-0.25	0.05	.00**
Perceived social support (Friend)	0.34	0.06	.00**
Maternal dysfunctional parenting styles	-0.17	0.04	.00**
Positive affect			
Perceived stress	-0.50	0.04	.00**
Perceived social support (Friend)	0.16	0.05	.00**
Perceived social support (Significant Other)	0.15	0.04	.00**
Negative affect			
Perceived stress	0.68	0.03	.00**
Perceived social support (Friend)	-0.08	0.04	.03*
Maternal dysfunctional parenting styles	0.16	0.03	.00**

Perceived stress was related to each of the resilience outcomes with moderate to high associations. As anticipated, the path coefficients indicate that higher levels of perceived stress predicted lower levels of mental well-being, campus connectedness, and positive affect. Also, higher levels of perceived stress predicted higher levels of psychological distress and more experiences of negative affect. The strongest predictive association was between perceived stress and psychological distress ($\beta = 0.71, p \leq .00$). Similarly, perceived social support from friends was significantly related to each of the resilience outcomes, with the strongest relationship with campus connectedness ($\beta = 0.34, p \leq .00$). The weakest predictive relationship was between maternal dysfunctional parenting styles and psychological distress ($\beta = -0.07, p \leq .02$). Furthermore, the

results indicated that paternal dysfunctional parenting styles and perceived social support from family were not statistically related to any of the outcomes of resilience.

The proportion of variance explained by the baseline cross-sectional model of direct effects on the outcomes of resilience was 54% for mental well-being, 65% for psychological distress, 29% for campus connectedness, 39% of positive affect and 58% for negative affect. This suggests that there is a large proportion of unexplained variance for social resilience, operationalised as campus connectedness, that has not been accounted for in the proposed socio-ecological model of resilience, cross-sectionally at baseline. The factor correlations between the outcome variables were strongest for the relationship between psychological distress and mental well-being ($r = -0.64, p \leq .00$) and weakest between negative affect and campus connectedness ($r = -0.23, p \leq .00$).

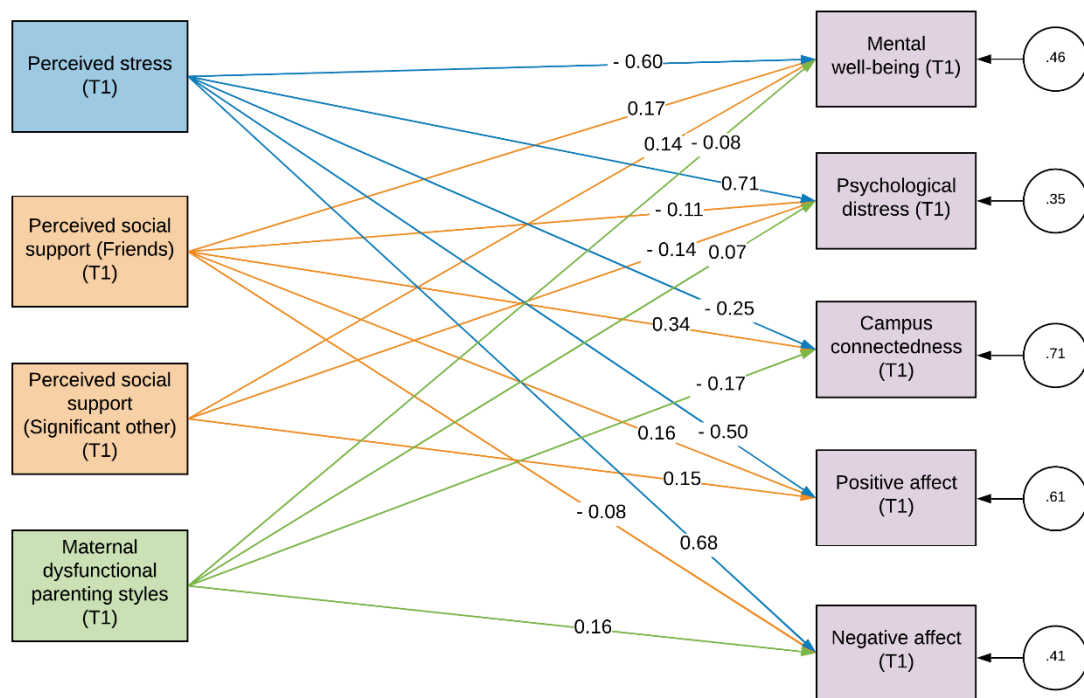


Figure 20 Statistically significant standardised path coefficients of the direct effects model at baseline, $p \leq .05, n=362$.

7.3.1.2 Longitudinal direct effects path model

The longitudinal direct effects model was evaluated to determine if the predictor variables reported at baseline influenced the outcomes of resilience reported at follow-up. The standardised path coefficients of the statistically significant paths of the longitudinal direct effects model are summarised in the Appendices (Appendix S, Table S-1). The model fit the data well very with a χ^2 statistic of 9.24 (6, $p \leq 0.16$); CFI = 0.99; TLI = 0.99; RMSEA = 0.04 (90% CI: 0.00, 0.08), and SRMR = 0.03.

As hypothesised, perceived stress was found to be a significant predictor of all outcomes of resilience with moderate effects. The direct predictive relationships from perceived social support from significant others and maternal dysfunctional parenting styles remained stable across time. Contrary to the hypotheses, paternal dysfunctional parenting styles and perceived social support by the family were not statistically related to the outcomes of resilience. The significant paths of the longitudinal direct effects model are depicted in Figure 21.

Unlike the cross-sectional direct effects model at baseline (see Figure 20), several relationships from the predictor perceived social support from friends to the outcomes of resilience were not stable across time. Specifically, perceptions of social support from friends did not prospectively influence psychological distress and emotional resilience (i.e., positive and negative affect). Additionally, the magnitude of the predictive capacity varied between the relationships across time. In the longitudinal model, the predictive capacity of perceived social support from significant others on mental well-being ($\beta = 0.16, p \leq .00$), psychological distress ($\beta = -0.16, p \leq .00$), and positive affect ($\beta = 0.22, p \leq .00$) increased across time. This increase in predictive effect was also found for maternal dysfunctional parenting styles on mental well-being ($\beta = -0.10, p \leq .00$), psychological distress ($\beta = 0.10, p \leq .00$), campus connectedness ($\beta = -0.21, p \leq .00$), and negative affect ($\beta = 0.20, p \leq .00$). However, apart from the

relationship between perceived stress and campus connectedness ($\beta = -0.31$, $p \leq .00$), the predictive capacity of perceived stress on the outcomes of resilience reduced over time. The unexplained variance in the outcome variables also increased.

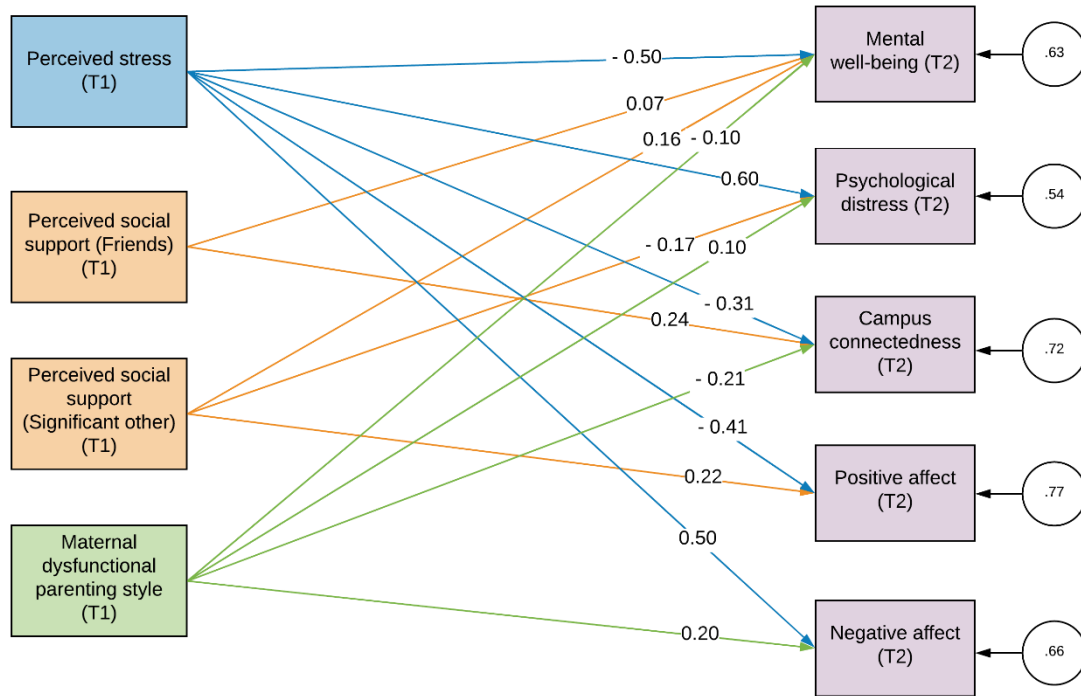


Figure 21 Standardised estimates of the longitudinal direct effects model [predictor variables at baseline (T1) on outcomes at follow-up (T2)], statistically significant at $p \leq .05$, $n=362$.

7.3.2 Indirect effects path models

Mediation analyses examined whether the direct effects of the predictor variables (i.e., perceived stress, perceived social support, and dysfunctional parenting styles) on the outcome variables (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect), were conveyed via the mediator (i.e., cognitive reappraisal), cross-sectionally and

longitudinally (Preacher & Hayes, 2008). A description of the analytical strategy for mediation analysis as undertaken in this thesis can be found in Chapter 6 (Methodology and data processing), section 6.6.5. The results presented in this section answer the following research questions:

- a) Does the ability to downregulate negative emotional responses (i.e., using cognitive reappraisal) partly mediate the relationships between perceived stress, perceived social support (from friends, family, and significant others), and maternal and paternal dysfunctional parenting styles on the outcomes of resilience, including mental well-being, psychological distress, campus connectedness, and positive and negative affect, in university students?
- b) Does the partial mediation effect of cognitive reappraisal reported at baseline influence the relationships between the predictors reported at baseline and the outcomes of resilience reported at follow-up?

7.3.2.1 Indirect effects in the cross-sectional model at baseline

The standardised path coefficients of direct relationships, including from the predictor variables to the mediator, and from the mediator to the outcome variables are depicted in Figure 22. The direction of the direct relationships was as anticipated. Paternal dysfunctional parenting styles and perceived social support by the family had no direct relationships with the outcome variables and the mediator, cognitive reappraisal. Also, cognitive reappraisal did not have a direct relationship with the outcome variable negative affect. Therefore, no indirect effects were anticipated to this outcome variable (i.e., negative affect) from any of the predictor variables.

The variance accounted for by the partial mediation model at baseline was 57% for mental well-being, 66% for psychological distress, 30% for campus connectedness, 42% for positive affect, and 58% for negative affect. The

correlation between the outcome variables ranged from -0.19 (between negative affect and psychological distress) and -0.77 (between psychological distress and mental well-being).

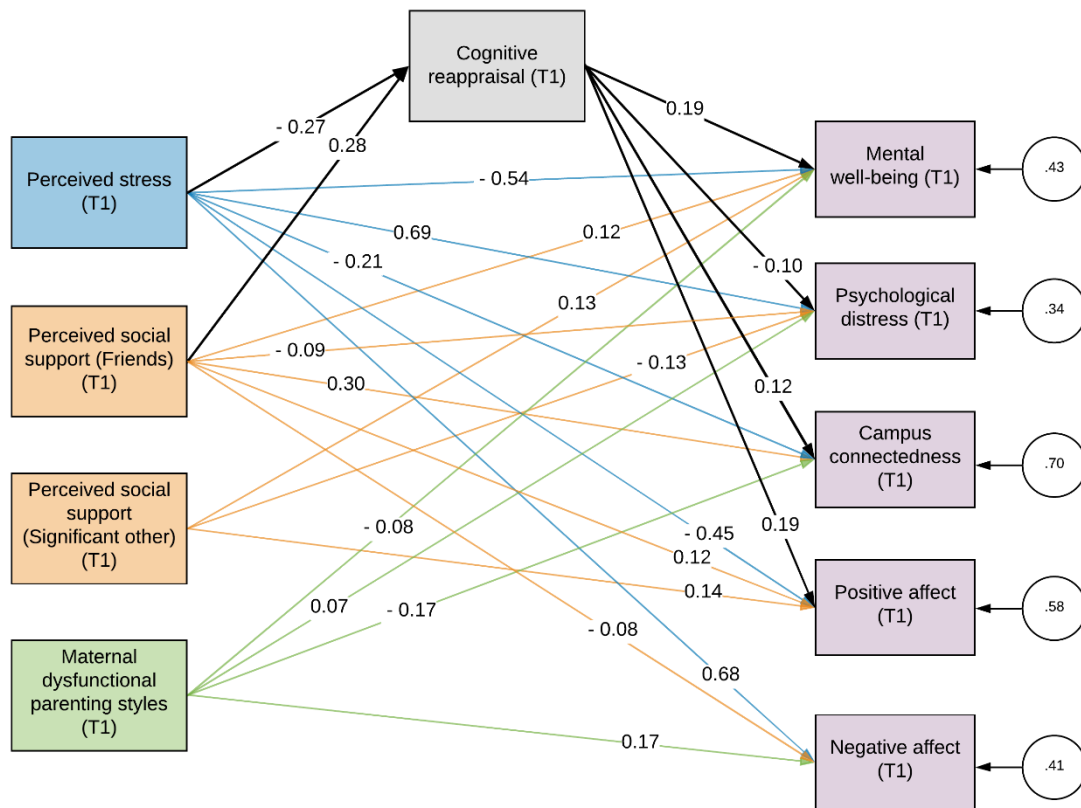


Figure 22 Statistically significant direct paths of the partial mediation model at baseline (T1), $p \leq .05$, $n = 362$.

The indirect effects model at baseline revealed significant but partial mediation effects involving two of the six predictor variables, i.e., perceived stress and perceived social support from friends (see Figure 23). Perceived stress was indirectly associated with mental well-being ($\beta = -0.05$, $p \leq .00$), psychological distress ($\beta = 0.03$, $p \leq .05$), campus connectedness ($\beta = -0.03$, $p \leq .05$), and positive affect ($\beta = -0.05$, $p \leq .00$) through cognitive reappraisal. Perceived social support from friends was indirectly associated with mental well-being ($\beta = 0.05$,

$p \leq .00$), psychological distress ($\beta = -0.03$, $p \leq .00$), and positive affect ($\beta = 0.05$, $p \leq .00$) through cognitive reappraisal.

The partial mediation model at baseline indicated a good fit to the data with a non-significant χ^2 statistic of 4.33 (6, $p \leq .63$); CFI = 1.00; TLI = 1.00; RMSEA = 0.00 (90% CI: 0.00, 0.06), and SRMR = 0.01. A full mediation model, i.e., a non-nested constrained model, resulted in the worsening of model fit with χ^2 statistic of 451.22 (22, $p \leq .00$); CFI = 0.72; TLI = 0.51; RMSEA = 0.23 (90% CI: 0.21, 0.25), and SRMR = 0.24. The difference in model fit between the constrained and unconstrained models was examined using the Satorra-Bentler Scaled Chi-square test (Satorra & Bentler, 1988). The comparison was found to be statistically significant [440.98 (1), $p \leq .00$], suggesting that the partial mediation model fits the data the best at baseline.

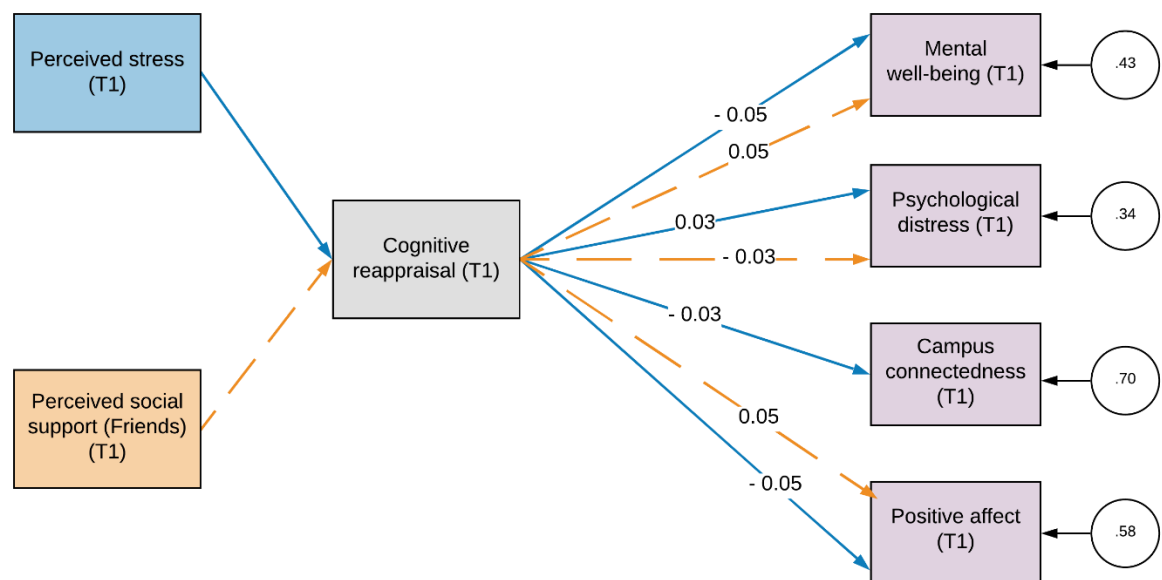


Figure 23 Standardised coefficients of the indirect effects of predictor-mediator-outcome relationships at baseline. Only statistically significant indirect effects are shown ($p \leq .00$). For clarity, direct paths are not shown. Estimates apply to the whole sample ($n=362$). Dotted orange line: the indirect path from perceived social support from friends to outcome variables. Solid blue line: the indirect path from perceived stress to outcome variables.

The magnitude of the indirect effects differs marginally between the hypothesised paths and while they were statistically significant, their effects were small. Table 6 below presents the standardised parameter estimates of the direct and indirect effects of the significant paths as well as the proportion of the effects. The proportion of indirect effect via cognitive reappraisal was largest for the relationship between perceived social support from friends and experiences of positive affect (i.e., 29.41%) followed by the relationship with psychological well-being (27.78%) and psychological distress (27.27%). The smallest proportion of indirect effect was for the relationships between perceived stress and the outcomes of psychological resilience, i.e., mental well-being (8.47%) and psychological distress (4.22%). The examination of the direct effect estimates versus the indirect effect estimates suggests that the indirect effects are very small. While their proportion of influence on the total predictor-outcome relationship is statistically significant, they are less influential than direct relationships. Therefore, the direct effects had a greater predictive capacity on the outcomes of resilience than the indirect effects.

Cross-sectionally at follow-up, the partial mediation model could not be estimated and evaluated as cognitive reappraisal did not have a significant relationship with any of the outcome variables. As demonstrated by the descriptive statistics for this variable (see Table 3), the use of cognitive reappraisal as a strategy significantly reduced at the follow-up phase. This could potentially explain why there is no evidence for mediation effects cross-sectionally at follow-up. Consequently, a longitudinal examination of the indirect effects was conducted.

Table 6 Standardised 95% confidence intervals of parameter estimates of the direct, indirect, and total effects of the partial mediation model at baseline phase, statistically significant at $*p \leq .05$ ($n=362$).

Hypothesis	Effects	Lower 2.5% CI	Estimate	Upper 2.5% CI	Proportion of effect
Perceived stress → Mental well-being	Direct	-0.61	-0.54*	-0.47	90.00%
	Indirect	-0.08	-0.05*	-0.02	8.33%
	Total	-0.66	-0.60*	-0.53	
Perceived social support (Friend) → Mental well-being	Direct	0.03	0.12*	0.22	66.67%
	Indirect	0.03	0.05*	0.08	27.78%
	Total	0.09	0.18*	0.27	
Perceived stress → Psychological distress	Direct	0.63	0.69*	0.74	97.18%
	Indirect	0.01	0.03*	0.05	4.22%
	Total	0.66	0.71*	0.76	
Perceived social support (Friend) → Psychological distress	Direct	-0.16	-0.08*	-0.01	72.72%
	Indirect	-0.05	-0.03*	-0.01	27.27%
	Total	-0.19	-0.11*	-0.04	
Perceived stress → Campus connectedness	Direct	-0.31	-0.21*	-0.12	84.00%
	Indirect	-0.06	-0.03*	-0.01	12.00%
	Total	-0.34	-0.25*	-0.15	
Perceived stress → Positive affect	Direct	-0.54	-0.45*	-0.36	90.00%
	Indirect	-0.08	-0.05*	-0.02	10.00%

	Total	-0.59	-0.50*	-0.42	
Perceived social support (Friend) → Positive affect	Direct	0.02	0.11*	0.21	64.70%
	Indirect	0.02	0.05*	0.09	29.41%
	Total	0.07	0.17*	0.27	

7.3.2.2 Longitudinal mediation analyses

The standardised path coefficients of the direct relationships, including from the predictor variables to the mediator, and from the mediator to the outcome variables are depicted in Figure 24. The direction of the direct relationships was as anticipated. As with the previous models, the results indicated that paternal dysfunctional parenting styles and perceived social support by the family had no direct relationships with the outcome variables and the mediator, cognitive reappraisal, longitudinally. Also, cognitive reappraisal did not have a direct relationship with the outcome variable of negative affect.

The variance accounted for by the partial mediation model examined longitudinally was 38% for mental well-being, 47% for psychological distress, 29% for campus connectedness, 26% for positive affect, and 34% for negative affect. The variances explained by the longitudinal mediation model were lower than the baseline mediation model. The correlation between the outcome variables ranged from -0.19 (between negative affect and psychological distress) and -0.77 (between psychological distress and mental well-being).

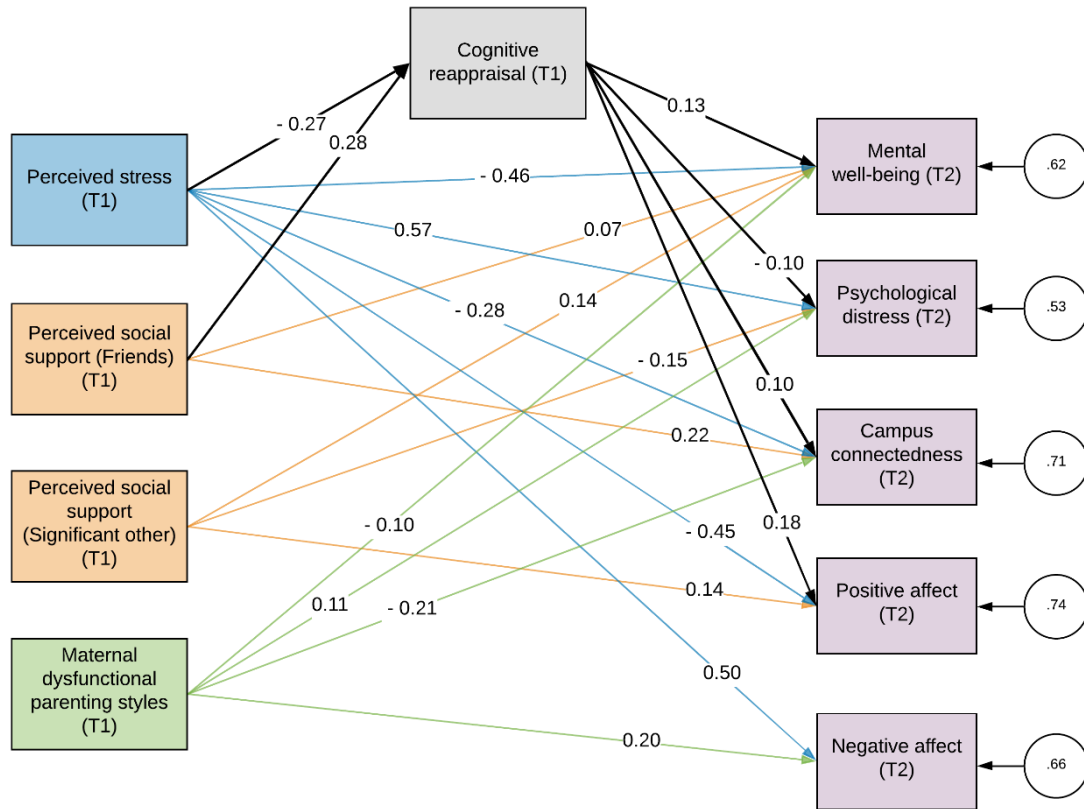


Figure 24 Statistically significant direct paths of the longitudinal partial mediation model, $p \leq .05$, $n=362$.

As with the baseline partial mediation model (see Figure 23), the longitudinal indirect effects model revealed significant but partial mediation effects involving two of the six predictor variables reported at baseline, i.e., perceived stress and perceived social support from friends (see Figure 25). Perceived stress was indirectly associated with mental well-being ($\beta = -0.03$, $p \leq .05$), psychological distress ($\beta = 0.03$, $p \leq .02$), and positive affect ($\beta = -0.05$, $p \leq .05$) through cognitive reappraisal. Across time, perceived stress was no longer indirectly associated with campus connectedness through cognitive reappraisal. Unlike the indirect effects model at baseline, perceived social support from friends had an indirect (i.e., via cognitive reappraisal) predictive association only with mental well-being ($\beta = 0.04$, $p \leq .05$).

The longitudinal partial mediation model indicated a good fit to the data with a non-significant χ^2 statistic of 10.02 (9, $p \leq .35$); CFI = 0.99; TLI = 0.99; RMSEA = 0.02 (90% CI: 0.00, 0.06), and SRMR = 0.02. A full mediation model, i.e., a non-nested constrained model, resulted in the worsening of model fit with χ^2 statistic of 286.27 (22, $p \leq .00$); CFI = 0.82; TLI = 0.68; RMSEA = 0.18 (90% CI: 0.16, 0.20), and SRMR = 0.20. The difference in model fit between the constrained and unconstrained models was examined using the Satorra-Bentler Scaled Chi-square test (Satorra & Bentler, 1988). The comparison was found to be statistically significant [278.07 (13), $p \leq .00$] suggesting that the longitudinal partial mediation model fits the data the best.

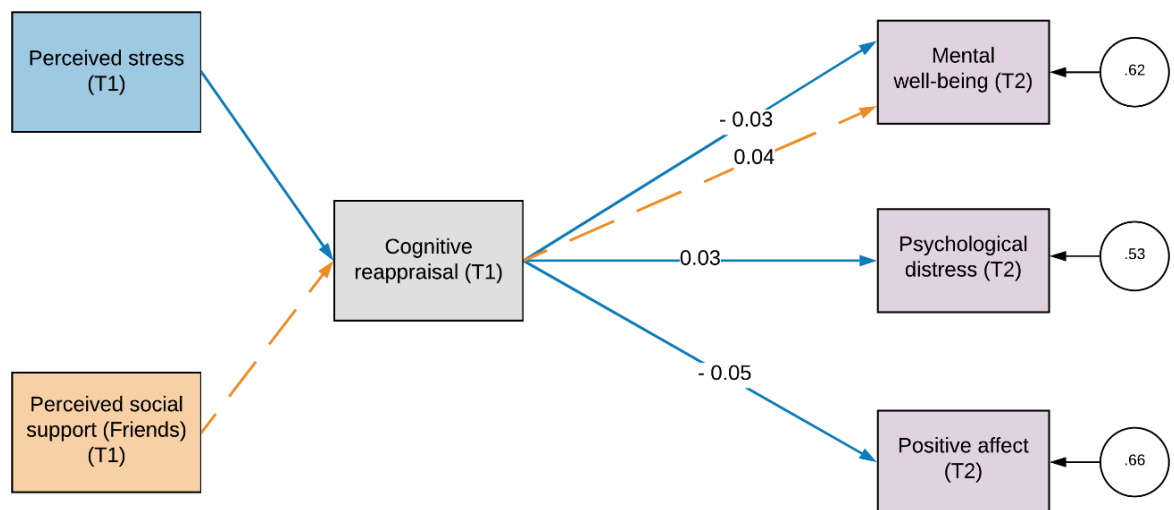


Figure 25 Standardised estimates of the longitudinal indirect effects of predictor-mediator-outcome relationships. Only statistically significant effects are shown ($p \leq .00$). Estimates apply to the whole sample ($n=362$). Dotted orange line: the indirect path from perceived social support from friends to outcome variables. Solid blue line: the indirect path from perceived stress to outcome variables.

Table 7 presents the standardised parameter estimates of the direct and indirect effects of the significant paths as well as the proportion of the effect. The proportion of indirect effect was largest for the relationship between perceived social support from friends to mental well-being (i.e., 40%). The smallest

proportion of indirect effect was on the relationship between perceived stress and psychological distress (5%). The proportion of indirect effects are greater for these relationships as compared to the partial mediation model at baseline. Overall, the direct effects had a greater influence on the predictive relationship between the predictor variables and the outcome variables.

Table 7 Standardised 95% confidence intervals of parameter estimate of the longitudinal partial mediation model, statistically significant at $*p \leq .05$ ($n=362$).

Hypothesis	Effects	Lower 2.5% CI	Estimate	Upper 2.5% CI	Proportion of effect
Perceived stress → Mental well-being	Direct	-0.54	-0.46*	-0.37	93.87%
	Indirect	-0.06	-0.03*	-0.01	6.12%
	Total	-0.57	-0.49*	-0.41	
Perceived social support (Friend) → Mental well-being	Direct	0.02	0.07*	0.12	70.00%
	Indirect	0.01	0.04*	0.06	40.00%
	Total	0.05	0.10*	0.16	
Perceived stress → Psychological distress	Direct	0.50	0.57*	0.65	95.00%
	Indirect	0.01	0.03*	0.05	5.00%
	Total	0.53	0.60*	0.67	
Perceived stress → Positive affect	Direct	-0.44	-0.35*	-0.26	87.50%
	Indirect	-0.08	-0.05*	-0.02	12.50%
	Total	-0.48	-0.40*	-0.31	

7.3.3 Moderated mediation analyses

Moderated mediation occurs when the strength of the mediator's influence (i.e., cognitive reappraisal) depends on the level of another variable (i.e., gender and/or ethnicity). Due to a very small number of participants identifying with other gender identities (<1%), it was not possible to examine the moderating influences or group differences between gender identities beyond male and female students. Similarly, all non-White/White British ethnic identities in the obtained sample formed approximately 18% of the total sample and therefore, it was not possible to disaggregate these ethnic groups to examine differences between the range of ethnic identities. It should be noted that within this group, the majority of the students were of Asian/Asian British (including Indian, Pakistani, Chinese, other Asian) ethnic backgrounds (12.74%). See Table D-1 in Appendix D for further information about the sample characteristics. The differential influences on the role of the mediator for different gender (male and female) and ethnic groups (White/White British and other ethnic identities) were compared using a multiple group approach and confirmed using the Wald's Chi-square test. A significant Wald test statistic indicated that the groups are significantly different for the specified hypothesised paths (Li et al., 2020).

The moderated mediation analyses answered the following questions, cross-sectionally and longitudinally:

- a) Are the effects between perceived stress, perceived social support and maternal and paternal dysfunctional parenting styles and the ability to downregulate negative emotional responses (i.e., using cognitive reappraisal) stronger for university students identifying with a specific gender identity (i.e., male and female)?
- b) Are the effects between perceived stress, perceived social support and maternal and paternal dysfunctional parenting styles and the ability to downregulate negative emotional responses (i.e., using cognitive reappraisal) stronger for university students of a specific ethnic background (i.e., White/White British and other ethnic identities)?

- c) Are the effects between the ability to downregulate negative emotional responses (i.e., using cognitive reappraisal) and the outcomes of resilience, including mental well-being, psychological distress, campus connectedness, and positive and negative affect, stronger for university students identifying with a specific gender identity (i.e., male and female)?
- d) Are the effects between the ability to downregulate negative emotional responses (i.e., using cognitive reappraisal) and the outcomes of resilience, including mental well-being, psychological distress, campus connectedness, and positive and negative affect, stronger for university students of a specific ethnic background (i.e., White/White British and other ethnic identities)?

7.3.3.1 Baseline moderated mediation model

The baseline moderated mediation models for both gender and ethnicity were just-identified (i.e., not enough degrees of freedom to compute goodness-of-fit indices) because of which the model fit could not be evaluated. Instead, parameter estimates were examined and have been reported below.

7.3.3.1.1 Gender

In the male model, the mediator, cognitive reappraisal, was significantly associated with each of the predictor variables, apart from perceived social support from family. However, cognitive reappraisal did not have a direct significant relationship with any of the outcome variables. Unexpectedly, for reasons unclear, the experience of maternal dysfunctional parenting styles by male students was positively associated with cognitive reappraisal ($\beta = 0.28$, $p \leq .03$) and with mental well-being ($\beta = 0.23$, $p \leq .04$). The standardised regression coefficients for the direct relationships for the male model can be found in Appendix S (Table S-2). In the female model, unlike the male model, the mediator, cognitive reappraisal, was significantly associated with two of the predictor variables, i.e., perceived stress and perceived social support from friends. Additionally, unlike the male model, the mediator had a statistically

significant direct relationship with each of the outcome variables. The standardised regression coefficients of the direct relationships for the female model can be found in Appendix S (Table S-3). An inspection of the indirect effects indicated that the mediational effects of cognitive reappraisal were not significant for male students. This was anticipated due to the absence of statistically significant direct relationships between the mediator and the outcome variables. In turn, there was evidence for partial mediation effects for female students (see **Error! Reference source not found.**), albeit with a small magnitude of effects.

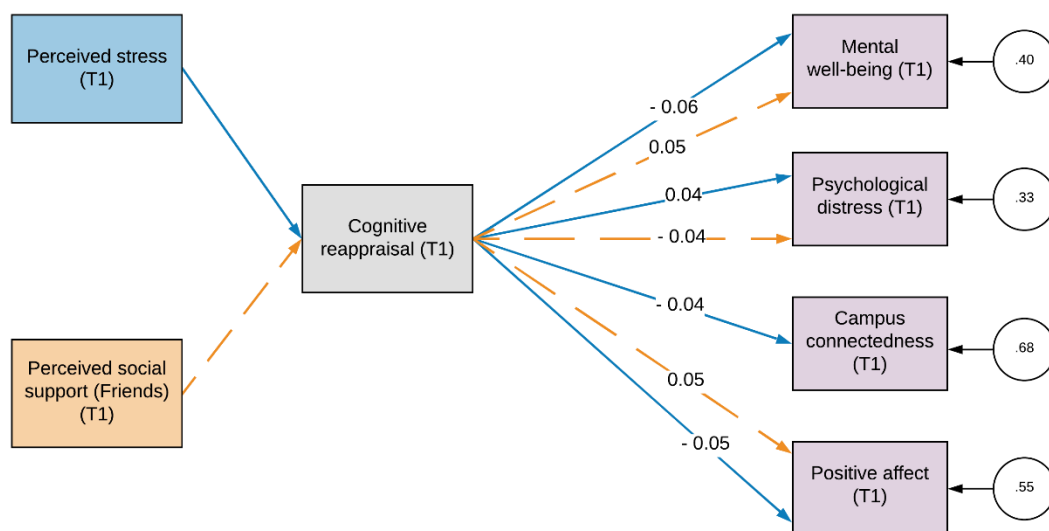


Figure 26 Standardised estimates of the baseline indirect effects for female students. Only statistically significant effects are shown ($p \leq .00$). Estimates apply to the whole sample ($n=288$). Dotted orange line: the indirect path from perceived social support from friends. Solid blue line: the indirect path from perceived stress.

Error! Reference source not found. presents the standardised parameter estimates of the direct and indirect effects of the significant paths as well as the proportion of the effect for the baseline mediation model for female students. The proportion of indirect effect was weakest for the relationship between perceived stress and psychological distress (i.e., 5.79%). The largest proportion of indirect effect was on the relationship between perceived social support from friends and mental well-being (31.25%). Overall, the direct

relationships from the predictor variables perceived stress and perceived social support from friends had greater influence in predicting the outcomes of resilience in the baseline moderated mediation model for female students.

Based on the equality constraints and the Wald's test, the indirect effects for the relationships between perceived stress and psychological distress [Wald's $\chi^2(1) = 5.19, p \leq .05$] and mental well-being [Wald's $\chi^2(1) = 3.99, p \leq .05$] were found to be significantly different between male and female students.

Similarly, a significant value of Wald's test confirmed that the indirect effect for the relationships between perceived social support from friends and psychological distress [Wald's $\chi^2(1) = 3.95, p \leq .05$] were significantly different between the two groups. Among the other defined parameters, the difference between the indirect effects for the two groups was not found to be statistically significant, indicating that these mediation effects are not moderated by gender. Therefore, gender differences only moderated the mediation effects of cognitive reappraisal on the relationships between perceived stress and psychological resilience (i.e., mental well-being and psychological distress), and between perceived social support from friends and psychological distress in the cross-sectional baseline model.

Table 8 Standardised 95% confidence interval parameter estimates of total, direct, and indirect effects for female students in the baseline moderated mediation model. Statistically significant at * $p \leq .05$.

Hypothesis	Effects	Lower 2.5% CI	Estimate	Upper 2.5% CI	Proportion of effect
Female students (n = 288)					
Perceived stress → Mental well-being	Direct	-0.61	-0.53*	-0.45	89.83%
	Indirect	-0.09	-0.06*	-0.02	10.17%
	Total	-0.67	-0.59*	-0.51	
Perceived social support (Friend) → Mental well-being	Direct	-0.00	0.10	0.21	62.50%
	Indirect	0.02	0.05*	0.09	31.25%
	Total	0.05	0.16*	0.27	
Perceived stress → Psychological distress	Direct	0.57	0.65*	0.71	94.20%
	Indirect	0.01	0.04*	0.06	5.79%
	Total	0.63	0.69*	0.75	
Perceived social support (Friend) → Psychological distress	Direct	-0.18	-0.10*	-0.01	76.92%
	Indirect	-0.06	-0.04*	-0.01	30.77%
	Total	-0.22	-0.13*	-0.04	
Perceived stress → Campus connectedness	Direct	-0.35	-0.23*	-0.11	85.18%
	Indirect	-0.06	-0.04*	-0.01	14.81%
	Total	-0.38	-0.27*	-0.16	

Perceived stress → Positive affect	Direct	-0.58	-0.48*	-0.37	92.31%
	Indirect	-0.08	-0.05*	-0.02	9.61%
	Total	-0.62	-0.52*	-0.42	
Perceived social support (Friend) → Positive affect	Direct	0.02	0.14*	0.25	77.78%
	Indirect	0.01	0.05*	0.08	27.8%
	Total	0.07	0.18*	0.30	

7.3.3.1.2 Ethnicity

In the baseline model for White/White British students, the mediator, cognitive reappraisal, had a significant direct relationship with each of the predictor variables, apart from perceived social support from family, and with each of the outcome variables, apart from negative affect. The standardised regression coefficients for the direct relationships for this model can be found in Appendix S (Table S-4).

For students of other ethnic backgrounds, the mediator, cognitive reappraisal, had a statistically significant direct relationship with each of the outcome variables, apart from negative affect in the baseline model. However, unlike the model for White/White British students, the mediator, cognitive reappraisal, had a statistically significant relationship with four of the six predictor variables, i.e., perceived stress, and each of the three sources of perceived social support, i.e., from family, friends, and significant others. The standardised regression coefficients for the direct relationships for this model can be found in Appendix S (Table S-5).

As depicted in **Error! Reference source not found.**, for White/White British students, cognitive reappraisal partially mediated the relationships between perceived stress and mental well-being ($\beta = -0.05, p \leq .05$) and psychological distress ($\beta = 0.03, p \leq .05$). The magnitude of the indirect effects was weaker than the estimates of direct effects for these relationships. The proportion of partial mediation effect was weakest for the relationship between perceived stress and psychological distress (4.35%) and strongest for the relationship between perceived stress and mental well-being (9.09%) (see **Error! Reference source not found.**).

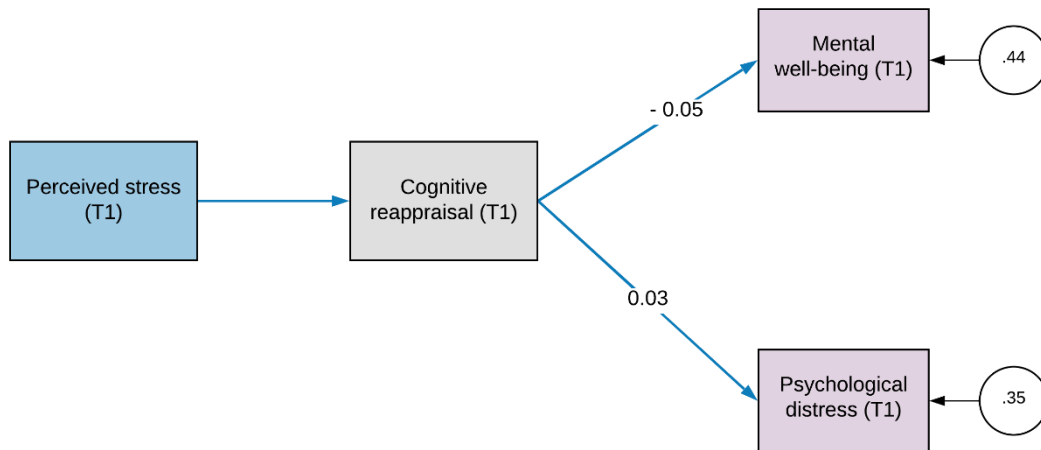


Figure 27 Standardised estimates of the baseline indirect effects for White/White British students. Only statistically significant effects are shown ($p \leq .00$). Estimates apply to the whole sample ($n=294$).

For students of other ethnic backgrounds, the indirect effects model at baseline revealed statistically significant, albeit small magnitude of effect, full and partial mediation effects of cognitive reappraisal (see **Error! Reference source not found.**).

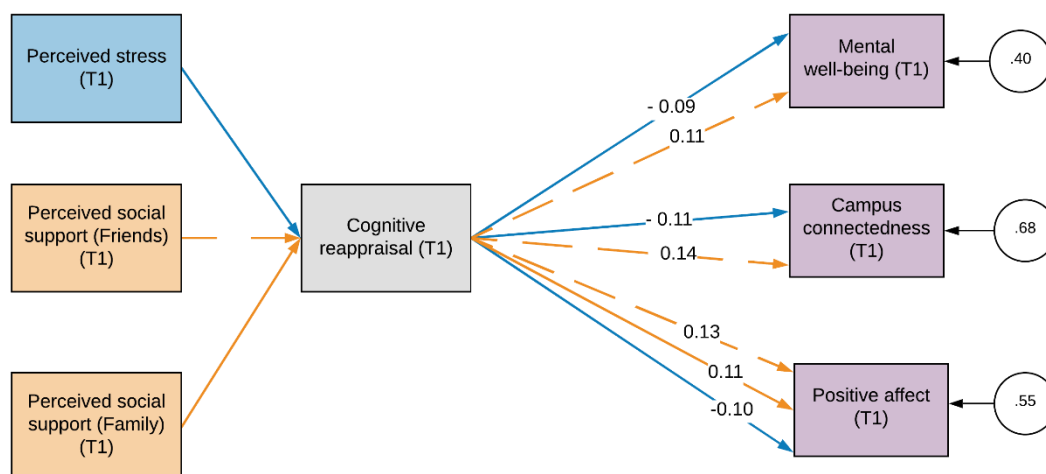


Figure 28 Standardised estimates of the baseline indirect effects for students of other ethnic backgrounds students. Only statistically significant effects are shown ($p \leq .00$). Estimates apply to the whole sample ($n=66$). Solid blue line: indirect effects from perceived stress; dotted orange line: indirect effects from perceived social support from friends; solid orange line: indirect effects from perceived social support from family.

Based on the 95% confidence intervals of the indirect effects for the baseline model of the students of other ethnic backgrounds, evidence for full mediation was found for the relationships between:

- perceived stress and campus connectedness [$\beta = -0.11, p \leq .01, (95\% \text{ CI: } -0.21, -0.02)$], with 35.48% of the total effect being indirectly conveyed by cognitive reappraisal,
- perceived social support from friends and mental well-being [$\beta = 0.11, p \leq .01, (95\% \text{ CI: } 0.02, 0.20)$], with 55% of the total effect being indirectly conveyed by cognitive reappraisal,
- perceived social support from friends and campus connectedness [$\beta = 0.14, p \leq .00, (95\% \text{ CI: } 0.04, 0.25)$], with 43.75% of the total effect being indirectly conveyed by cognitive reappraisal and,
- perceived social support from family and positive affect [$\beta = 0.11, p \leq .03, (95\% \text{ CI: } 0.01, 0.20)$], with 183% of the total effect being indirectly conveyed by cognitive reappraisal. It is important to note here that the overall effect, i.e., the total effect of this relationship was non-significant. The direct and indirect effects are in opposing directions suggesting the presence of suppression or inconsistent mediation (see Agler & De Boeck, 2017; MacKinnon, Krull, & Lockwood, 2000). A significant total and/or direct effect is not necessary for a significant indirect effect (Rucker, Preacher, Tormala, & Petty, 2011).

Error! Reference source not found. presents the standardised parameter estimates of the direct and indirect effects of the significant paths as well as the proportion of the effect for the baseline moderated mediation model for students of the different ethnic backgrounds.

Table 9 Standardised 95% confidence interval parameter estimates of total, direct, and indirect effects for White/White British students and students of other ethnic backgrounds in the baseline mediation model. Statistically significant at $*p \leq .05$, $n=362$.

Hypothesis	Effects	Lower 2.5% CI	Estimate	Upper 2.5% CI	Proportion of effect
White/White British students (n = 294)					
Perceived stress → Mental well-being	Direct	-0.58	-0.50*	-0.42	90.91%
	Indirect	-0.09	-0.05*	-0.02	9.09%
	Total	-0.63	-0.55*	-0.48	
Perceived stress → Psychological distress	Direct	0.59	0.66*	0.72	95.65%
	Indirect	0.01	0.03*	0.06	4.35%
	Total	0.63	0.69*	0.75	
Students of other ethnic backgrounds (n = 66)					
Perceived stress → Mental well-being	Direct	-0.78	-0.61*	-0.45	87.14%
	Indirect	-0.15	-0.09*	-0.03	12.85%
	Total	-0.85	-0.70*	-0.56	
Perceived social support (Friend) → Mental well-being	Direct	-0.08	0.09	0.26	45%
	Indirect	0.02	0.11*	0.20	55%
	Total	0.02	0.20*	0.38	
Perceived stress → Campus connectedness	Direct	-0.41	-0.19	0.03	61.29%
	Indirect	-0.21	-0.11*	-0.02	35.48%
	Total	-0.52	-0.31*	-0.09	

Perceived social support (Friend) → Campus connectedness	Direct	-0.07	0.15	0.42	46.87%
	Indirect	0.04	0.14*	0.25	43.75%
	Total	0.07	0.32*	0.56	
Perceived stress → Positive affect	Direct	-0.64	-0.47*	-0.30	81.03%
	Indirect	-0.17	-0.10*	-0.03	17.24%
	Total	-0.74	-0.58*	-0.41	
Perceived social support (Family) → Positive affect	Direct	-0.30	-0.05	0.21	83.33%
	Indirect	0.01	0.11*	0.20	183.00%
	Total	-0.21	0.06*	0.33	
Perceived social support (Friend) → Positive affect	Direct	0.01	0.15*	0.29	53.57%
	Indirect	0.03	0.13*	0.22	46.43%
	Total	0.11	0.28*	0.44	

The equality constraints indicated that there was a significant difference in the mediation effects of cognitive reappraisal between White/White British students and students of other ethnic backgrounds on the relationships between perceived social support from friends and positive affect ($Z = -2.15$, $p \leq .03$) and between perceived social support from friends and campus connectedness ($Z = -2.32$, $p \leq .02$). These indirect effects from perceived social support from friends were significant for only students of other ethnic backgrounds and not for White/White British students. The Wald's test confirmed that the indirect effects for the relationships between perceived social support from friends and positive affect [Wald's $\chi^2(1) = 4.61$, $p \leq .05$] and campus connectedness [Wald's $\chi^2(1) = 5.34$, $p \leq .05$] were significantly different across the two groups.

Therefore, ethnicity moderated the mediation effects of cognitive reappraisal on the relationships between perceived social support from friends and positive affect and campus connectedness in the cross-sectional model at baseline. Additionally, the proportions of indirect effect were larger for students of other ethnic backgrounds, suggesting that they were more likely to utilise cognitive reappraisal as an emotion regulation strategy than White/White British students. However, based on the discrepancy in sample size between the groups, there is a concern for the inflation of Type I error, and therefore, these results were interpreted based on this limitation.

7.3.3.2 Longitudinal moderated mediation model

As with the baseline moderated mediation models, the longitudinal moderated mediation models for both gender and ethnicity were just-identified (i.e., not enough degrees of freedom to compute goodness-of-fit indices). For this reason, the goodness-of-fit indices could not be evaluated. Instead, parameter estimates were examined and have been reported below.

7.3.3.2.1 Gender

As with the baseline male model, cognitive reappraisal did not mediate any of the relationships between the predictors and outcomes of resilience for male students. This was anticipated due to the absence of statistically significant direct relationships between the cognitive reappraisal and the outcome variables (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect). See Appendix S, Table S-6, for the standardised regression coefficients for the longitudinal direct relationships for the male model. The longitudinal model for female students revealed several statistically significant direct relationships from the predictors to the mediator, and from the mediator to the outcome variables (see Appendix S – Table S-7). **Error! Reference source not found.** presents the standardised parameter estimates of the direct and indirect effects of the significant paths as well as the proportion of the effects for the longitudinal moderated mediation model for female students. There was evidence for full and partial mediations for female students (see **Error! Reference source not found.**). Unlike the baseline moderated mediation model (see **Error! Reference source not found.**), being female did not moderate the indirect effects via cognitive reappraisal to mental well-being and campus connectedness in the longitudinal mediation model.

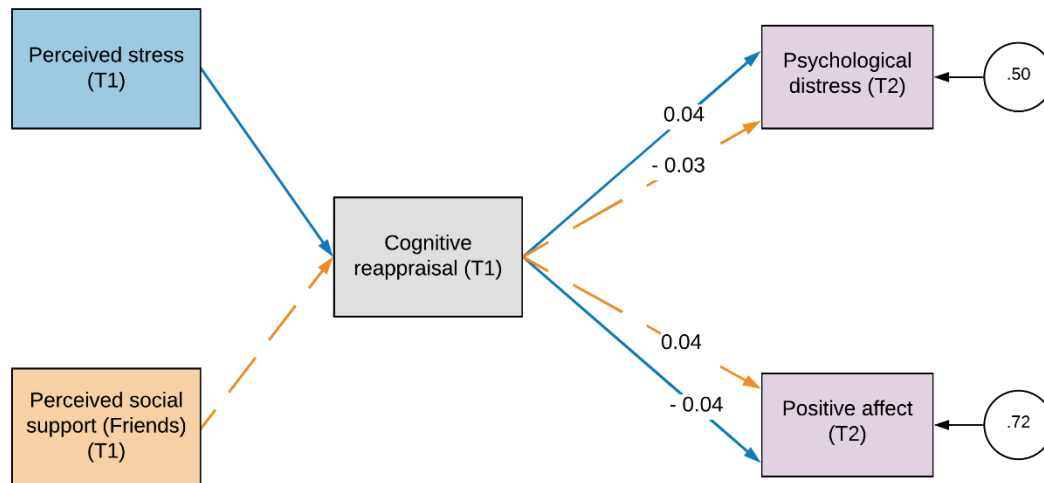


Figure 29 Standardised estimates of the longitudinal indirect effects for female students. Only statistically significant effects are shown ($p \leq .00$). Estimates apply to the whole sample ($n=288$). Dotted orange line: the indirect path from perceived social support from friends. Solid blue line: indirect from perceived stress.

For female students, there was evidence for full mediation based on the level of significance and the 95% confidence interval of the indirect effects for the relationships between perceived social support from friends and positive affect [$\beta = 0.04$, $p \leq .05$, 95% CI (0.01, 0.07)] and psychological distress [$\beta = -0.04$, $p \leq .05$, 95% CI (-0.06, -0.01)]. The proportion of partial mediation effect of cognitive reappraisal was weakest for the relationship between perceived stress and psychological distress (i.e., 7.01%). The largest proportion of indirect effect was for the relationship between perceived social support from friends and psychological distress (30%). Overall, the direct relationships between perceived stress and psychological distress and positive affect were stronger than the indirect effects through cognitive reappraisal. Although the proportion of effect for the mediation was lower than the proportion of the direct effects, cognitive reappraisal fully mediated the relationships between perceived social support from friends and positive affect and psychological distress for female students.

However, the equality constraints indicated that there were no significant differences in the estimates of indirect effects due to the gender identity of the students. This was also supported by a non-significant value of the Wald's test

statistic. These results were interpreted with caution (as discussed in the final chapter of this thesis) due to the large discrepancies in the sample sizes in the two groups.

Table 10 Standardised 95% confidence interval parameter estimates of total, direct, and indirect effects for female students in the longitudinal mediation model. Statistically significant at * $p \leq .05$.

Hypothesis	Effects	Lower 2.5% CI	Estimate	Upper 2.5% CI	Proportion of effect
Female students (n = 288)					
Perceived stress → Psychological distress	Direct	0.44	0.54*	0.62	94.74%
	Indirect	0.01	0.04*	0.07	7.01%
	Total	0.45	0.57*	0.66	
Perceived social support (Friend) → Psychological distress	Direct	-0.18	-0.07	0.04	70.00%
	Indirect	-0.06	-0.03*	-0.01	30.00%
	Total	-0.22	-0.10	0.01	
Perceived stress → Positive affect	Direct	-0.44	-0.32*	-0.20	88.89%
	Indirect	-0.07	-0.04*	-0.01	11.11%
	Total	-0.48	-0.36*	-0.25	
Perceived social support (Friend) → Positive affect	Direct	-0.01	0.11	0.24	73.33%
	Indirect	0.01	0.04*	0.07	26.66%
	Total	0.02	0.15*	0.29	

7.3.3.2.2 Ethnicity

As with the baseline model, in the longitudinal model for students of White/White British backgrounds, the mediator, cognitive reappraisal, had significant direct associations with only two of the predictor variables, i.e., perceived stress and perceived social support from friends. Cognitive reappraisal had a direct association with most of the outcome variables (i.e., mental well-being, psychological distress, and positive affect), apart from negative affect and campus connectedness. The standardised regression coefficients for the direct relationships of the model can be found in Appendix S (Table S- 8).

Unlike the baseline model for students of other ethnic backgrounds, the mediator, cognitive reappraisal, did not have a statistically significant direct relationship with the outcomes of resilience reported at follow-up. Cognitive reappraisal had a statistically significant relationship with four of the six predictor variables reported at baseline, i.e., perceived stress, and each of the three sources of perceived social support (i.e., from family, friends, and significant others). The standardised regression coefficients for the direct relationships of the model can be found in Appendix S (Table S-9).

There was no evidence for partial or full mediation by cognitive reappraisal for students of other ethnic backgrounds. For the longitudinal mediation model for White/White British students, the partial mediation effects of cognitive reappraisal reported at baseline were statistically significant for the relationships between the predictor variable, perceived stress, with the outcome variables of mental well-being, psychological distress, and positive affect. However, the 95% confidence intervals of these relationships contained a zero, revealing no evidence for significant indirect effects (see **Error! Reference source not found.**). This was supported by the Wald's test. Therefore, the ethnicity of the students did not moderate the mediation effects of cognitive reappraisal in the longitudinal path model. It is reiterated that these findings may be influenced by Type II errors due to the discrepancies in the sample sizes between the two groups.

Table 11 Standardised regression coefficients for indirect effects in the longitudinal mediation model for White/White British students, statistically significant at $p \leq .05$.

Hypothesis	Effects	Lower 2.5% CI	Estimate	Upper 2.5% CI
White/White British students (n = 292)				
Perceived stress → Mental well-being	Direct	-0.52	-0.41*	-0.29
	Indirect	-0.07	-0.04*	-0.00
	Total	-0.55	-0.44*	-0.33
Perceived stress → Psychological distress	Direct	0.41	0.51*	0.62
	Indirect	0.00	0.03*	0.07
	Total	0.45	0.55*	0.65
Perceived stress → Positive affect	Direct	-0.44	-0.32*	-0.20
	Indirect	-0.08	-0.04*	-0.00
	Total	-0.48	-0.36*	-0.24

7.4 Summary of findings

The findings reported in the previous sections provided partial support to the research hypotheses. The key findings have been summarised below.

Hypotheses related to the direct relationships between an individual (i.e., perceived stress), social (i.e., perceived social support), and familial (i.e., maternal and paternal dysfunctional parenting styles) risk and protective factors and psychological (i.e., mental well-being and psychological distress), emotional (i.e., positive and negative affect), and social (i.e., campus connectedness) resilience:

- Cross-sectionally at baseline perceived stress and perceived social support from friends had statistically significant associations with each of the outcomes of resilience. Perceived social support from significant others was associated with mental well-being, psychological distress, and positive affect. Maternal dysfunctional parenting styles had a direct relationship with mental well-being, psychological distress, campus connectedness and negative affect. Perceived social support from family and paternal dysfunctional parenting styles did not have direct relationships with the outcomes of resilience.
- Longitudinally, perceived stress reported at baseline significantly predicted all the outcomes of resilience reported at follow-up. Unlike in the baseline direct effects model, perceived social support from friends reported at baseline did not predict psychological distress and positive and negative affect reported at follow-up. Instead, perceived social support from friends had positive associations with mental well-being and campus connectedness. The direct relationships between the perceived social support from significant others and mental well-being, psychological distress, and positive affect remained consistent across time. Similarly, across time, maternal dysfunctional parenting styles were associated with mental well-being, psychological distress, campus connectedness and negative affect. As with the baseline model, perceived social support from family and paternal dysfunctional

parenting styles did not have a direct relationship with the outcomes of resilience in the longitudinal direct effects model.

Hypotheses related to the partial mediation role of cognitive reappraisal on the relationships between individual, social, and familial risk and protective factors and psychological, emotional, and social resilience:

- Cross-sectionally at baseline, cognitive reappraisal partly mediated the relationships between perceived stress and mental well-being, psychological distress, campus connectedness, and positive affect. Cognitive reappraisal partly mediated the relationships perceived social support from friends and mental well-being, psychological distress, and positive affect. The magnitude and the proportion of indirect effects of cognitive reappraisal on these relationships were smaller than their direct associations.
- Longitudinally, cognitive reappraisal partly mediated the relationships between perceived stress reported at baseline and mental well-being, psychological distress, and positive affect reported at follow-up. Unlike the mediation model at baseline, cognitive reappraisal partly mediated the relationship between the predictor perceived social support from friends only with the outcome variable of mental well-being. The magnitude and the proportion of indirect effects of cognitive reappraisal on these relationships were smaller than the direct relationships.
- Cognitive reappraisal did not mediate the relationships between the predictors, paternal and maternal dysfunctional parenting styles, perceived social support from family and significant others and the outcomes of resilience, cross-sectionally and longitudinally.

Hypotheses related to the moderating role of gender and ethnicity on the partial mediation effects of cognitive reappraisal on the relationships between the individual, social, and familial risk and protective factors and psychological, emotional, and social resilience:

- Cross-sectionally at baseline, gender differences (i.e., between male and female students) moderated the mediation effects of cognitive reappraisal on the relationships between perceived stress and psychological resilience (i.e., mental well-being and psychological distress), and between perceived social support from friends and psychological distress. These indirect effects were significant for only female students and not for male students.
- Longitudinally, the gender identity of the students did not moderate the longitudinal mediation effects of cognitive reappraisal.
- Cross-sectionally at baseline, ethnic differences (i.e., between White/White British students and students of other ethnic backgrounds) moderated the mediation effects of cognitive reappraisal on the relationships between perceived social support from friends and positive affect and campus connectedness. These indirect effects were significant for only non-White British students and not for White/White British students.
- Longitudinally, the ethnicity of the students did not moderate the longitudinal mediation effects of cognitive reappraisal.

7.4.1 Key findings

- Perceived stress significantly predicts all the outcomes of resilience (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect).
- Perceived social support from family and paternal dysfunctional parenting styles did not predict psychological resilience (mental well-being and psychological distress), social resilience (campus connectedness), or emotional resilience (positive and negative affect).
- Perceptions of social support from significant others has a stronger effect on mental well-being compared to perceptions of social support from friends.

- The magnitude and proportion of significant indirect effects of cognitive reappraisal were smaller than the direct effects to the outcomes of resilience.
- Longitudinally, gender and ethnicity did not moderate the indirect effects of cognitive reappraisal.

The next chapter critically discusses these findings and associates them with the existing literature on resilience in higher education settings.

Chapter 8 Discussion

In this thesis, the validity of a novel socio-ecological model of resilience was investigated in a representative cohort of undergraduate students within a higher education context, i.e., at the University of Nottingham (UoN), UK. The model aimed to examine the predictive role of within-individual (i.e., perceived stress), familial (i.e., dysfunctional parenting styles), and social (i.e., perceived social support from friends, family, and significant others) risk and protective factors on a multidimensional construct of resilience; the role of cognitive reappraisal as an underpinning mechanism leading to resilience; and the potential variations due to gender and ethnicity of the students on the underlying role of cognitive reappraisal. In response to the limited theoretical delineation of resilience in the literature within the higher education setting, the model of resilience, as proposed in this thesis, was based on several well-established theoretical frameworks that have guided resilience research across populations, including university students. To the best of the author's knowledge, this is the first comprehensive evaluation of a socio-ecological model of a multidimensional construct of resilience in university students in the UK.

As reported in Chapter 7, the key findings based on the longitudinal analyses are:

- Perceived stress significantly predicts all the outcomes of resilience (i.e., mental well-being, psychological distress, campus connectedness, and positive and negative affect).
- Perceived social support from family and paternal dysfunctional parenting styles did not predict psychological resilience (mental well-being and psychological distress), social resilience (campus connectedness), or emotional resilience (positive and negative affect).
- Perceptions of social support from significant others has a stronger effect on mental well-being as compared to perceptions of social support from friends.

- Cognitive reappraisal reported at the start of the academic year partly conveyed the causal relationships between perceived stress and mental well-being, psychological distress, and positive affect across time.
- Cognitive reappraisal reported at the start of the academic year partly conveyed the causal relationship between perceived social support from friends and mental well-being across time.
- The magnitude and proportion of significant indirect effects of cognitive reappraisal were smaller than the direct effects to the outcomes of resilience.
- The underlying mechanism of cognitive reappraisal on the pathways to resilience did not significantly differ between different gender and ethnic identities of the undergraduate students.

Overall, the findings make a significant scientific contribution to the extant resilience literature by addressing several conceptual and methodological limitations. Firstly, in this thesis, resilience was conceptualised (and operationalised) as a complex, multidimensional construct that encompasses psychological, emotional, and social domains of mental health and well-being of university students. Further, it incorporated strength-based outcomes along with indicators of poor mental health and well-being. In doing so, the thesis contributes to the growing literature on poly-strengths (Hamby et al., 2018); refutes that resilience is the absence of poor consequences in the face of adversity (Almedom & Glandon, 2007; Richardson, 2002); and recognises that positive adaptation to adversity can manifest in different domains of mental health and well-being among university students (Luthar et al., 2000).

Secondly, based on the recommendations by pioneering resilience researchers, the thesis adopted a socio-ecological approach to examine the predictive role of within-individual, familial, and social risk and protective factors on resilience (Garmezy, 1985; Ungar, 2011). In this thesis, the role of early experiences of dysfunctional parenting styles, along with within-individual and social factors, i.e., perceived stress and perceived social support from different sources respectively, was examined in a comprehensive model of resilience in university students in the UK. The findings revealed in this thesis support the inclusion of such ecologically-based predictors of resilience

and thereby expand on the singular focus on individual characteristics that constitute the majority of the existing resilience literature (Sippel et al., 2015).

Thirdly, by examining mediation models, the thesis goes beyond the examination of direct associations, i.e., predictor-outcome relationships, that largely constitute the resilience literature within the higher education context. The thesis revealed the partial explanatory role of cognitive reappraisal which has significance for the design of CBT-based resilience-promoting interventions that target emotion regulation strategies. The thesis added further nuance to the causal relationships by exploring the role of gender and ethnicity on the underlying influences of cognitive reappraisal through moderated mediation models. While the longitudinal moderated mediation models did not find any differences in the causal sequence among different gender and ethnic backgrounds, the thesis provides preliminary insights into the potential influential role of socio-demographic characteristics of university students.

Finally, the thesis addressed the limitations of cross-sectional and correlational studies by adopting a two-phase study design. Additionally, advanced statistical modelling techniques were used to examine the validity of the measuring instruments and the model as a whole. The findings offer partial support for the prospective validity of the proposed causal relationships based on the longitudinal analyses of direct relationships, indirect effects, and moderated mediation effects.

The overall aim of the model was to identify key elements that are essential for the cultivation and maintenance of resilience in university students. The findings of the thesis encourage an integrative theorisation of a multidimensional conceptualisation of resilience to capture the complexity of the construct and the role of ecologically-based risk and protective factors to understand the different pathways to resilience in university students. The following sections provide a critical discussion of the major findings and highlight the implications of the findings for future research, practice, and higher education policy development. An overview of the strengths and limitations of the study is also provided. The discussion concludes by

considering the future directions for resilience research involving university students within the higher education context.

8.1 Perceived stress: A key predictor for psychological, social, and emotional resilience

The results of the thesis indicated that at the start of the academic year, a decrease in perceived stress was significantly associated with better mental well-being, higher levels of connectedness to the university, and more experiences of positive affect. Conversely, students with higher levels of perceived stress were more likely to experience psychological distress and negative affect. The longitudinal findings support the stability of these direct associations and indicated an increase in the experiences of negative affect across time. Notably, among the proposed predictors of resilience in the model, i.e., perceived social support from friends, family, and significant others, as well as dysfunctional parenting styles, perceived stress had direct associations with each of the outcomes of resilience across time.

These results are consistent with the wealth of empirical research on the role of poor perceptions of frequent and chronic stressors by students' on their mental well-being and resilience (e.g., Lee et al., 2018; Pangallo et al., 2015; Robbins et al., 2018). The results support the proposition that as stress levels increase, the experiences of positive emotions, such as happiness and joy, decrease (Heinen, Bullinger, & Kocalevent, 2017; Schiffrin & Nelson, 2010), as well as the students' sense of belongingness to the university environment (Armstrong & Oomen-Early, 2009; Lee et al., 2002). Greater levels of perceived stress have been found to increase loneliness and elevate symptoms of depression in university students (Lee et al., 2018). It is theorised that the perceptions of stress, potentially due to daily hassles and challenges within the higher education context, when seen as less overwhelming can make them appear to be manageable, leading to successful adaptation (García-León, Pérez-Mármol, Gonzalez-Pérez, García-Ríos, & Peralta-Ramírez, 2019). This supported by Lazarus & Folkman (1984), who propound that the evaluation of stress as harmful to the individual's well-being is a result of the appraisal of

resources within the individual and their environment. The students who perceive stressors as less threatening relies on resources such as an appraisal of the availability of social support and their ability to downregulate their emotional and cognitive responses, thereby leading to psychological, social, and/or emotional resilience.

The time at university is marked by transitional phases, such as the transition to and out of university, along with unique challenges related to finances, academia, and social interactions. Considering the exposure to sources of stress within the higher education context is inevitable, the findings suggest that resilience can exist in the face of stressors perceived to be threatening, and efforts to modulate and manage these stressors can enhance psychological, social, and emotional well-being (Lee et al., 2018).

8.1.1 The underlying role of cognitive reappraisal on the relationships between perceived stress and resilience

In addition to the direct associations between perceived stress and resilience, perceived stress was also associated with resilience (apart from negative affect) through the use of cognitive reappraisal. Specifically, the results indicate that the effects of perceived stress as reported at the start of the academic term on mental well-being, psychological distress, campus connectedness, and positive affect were partly due to the students' abilities to reappraise their emotional and cognitive responses to the stressors. These findings provide partial support for the empirical and theoretical propositions which posit the underlying role of cognitive reappraisal as a pathway to mental well-being and resilience in the face of stress (Kalisch et al., 2015; Richardson, 2002; Thomas & Zolkoski, 2020). Specifically, the downregulation of emotional responses to stressors can lead to the ability to the positive adaptation to stressors in a way that does not threaten the students' mental well-being (Banyard et al., 2017; Gross, 2015).

The longitudinal analyses illuminated the temporal nature of the relationship between the downregulation of stress perceptions and the connectedness to

the university reported at the end of the second term. The findings suggested that the use of cognitive reappraisal techniques to modulate the perceptions of stress did not influence the students' connectedness to the campus across time. While previous research has found negative correlations between connectedness and perceived stress in university students (e.g., Pidgeon et al., 2014; Whittaker, 2008), there has been little investigation into the underlying mechanisms of these relationships. This finding suggests that further research is required to understand the underpinning role of adaptive emotion regulation strategies, such as cognitive reappraisal, on perceived stress and their relation to campus connectedness. As such, the longitudinal analyses indicated that the proportion of underlying effects of cognitive reappraisal got larger over time in predicting mental well-being, psychological distress, and positive affect. Thus, the students' ability to downregulate the impact of perceived stress can alleviate the ill effects on psychological and emotional mental health and well-being (Extremera & Rey, 2015).

These results are consistent with the transactional model of stress (Lazarus & Folkman, 1984) and the theory of emotion regulation (Gross, 1998). Within these frameworks, adaptive or maladaptive outcomes are influenced on the individual's appraisal of the stressor as manageable or uncontrollable. This can influence outcomes (maladaptive or adaptive) through the elevation or suppression of their experiences of positive emotions in the face of adversity (Gross & John, 2003). Additionally, the perceptions of stressors in the environment can cultivate higher levels of resilience by introducing or replenishing protective resources and processes, rather than no experience of stress (Nechvatal & Lyons, 2013; Pereira et al., 2017; Richardson, 2002; Steinhardt & Dolbier, 2008). The findings of the thesis support the theoretical propositions by Gross & John (2003) which suggest that students who tend to use reappraisal strategies are more likely to be optimistic, or experience positive affect, and perceive their stress as less threatening (Andreotti et al., 2013; Brockman et al., 2017; McRae, Jacobs, Ray, John, & Gross, 2012; Reich, Zautra, & Hall, 2010; Troy & Mauss, 2011; Tugade & Fredrickson, 2007). In other words, perceiving stress as threatening can trigger a cognitive response which can elicit positive affect and decrease ill effects on mental well-being

(O'Hara, Armeli, Boynton, & Tennen, 2014). Additionally, the direct relationship between stress perceptions and negative affect was not explained by the reappraisal capacity of the students. This finding is consistent with the notion that individuals who appraise regularly are more likely to experience and display positive emotions than negative emotions (Gross & John, 2003).

The findings provide preliminary evidence for the role of an adaptive emotion regulation strategy as an underlying mechanism that promotes resilience, specifically psychological and emotional domains of resilience in university students. Additionally, they align with the evidence that suggests that resilience in the face of stress is possible, and the use of cognitive reappraisal can have significant implications on the adaptation to the stressor (Bonanno, 2004; Troy, Shallcross, Brunner, Friedman, & Jones, 2018). Regardless of the cause of the stressors, the results of the thesis suggest that successful management and adaptation to stress are important antecedents to resilience (Garcia-Dia, DiNapoli, Garcia-Ona, Jakubowski, & O'Flaherty, 2013; Kimhi & Eshel, 2015; Masten & Obradović, 2006; Onan et al., 2019; Windle, 2011). Considering the ability to successfully adapt to stressors can enhance resilience (Oken, Chamine, & Wakeland, 2015), these results reinforce the need for stress management interventions that focus on cultivating resilience in students within the higher education context (e.g., Dyrbye et al., 2017; Galante et al., 2018; Houpy et al., 2017; Steinhardt & Dolbier, 2008; Wald et al., 2016). Further investigation into the role of emotion regulation strategies is required to justify the design of cognitive-based resilience-promoting interventions. Finally, the findings endorse stress-reduction interventions which conceptualise and operationalise resilience as multidimensional, with domains salient to university students within the higher education context.

8.2 Perceived social support: The predictive role of friends and significant others on psychological, social, and emotional resilience

In the thesis, three specific sources of support, i.e., family, friends, and significant others, were examined as potential protective factors that contribute to the three domains of resilience (i.e., psychological, social, and emotional). Students who perceived higher levels of social support from friends had better mental well-being, a greater sense of connectedness with the university, more experiences of positive emotions, and lower levels of psychological distress and negative affect at the start of the academic year. This predictive influence of perceived social support from friends was most strongly related to connectedness to the campus and mental well-being. The role of perceived social support from friends on enhancing the sense of belongingness to the university was anticipated based on the existing literature that has emphasised the positive role of peer support networks (Anthoney, Stead, & Turney, 2017; Lashari, Kaur, & Awang-Hashim, 2018; Pidgeon et al., 2014; Pittman & Richmond, 2008). Furthermore, the positive influences of perceived social support from friends has been found on mental well-being (e.g., Friedlander et al., 2007; Hall et al., 2020; Hefner & Eisenberg, 2009; Laidlaw et al., 2016), adjustment to the university (e.g., London, Rosenthal, Levy, & Lobel, 2011; Macaskill & Denovan, 2013; Pidgeon et al., 2014), and reduced levels of psychological distress and negative affect (e.g., Gebre & Taylor, 2017; Khodarahimi, Hashim, & Mohd-Zaharim, 2012; Stallman et al., 2017; Zhang et al., 2018). Overall, these direct associations support the protective role of perceived social support from friends for the development of psychological, social, and emotional resilience in university students in the face of frequent and chronic stressors (Sippel et al., 2015).

Interestingly, the longitudinal analysis revealed that perceptions of social support from friends were directly associated with only mental well-being and campus connectedness, with the predictive capacity on these outcomes of resilience reducing over time. These are notable findings considering that the

existing research posits that university students continue to develop friendship networks during their time at university which positively impacts their resilience and adjustment to university (Catling et al., 2013; Donohoe et al., 2020; Holdsworth et al., 2018; Lashari et al., 2018). The reduction in the predictive capacity of perceived social support from friends on mental well-being and campus connectedness is of concern. Although the reasons for this could not be established in the thesis, the findings signify the need for cultivating long-lasting peer networks that support students' well-being and adjustment to the university. The urgency of this need is supported by the findings of the preliminary analyses which indicated a significant reduction of perceived social support from friends over time.

Higher levels of perceived social support from significant others predicted higher levels of mental well-being and positive affect, and lower levels of psychological distress. These relationships got stronger across time suggesting that having a significant person/people, such as personal tutors, professors, professional advisors, a romantic partner, hall managers, so on, can be a key source of perceived support to cultivate psychological resilience and increased experiences of positive affect (Clauss-Ehlers & Wibrowski, 2007; Clifton, Perry, Stubbs, & Roberts, 2008; Freeman et al., 2007; Wilcox, Winn, & Marylynn, 2005). It is interesting to note that perceived support from significant others appears to have a stronger effect on mental well-being, than from friends. Perhaps, the reduction of perceived support from friends has led to the emergence of long-lasting support from other sources, including a romantic partner. Therefore, the significance of support networks beyond friendships within the context of higher education is worth considering as predictors of resilience for university students.

A notable finding of the thesis is the lack of a direct association between perceived social support from family and resilience. There have been mixed reports on the role of perceived social support from family on resilience and mental health outcomes. For example, a longitudinal study by Taylor et al. (2014) found associations between ego-resiliency and higher levels of perceived social support from family across time, suggesting that resilient university students perceive their family members to be important resources

for support. Similar importance of perceived social support from family on life satisfaction, adjustment to university, and academic performance have been reported in several other studies (e.g., Crombie et al., 2013; Guan & Fuligni, 2016; Hall et al., 2017; Lau et al., 2018; Rodríguez, Tinajero, & Páramo, 2017; Schnettler et al., 2017).

Conversely, several other studies involving university students have found that perceived social support from friends was a more consistent predictor or moderator of stress-resilience relationships, psychological distress, and positive adjustment to university than perceived support from family (e.g., Friedlander et al., 2007; Narayanan & Onn, 2016; Rodriguez, Mira, Myers, Morris, & Cardoza, 2003; Wilks, 2008). It is possible that for university students the need for autonomy marks a shift from their need to depend on their parents to cope with university life (Arnett, 2000; Aquilino 2006; Lindell 2017; Padilla-Walker 2012). The university provides opportunities for a range of support network that is possibly more valuable than their dependence on their families (Narayanan & Onn, 2016). Friends and other significant people within the context of the university are more likely to be able to understand the challenges associated with university life and be of immediate assistance and support than family members (Rodriguez et al., 2003). The lack of support for the predictive role of family support on resilience emphasises upon the dynamic nature of family systems across the lifespan (Lindell & Campione-Barr, 2017).

The differences in the protective role of perceived social support on different domains of resilience revealed in this thesis are in line with a study by Lee et al. (2018). The researchers demonstrated the variations in the influences of different sources of support on different aspects of well-being in university students. For example, they found that family support impacted the associations between perceived stress and physical health, while support from friends and romantic partners impacted the associations between perceived stress and loneliness. Therefore, the findings of this thesis support the need for examining the relational contexts of social support in emerging adults (Lee & Goldstein, 2016; Lindell & Campione-Barr, 2017).

8.2.1 The underlying role of cognitive reappraisal on the relationships between perceived social support and resilience

In addition to the direct associations between perceived social support from friends and resilience, perceived social support from friends was also associated with mental well-being, psychological distress, and positive emotions via cognitive reappraisal. However, across time, the effect of perceived social support from friends was conveyed via cognitive reappraisal only to mental well-being. In other words, higher levels of perceived social support from friends enhanced the students' mental well-being, only partly due to their ability to regulate their emotional and cognitive responses when faced with stressors. Considering the magnitude of the predictive effect of the direct associations was stronger, the finding suggests that perceived social support can directly promote mental well-being without depending on the use of cognitive reappraisal as an emotion regulation strategy.

The findings of the partial mediation role of cognitive reappraisal in the perception of social support from friends to mental well-being support the emerging investigation into interpersonal theories of emotions. These explore the role of social sharing with other and regulation of emotions as a way of coping with and dampening the effects of stress across different populations (Cutrona & Russell, 2017; Reeck, Ames, & Ochsner, 2016; Zaki & Craig Williams, 2013; Zhou, Wu, & Zhen, 2017). Gross and John (2003) report that individuals who engage in cognitive reappraisal feel more supported socially, are more likely to share their positive and negative emotions with others and have better interpersonal relationships (Cutuli, 2014). In adolescents, social support has been found to predict post-traumatic growth and subjective well-being through cognitive reappraisal (Feeney & Collins, 2014; Li et al., 2020; Zhou et al., 2017). Such causal relationships have not been studied extensively in university student populations. However, recently a study by d'Arbeloff et al. (2018) found that university students with higher perceived social support use cognitive reappraisal to attenuate future symptoms of anxiety and depression.

In support of the existing literature, the findings of the thesis provide partial support for the role of perceived social support in utilising adaptive emotion regulation strategies to enhance mental well-being. It is possible that students appraise their friendship networks as supportive and understanding, and feel equipped to adjust their emotional and cognitive states to cope with stressful circumstances (Appleton, Buka, Loucks, Gilman, & Kubzansky, 2013). These findings explain why in the presence of adverse events or stressors, the social support networks from friends get activated and influence emotion regulation which can lead to adaptive outcomes, such as psychological and emotional well-being (Basson & Rothmann, 2018; Haga et al., 2009; McRae, Jacobs, et al., 2012).

In this thesis, the role of social support from friends was found to be more influential than the underlying role of cognitive reappraisal. This means that the reasons how and why support from friends influence psychological, social, and emotional resilience cannot be determined by this study and the model may need to account for other factors that may underlie these relationships. Nonetheless, based on the results of the thesis, the predictive influence of perceived social support from friends suggests that enhancing opportunities to develop long-lasting and supportive friendships may be beneficial for social integration and positive well-being at university.

To conclude, the transition to university for most students involves residing separately from their families and learning to develop relationships with peers in catered or self-catered accommodations as well as in academic and social settings. The findings of the thesis reflect the changes in interpersonal relationships in emerging adults while at university (Arnett, 2014, 2015), and amplify the dynamic nature of the protective role of perceived social support (Rodriguez et al., 2003). Stable and meaningful sources of support and guidance from friends and other significant people at university can be instrumental in enhancing psychological and social functioning of university students, even those with dysfunctional family backgrounds (Sharp et al., 2017; Watt, Kim, Ceballos, & Norton, 2020; Yoon et al., 2019). Furthermore, emotion regulation strategies, cognitive reappraisal, and social support have been targeted in resilience-promoting interventions (Akeman et al., 2019;

Kwon et al., 2019; Nevin Onan, Karaca, & Barlas, 2019; Stephens & Gunther, 2016), and the findings of the thesis provide partial support towards the dynamic relationships between emotion regulation and social support (Berking, Wirtz, Svaldi, & Hofmann, 2014; Lindsey, 2020).

8.3 Dysfunctional parenting styles: The significant risk of maternal dysfunctional parenting styles on psychological, social, and emotional resilience

In the thesis, university students reported very few experiences of dysfunctional parenting styles, such as abuse, indifference, and over-control, by a mother/female caregiver and a father/male caregiver. Notably, experiences of dysfunctional parenting styles by a mother/female caregiver were significantly associated with poor psychological resilience (i.e., mental well-being and psychological distress), social resilience (i.e., campus connectedness), and more experiences of negative affect at university. Across time, such experiences of dysfunctional parenting by a mother/female caregiver were more strongly related to poor campus connectedness and experiences of negative affect.

Despite the sparse evidence on the relationships between dysfunctional family backgrounds and resilience of university students, the findings of the thesis support the theoretical propositions of the additive and cascading influences of early family-based risk factors on poor mental health outcomes throughout the lifespan (Brogden & Gregory, 2019; Gonçalves et al., 2017; Kessler et al., 2010; Masten, 2014b). For university students with dysfunctional family backgrounds, the cascading impact of exposure to early experiences of family-based risk along with the unique stressors related to the university can lead to a range of psychological and interpersonal problems in adulthood (Bethell, Newacheck, Hawes, & Halfon, 2014; Karatekin & Ahluwalia, 2020; Wright et al., 2013; Young, Lennie, & Minnis, 2011).

The findings of this thesis are consistent with studies that have found the associations of adverse parenting styles with poor mental health outcomes and

adjustment to university (e.g., Aquilino, 2006; Galambos, Barker, & Krahn, 2006; Karatekin & Ahluwalia, 2020; Rubin & Kelly, 2015; Singh, Manjula, & Philip, 2012; Toda, Kawai, Takeo, Rokutan, & Morimoto, 2008; Tran et al., 2015). For example, high conflict family backgrounds are associated with a heightened risk of depression and poor resilience in university students (Valdez et al., 2013; Yu et al., 2015), often obtaining no family support to cope with the challenges associated with the university (Sagrestano, Paikoff, Holmbeck, & Fendrich, 2003; Yu et al., 2015). Students growing up in family backgrounds which emphasised upon homogeneity have lowered levels of resilience and greater academic, social, and financial concerns while at university (Hall et al., 2020). Additionally, students with poor parent-child relationships and attachment can develop unhealthy interpersonal skills, such as mistrust and lack of autonomy, that can impact their psychological and social resilience (Suveg, Jacob, & Payne, 2010; Yu, Liu, Song, Fan, & Zhang, 2019). Negative parenting practices possibly influence the interactions among the family members and the overall functioning of the family, which can lead to poor psychosocial outcomes (Kim, 2013).

Interestingly, the findings of the thesis reveal that experiences of dysfunctional parenting styles from a mother/female guardian were a risk factor for poor resilience during university, while experiences of paternal dysfunctional parenting styles were not. While some studies report that perceived adverse parenting by father/male guardian has been found to be a risk factor for mental health outcomes in university students (Martin et al., 2016; Sedighimornani, Rimes, & Verplanken, 2020), others exclusively indicate the ill effects of poor maternal parenting styles on students (Bethell et al., 2014; Chen et al., 2018; Körük et al., 2016; Silva et al., 2007). But there is support for the risk posed by both maternal and paternal parenting styles and relationships on students (Hwang & Jung, 2020; Love, May, Cui, & Fincham, 2020; Yang, Zhu, Chen, Song, & Wang, 2016).

Based on the findings of the thesis, it is possible that mothers are primary caregivers and therefore continue to exert influence and control over the students even at university (Hwang & Jung, 2020; Körük et al., 2016; Silva et al., 2007). Such an over-controlling parenting style by mothers can encroach

on the students' need to develop autonomy and competence at university (Turner, Faulk, & Garner, 2020), and these students are likely to be more anxious (Parvez & Irshad, 2013). The relational differences could be due to the differences in early socialisation of emotions by parents and gendered parenting practices; for example, mothers have been found to socialise negative emotions in children more than fathers (Garside & Klimes-Dougan, 2002; Hwang & Jung, 2020). Additionally, the need for closeness and desire for identity in university students has been found to be associated with relationships with the mother (Tamura, 2019), suggesting that dysfunctions in the mother-child relationship, such as indifferent parenting, can impact the psycho-social development of emerging adults later in life.

Further exploration into the differences between maternal and paternal relationships and clarification on how this impacts university students' resilience was outside of the scope of this thesis. Despite this, the results of this thesis are consistent with studies that emphasise family dysfunction as a strong developmental risk factor for perceiving current life situations as more distressing (Afifi & MacMillan, 2011; Hyman, Paliwal, & Sinha, 2008; Kessler et al., 2010). These findings emphasise the need for positive parent-child relationships and family functioning for the development of later resilience (Archdall & Kilderry, 2016).

8.3.1 The underlying role of cognitive reappraisal on the relationships between dysfunctional parenting styles and resilience

The findings of the thesis suggest that cognitive reappraisal does not play a role in explaining how students' past experiences of dysfunctional parenting styles influence psychological, social, and emotional domains of resilience. Additionally, there was a lack of association between maternal and paternal dysfunctional parenting styles with cognitive reappraisal. Based on these results, it is not possible to support the theoretical propositions that growing up in dysfunctional family environments with poor quality of caregiving may lead to emotional dysregulations and an increased reliance on negative appraisals than adaptive emotion regulation strategies (e.g., Banyard et al.,

2017; Bowlby, 1982; Cicchetti & Toth, 2005; Karreman & Vingerhoets, 2012; New et al., 2009; Poole, Dobson, & Pusch, 2017).

The results do not align with the findings of the systematic review by Fritz et al. (2018), wherein the empirical evidence supported the role of cognitive reappraisal as an individual-level resilience factor that mediates and/or moderates the relationships between childhood adverse events and mental health in young people. It has been reported that growing up in over-controlling family backgrounds leads to a suppression of the display and experience of emotions and thoughts (Spasojević & Alloy, 2002). It is possible that students with such experiences develop maladaptive emotion regulation strategies, such as suppression or rumination (Fischer, Forthun, Pidcock, & Dowd, 2007; Frederickson et al., 2018), which have not been examined in this thesis. Alternatively, while regulatory strategies are impacted by early interactions with caregivers (Moutsiana et al., 2014), the ability to develop adaptive emotion regulation strategies can improve over time (Charles & Carstensen, 2014; Christou-Champi, Farrow, & Webb, 2015). It is possible that over time, these students have improved their ability to modulate their cognitive and emotional responses to adverse experiences by using other emotion regulation strategies. However, further investigation into such causal relationships was out of the scope of this thesis.

There is evidence that supports the promotion of emotion regulation skills such as cognitive reappraisal, suppression, and mindfulness to boost resilience and well-being in adults with experiences of adversity in their childhood (Cameron, Carroll, & Hamilton, 2018). However, the findings of this thesis suggest that for the university students' population, there is still a need to examine the underlying role of emotion regulation strategies, such as cognitive reappraisal, on the relationships between adverse experiences and resilience for their application in interventions (Karatekin & Ahluwalia, 2020).

8.4 The moderating influences of gender and ethnicity of the underlying role of cognitive reappraisal

8.4.1 Gender

The findings of this thesis revealed no differences between gender identities (specifically, male and female students) on the underlying mechanism of cognitive reappraisal on the pathways to resilience. The lack of significant differences between male and female undergraduate students in the use of cognitive reappraisal as a mechanism to cultivate resilience is in line with previous studies (Brockman et al., 2017; Gentzler, Kerns, & Keener, 2010). It could be that larger and more comparable sample sizes across gender groups might be required for statistically significant differences due to gender. Nevertheless, there are preliminary indications for differences in gender groups that can be discussed and should be investigated further.

In the thesis, female students' perceptions of stress and social support from friends impacted their levels of psychological distress and positive affect partly through the use of cognitive reappraisal. This contradicts the preliminary evidence reported in a study involving adult non-clinical population in which men with higher levels of perceived stress upregulated their emotions to achieve higher levels of happiness and lower levels of depression as compared to women (Extremera & Rey, 2015). These contradictory findings are aligned with the mixed literature on gender-differences in emotion regulation research. Some studies have found gender differences in the use of cognitive reappraisal and adaptive emotion regulation strategies (e.g., Duarte, Matos, & Marques, 2015; Rueth, Otterpohl, & Wild, 2017). For example, in agreement with the preliminary indications of the results of this thesis, women with higher levels of perceived stress tend to use positive appraisals to regulate their emotional and cognitive responses to stress more often than men (Tamres et al., 2002), leading to more experiences of positive and negative emotions than men (Gohm, 2003).

Alternatively, no such gender differences have been found in the use and effects of cognitive reappraisal (Gross & John, 2003; Gross et al., 2006). Instead, some theorists have suggested that women are more likely to use maladaptive and internally-focused emotion regulation strategies such as rumination, wishful thinking, and problem-focused disengagement (Duarte et al., 2015; Nolen-Hoeksema, 2012). In turn, men may be more active in their problem solving and therefore, are more likely to use reappraisal strategies (Aldao et al., 2010; Nolen-Hoeksema, 2012; Tamres et al., 2002).

Overall, the findings of this thesis underline the need for further research into gender-specific emotion regulation strategies, as underpinning mechanisms, which account for interpersonal contexts and social functioning that can lead to different emotional and psychological outcomes (Salguero, Extremera, Cabello, & Fernández-Berrocal, 2015). Studies suggest that the differences in the choice of emotion regulation strategies by males and females may be influenced by social experiences and gender-specific relationships with emotions. For example, male adolescents were found to use distraction by engaging with a social partner as a strategy for coping with negative affect (Stone 2019). The role of social support on emotional dysregulation is reportedly stronger for female university students than male students (Mo et al., 2018). Considering that in this thesis, and as previously reported, female students report higher levels of social support than male students (Stoliker & Lafreniere, 2015), meaningful engagement by female students with friendship networks can be associated with the increased use of upregulation of emotions (Nolen-Hoeksema, 2012). Such findings suggest that interventions that target emotion regulation for resilience promotion may not have a uniform effect across genders. Male students might benefit from activities with support networks that distract them from the stressors, while female students may benefit from activities that provide them with the opportunities to express and dwell on their emotions to cultivate psychological and emotional resilience (Nolen-Hoeksema, 2012).

8.4.2 Ethnicity

In the thesis, the different ethnic backgrounds of the university students did not influence the underpinning role of cognitive reappraisal on the pathways to resilience. As with gender-differences, it is possible that larger and more diverse samples might be required for statistically significant differences due to the ethnicity of the students on the pathways to resilience. However, the thesis provides preliminary insight that suggests that the students of non-White/White British ethnic backgrounds with higher levels of perceived social support from friends and family utilise cognitive reappraisal as a strategy to modulate their emotions and cognitions, leading to positive well-being, higher levels of campus connectedness and experiences of positive affect. Considering this was not found for White/White British participants in this thesis, it is worth discussing the possible differences due to ethnicity on the use of emotion regulation.

The differences due to culture or the moderating role of ethnicity on emotions and emotion regulation strategies are mixed, and the importance of cultural values has led to ongoing investigations in emotion regulation research (Cheung & Park, Irene, 2010; Gross, 2015). Ethnic differences and the moderating role of ethnicity have been found on reappraisal and psychological health and adjustment (Juang et al., 2016; Kwon et al., 2013; Soto, Perez, Kim, Lee, & Minnick, 2011; Tweed, White, & Lehman, 2004; Yeh & Inose, 2003). Conversely, differences due to ethnicity on reappraisal have not been found in studies involving East Asian and Western cultures (English & John, 2013; Matsumoto et al., 2008; Nozaki, 2018; Soto et al., 2011). As discussed in the literature review (Chapter 5), values related to social relationships and emotions in different ethnic backgrounds are critical to understanding emotion regulation (Arens et al., 2013; Matsumoto et al., 2008).

While the sample sizes across ethnic groups differed in this thesis, Asian/Asian British students constituted the majority of the students of other ethnic backgrounds. Based on previous literature, specific cultures (e.g., Asian or Latinx contexts) may discourage the use of specific emotion regulation

strategies based on cultural norms that impact the display and experience of emotions (Butler et al., 2007). For example, Asian Americans are more likely to use rumination and suppression as an emotion regulation strategy than European Americans (Chang, Tsai, & Sanna, 2010; Kwon et al., 2013). Importantly, suppression of emotions by individuals of Asian ethnic backgrounds does not negatively affect depression, anxiety, and psychological distress (Chang et al., 2010; Soto et al., 2011; Tsai & Lau, 2013; Tsai, Nguyen, Weiss, Ngo, & Lau, 2017), suggesting that these might be considered as adaptive strategies for certain ethnic groups. It is possible that the participants of other ethnic backgrounds in this thesis are from collectivistic cultures. This can explain why perceived social support from family and friends influenced their use of cognitive reappraisal to cultivate resilience (Arens et al., 2013).

However, despite insufficient evidence to support the moderation of ethnic differences on cognitive reappraisal across time, the findings of the thesis emphasise the investigation of ethnic differences on resilience in association with emotion regulation strategies (Fung et al., 2019). The disentanglement of potential ethnic differences can enhance the sensitivity of resilience-promoting interventions for university students, particularly in universities with large cultural diversity, such as UoN.

8.5 Strengths and limitations

8.5.1 Strengths

The thesis has several notable strengths. The development of the model was rooted in distinct theoretical frameworks that have informed resilience research and adapted the recommended ecological approach to the context of higher education. The pathways proposed in the model were operationalised based on the empirical evidence supported by a range of systematic and scoping reviews within the higher education-based resilience literature. By integrating theory with empirical evidence, to the best of the author's knowledge, this is the first study to simultaneously test the predictive role of risk and protective factors of resilience from within the individual (i.e.,

perceived stress), the social context (i.e., perceived social support from different sources), and the family context (i.e., dysfunctional parenting styles). Family-based risk factors have largely been left out in resilience models for university students. The incorporation of such ecologically-based risk and protective factors emphasised on the transactional nature of protective factors and processes that decentralises the largely individual-focused resilience literature within the higher education context.

A key contribution of the model is its examination of how and under which circumstances, (i.e., the underpinning mechanism of cognitive reappraisal) university students develop resilience. The moderating role of gender and ethnicity was considered vital to explicate the difference in how cognitive reappraisal underpins the pathways to the multidimensional construct of resilience. This is potentially the first study involving university students in the UK to explore these moderated mediation effects on a comprehensive socio-ecological model of resilience. The examination of gender- and ethnic-differences highlighted the complex, interpersonal, and dynamic nature of the factors that influence resilience. The findings provide a step forward towards socio-ecological models of resilience that aim to contextualise emotion regulation strategies and key differences in the pathways to resilience due to the sociodemographic characteristics of university students.

The multidimensional conceptualisation of resilience, and subsequently its operationalisation, is a significant strength as it captures a range of positive and negative indicators of psycho-social and emotional adjustment by university students in the face of stressors. Considering the limitations of the existing measures of resilience, the use of key measures for psychological, social, and emotional mental health and well-being captured the complex nature of resilience. The use of such measures enhances the replicability of the proposed conceptual model in university student populations. Further support and research on such a conceptualisation of resilience can inform the development of a context-specific multidimensional measure of resilience for university students that account for the transactional relationships between protective factors and resilience-promoting processes.

Another key strength of the thesis is the use of a two-phase design. Much of the resilience research within the higher education context is limited by their cross-sectional nature which precludes the investigation of the stability of the relationships and produces biased estimates of mediation effects. The utilisation of a prospective two-phase design allowed for the examination of mediation effects which provided insight on the partial mediation role of cognitive reappraisal to the proposed pathways to resilience. Additionally, the use of advanced statistical modelling techniques, i.e., SEM, is a significant strength of the study as it made possible the simultaneous examination of multiple pathways to resilience and the validity of the model as a whole. Multiple complex associations, including direct, mediation, and moderated mediation effects were examined using advanced statistical software.

8.5.2 Limitations

Despite the significant strengths of the study, there are several limitations which should be considered. The response rate was small, and an attrition bias was detected. The final sample of the study was biased in terms of gender and ethnicity, i.e., majority of the respondents were female students and of White/White British ethnic background. 0.82% participants in this thesis self-identified as genders beyond male and female. Such a low uptake is aligned with studies that target the entire population of university students (e.g., Jones et al., 2018; Vaccaro et al., 2019; Xiao et al., 2017). While the intention of the thesis was to represent gender minority students, there was not a large enough sample size to examine the hypothesised pathways to resilience for these groups of students. The small sample sizes between the different ethnic and gender identity groups may have impeded the evaluation of the hypothesised pathways to resilience between the different groups of students. Therefore, the generalisability of the results is limited to a sample that is consistent with the cultural and geographic representation of the study sample, as well as the sample size, the non-normality of the distribution, the specification of the models, and the characteristics of the responses (DiStefano, 2002). This is important considering resilience is a context- and population-specific construct, and in its present form, the conceptual model is

restricted to a higher education setting in the Western (i.e., specifically the UK) context.

For data collection in the thesis, self-report data were obtained from measures that were reported to have strong psychometric properties in the extant literature. In this thesis, these measures were examined using CFA to evaluate their factorial validity and longitudinal measurement invariance. For most of the measures used, items were trimmed, or error terms were correlated to improve model fit, wherever theoretically justifiable. Even though the model modification was made based on best practice guidelines, the replicability of the findings of the path models is impacted by these modifications. The validity and replicability of the model of resilience should be interpreted based on this limitation.

Furthermore, it is possible that self-report tools do not accurately capture the underlying processes of interest (Haefel & Howard, 2010). The measure used to capture the family-based risk factor, Measure of Parenting Style (Parker et al., 1997) does not capture the frequency, severity, and duration of the dysfunctional parenting styles which can significantly impact the resilience outcomes. The low variability in scores for this measure, as found in this thesis, suggests that it is more suitable for clinical populations and future studies should reconsider this measure to assess family risk in a non-clinical population such as university students. Similarly, it is possible that the measure of the perceived social support (Zimet et al., 1988) used does not reflect all aspects of social support that is relevant to university students. Future studies could consider examining enacted and tangible support due to their relationship with emotions and mental health (Lakey, Orehek, Hain, & VanVleet, 2010; Reeve & Maslach, 2001), as well as other sources of support, such as from online communities (Cole, Nick, Zelkowitz, Roeder, & Spinelli, 2017; Deandrea, Ellison, Larose, Steinfield, & Fiore, 2012; Zhang, 2017).

Keeping in mind the survey length and sample size required for analysing models with several variables, it was not possible to examine multiple indicators of resilience, such as different kinds of emotion regulation strategies, multiple types of adverse events, and so on. The study cannot

conclude whether these associations are influenced by factors that have not been accounted for by the proposed model of resilience. Additionally, the thesis does not measure the nature and levels of adversity at each time-point. Further types of study designs, such as experimental and person-centred approaches, and the inclusion of culturally-sensitive and comprehensive measures can address these limitations.

While a strength of the study is its longitudinal nature, a two-phase design is limited in its capacity to make claims about causal inferences as well as predicted inferences as to how the relationships will change over time. For example, it is not possible to infer from the current data whether students will use cognitive reappraisal at a later time-point, which will strengthen its significance as an underlying mechanism for the pathways to resilience. Additionally, while there is no theoretical or empirical information available to judge an optimal lag between phases of the study (De Lange, Taris, Kompier, Houtman, & Bongers, 2003), it is possible that a 5-month lag is not enough to detect a significant change and make causal inferences. A lagged study requires a large sample size for the numerical precision of analyses (Ford et al., 2014). **Finally, as discussed in the results chapter of this thesis, the desired matched sample size was not obtained, and results, particularly for multiple group analyses, should be interpreted with caution.** For these reasons, future studies should consider multiple-wave longitudinal design studies with different time lags and large sample sizes to make such causal inferences for mediation processes (Cole & Maxwell, 2003; Ford et al., 2014).

8.6 Implications & future directions

The findings discussed in this thesis have significant implications for future resilience research and the development of sensitive resilience-promoting interventions and higher education policies. The multiple objectives of this thesis addressed several gaps in resilience research involving university students within the higher education context. The conceptual model confirms that there are dynamic and complex interactions that influence resilience and that it is composed of several malleable and amenable factors that can be

targeted by interventions to promote resilience. While the generalisability of the results is limited to the reasons discussed in the previous section, the model proposed and examined in this thesis provides a blueprint for future ecologically-based resilience research in university student populations.

8.6.1 Implications for research

Significant advances are being made to identify risk and protective factors that predict resilience and positive adjustment in university students (Brewer et al., 2019; Edwards, Jones, Mitchell, Hagler, & Roberts, 2016; Edwards et al., 2016; Holdsworth et al., 2018). However, protective factors have often been examined one at a time (Banyard et al., 2017) and without exploring the underpinning processes and potential variations due to socio-demographic characteristics. The thesis addresses these limitations, and the findings highlight the role of four risk and protective factors that contribute to the outcomes of resilience in university students, i.e., perceived stress, perceived social support from friends and significant others, and maternal dysfunctional parenting styles. However, the thesis does not investigate the frequency, type, and intensity of the stressors across the time-points to conclusively provide evidence for positive adaptation to these stressors. Instead, future studies could consider methods such as ecological momentary assessments and interviews to assess in-the-moment experiences of cognitions, emotions, and behaviours (Colombo et al., 2020; Silk, 2019).

While in this thesis, the protective role of perceived social support from various sources was examined, future research could explore the role of online communities as a source of support. For example, undergraduate students have been found to rely on online social support to offset poor in-person relationships (Cole et al., 2017), and individuals reporting higher levels of stress are more likely to gain support from online communities through social networking sites (Utz & Breuer, 2017). Further research with multiple time-points will be able to examine the dynamic nature of such sources of social support as a protective factor as students acclimatise to the university setting. Additionally, the thesis did not specify who constituted as “significant people”

and assumed that these are support networks beyond friends and family within the higher education context. It is possible that significant people can be university staff members, and future research can investigate their role in the promotion of mental health and resilience of students. Therefore, future studies can examine the differences in the perceptions of social support by including and specifying the multiple sources of support available within the higher education context.

The findings of the thesis revealed partial mediation effects of cognitive reappraisal in the hypothesised pathways of resilience, specifically from perceived stress and perceived social support from friends in the overall sample. Cognitive reappraisal strategies are being recognised as dynamic, subjective, context-specific constructs that are influenced by neurobiology, family upbringing, and cultural values among others (Colombo et al., 2020; Dixon-Gordon et al., 2015; Harrington et al., 2020; Lindsey, 2020; McRae & Gross, 2020; Silk, 2019). Additionally, cognitive reappraisal has been categorised into 8 different categories with different effects to an emotional stimulus (see McRae, Ciesielski, & Gross, 2012). The thesis does not examine these categories of cognitive reappraisal as well as the underpinning role of other emotion regulation strategies that may promote resilience in university students. It is possible that university students choose different appraisal styles based on the situation and the type of stressors (Milyavsky et al., 2018) or based on their cultural background and family environment (Kalisch et al., 2015; Mauss, Butler, Roberts, & Chu, 2010). Future research from multiple time-points and data sources will benefit from understanding what, when, and why university students choose to engage with a specific emotion regulation strategy to cultivate resilience.

Further nuanced investigation with larger and more diverse samples is required to validate the pathways proposed in the model across gender and ethnic groups. The findings of the thesis are specific to the obtained sample wherein most of the participants were female and of White/White British ethnic backgrounds. Consequently, these results may not generalise to more diverse student populations. There is increasing evidence on gender- and ethnic- differences across the constructs proposed in the model which can

influence the pathways to resilience. For example, a study by Lau et al. (2018) found the role of family and peer support with adjustment to university to be significant in a sample of Chinese undergraduate students. Similarly, a recent study by Arias-De la Torre et al. (2019) found that levels of psychological distress in Spanish undergraduate students increased as the levels of perceived support from family decreased. Such findings could be explained to stem from cultural elements, for example, the importance of family relations for students from collectivistic cultural backgrounds.

Additionally, the changing socio-cultural landscape and intersectionality need to be recognised and reflected in future resilience research involving university students, by actively recruiting students identifying with genders other than male and female, as well as diverse ethnic backgrounds. The psychological climate of the university can significantly impact the academic and social integration of sexual or gender minority students (Woodford & Kulick, 2014), with poor experiences at university leading transgendered students to drop out of their course (Formby, 2017; National Union of Students, 2014). Therefore, researchers are encouraged to account for the diversity in the student population in future research. This could be done by developing a more targeted recruitment strategies, such as contacting relevant student representatives and LGBTQ+ and international students' societies within the universities to encourage participation from the diverse groups of students.

Furthermore, the author acknowledges that future research should account for the potential moderating role of socio-economic background of university students on socio-ecological models of resilience. Particularly because socio-economic factors have been found to predict the risk of poor mental health of university students (Ibrahim et al., 2013; Nath, Paris, Thombs, & Kirmayer, 2012) and a moderator for effective emotion regulation (Troy et al., 2017). Family affluence and high socio-economic status has been found to protect against childhood adverse experiences (Wiehn et al., 2018). However, such research should be mindful of the global nature of the higher education student population as well as the need for a robust measure of socio-economic factors (Galobardes, Lynch, & Smith, 2007; Psaki et al., 2014; Shavers, 2007).

Finally, the thesis is limited to a two-phase study design and future multi-wave longitudinal designs using multi-level modelling techniques can delineate further important information regarding the dynamic nature of the pathways to resilience as proposed in this thesis. For instance, multi-wave longitudinal studies can examine the reciprocal and self-reinforcing relationships between the constructs. An example of that is that future research can provide insight into whether positive emotions bolster the ability of students to perceive stressors as less threatening, thereby influencing their ability to downregulate their negative emotional responses effectively. So, the temporal and reciprocal nature of the relationships proposed in the model needs further investigation.

8.6.2 Implications for practice and higher education policy

For practice:

The findings discussed in this thesis support the notion that there are factors beyond the individual that contribute to resilience. Consequently, interventions that promote resilience should account for external factors, such as social support and family relationships, along with self-regulation skills and self-care resources (Southwick & Charney, 2012). As previously discussed in Chapter 2, the model proposed and examined in this thesis can be adapted in the design of risk-focused, asset-focused, and/or process-focused resilience-based interventions (Masten, 2001). In the extant literature, resilience promotion in university students is often limited to the reduction of poor mental health. However, as supported by this thesis, resilience is not just the absence of ill health (Almedom & Glandon, 2007), and higher education programmes and policies should support the experience of stressors as non-pathological and non-stigmatising, and facilitate culturally appropriate and inclusive mental health-promoting competencies and opportunities among university students.

As discussed previously, the results reinforce the need for stress management interventions that focus on resilience in university students within the higher education context (e.g., Dyrbye et al., 2017; Galante et al., 2018; Houpy et al.,

2017; Soderstrom, Dolbier, Leiferman, & Steinhardt, 2000; Wald et al., 2016). Evidence in the literature which suggests that social support, positive emotions, and related psychosocial competencies can be targeted by interventions (e.g., Byrom, 2018; Dolbier et al., 2010; Mattanah et al., 2010; Philippe et al., 2018) amplifies the relevance of the results discussed in this thesis. Furthermore, universities should recognise the long-lasting impact of childhood adversities and the mental health services in the universities should be equipped to address the experiences of family-based risk factors, such as family dysfunctions, in a culturally competent manner (Robbins et al., 2018; Valdez et al., 2013).

While emotion regulation strategies, such as cognitive reappraisal, have been targeted in resilience-promoting interventions (e.g., Akeman et al., 2019; Chandler, Roberts, & Chiodo, 2015), the partial support for cognitive reappraisal as discussed in this thesis indicate the need for further empirical research on its benefits. Considering adults are reported to use cognitive reappraisal in their daily lives (Ford et al., 2017), it is possible that becoming aware of the benefits of cognitive reappraisal can enhance the perceived sense of manageability and self-regulation, thereby encouraging greater agency in university students to adapt to stressors. Additionally, the thesis has discussed some early indications of variations of ethnicity and gender on emotion regulation strategies which should be considered to counter the “one-size-fits-all” approach of cognitively-oriented resilience-promoting interventions.

Along with the levels of perceived stress, perceptions of social support from friends and significant people contributed to the resilience of students. Students have been found to develop and maintain a range of social groups that support each other in different ways (Park, 2018). The findings of the thesis suggest that supportive networks with university staff members and peers should be fostered.

- Support from university staff: University staff are in a unique position to be able to monitor the levels of distress in students and support their academic progression (Kalkbrenner, Jolley, & Hays, 2019; Zerquera, Ziskin, & Torres, 2018). However, there is a fear of being

evaluated and judged by members of the faculty (Tompkins, Brecht, Tucker, Neander, & Swift, 2016). Departments should consider appointing (and appropriately training) a member of staff who can support the academic progression as well as the pastoral aspects of the students' lives while at university. Even if the role involves signposting to appropriate welfare resources (Kalkbrenner et al., 2019), having an academic member of staff validate the students' experiences at university can be a significant protective factor.

- Peer-support: Students who provide each other academic support have been found to eventually develop close personal relationships (Zander, Brouwer, Jansen, Crayen, & Hannover, 2018). This suggests that creating more opportunities for group academic work along with social networks can benefit students, especially those from minority communities (Mishra, 2020). Student-led peer support programmes can also be a structured way of providing emotional support for students who require targeted interventions, e.g., students with mental health conditions (Byrom, 2018; Sontag-Padilla et al., 2018).

For policy:

The thesis extends the call for whole-university approaches for creating a “*resilient generation*” as proposed by recent policy reports (e.g., MHPC, 2019; UUK, 2020). The King’s Strategic Vision 2029 report (2020) posits that a constant state of resilience is an unrealistic aspiration considering higher education should be a challenge for university students. Instead, they suggest that for the promotion of self-care skills, student-led pastoral support is required to effectively manage the unique challenges associated with university life. This notion is supported by the model proposed in this thesis, that poor mental health can manifest alongside positive psychological, social, and emotional adjustment. The thesis also lends support to the availability of support services that capture the lived experiences and diverse backgrounds of the university students as emphasised by *Stepchange*, a whole university framework developed by Universities UK and Students’ Minds University Mental Health Charter (2020). This is particularly important since university services have been found to lack cultural sensitivity and understanding of the

experiences of certain groups of students, e.g., Black and ethnic minority students, international students, LGBTQ+ students and so on (Hughes & Spanner, 2019). Ultimately, a resilient university should co-evolve with students as active participants and account for the complex and non-linear relationship with its multiple sub-entities (Pinheiro & Young, 2017; Sutherland, 2019).

Importantly, as noted by the MHPC (2019), it is vital to minimise adverse experiences within the family backgrounds and cultivate positive family, peer, and community relationships to support mental health during important transitions, such as to and from the university. As discussed in this thesis, it is evident that students with experiences of adverse family environments, specifically maternal dysfunctional parenting styles, have poor outcomes of resilience. While such adverse experiences, such as indifferent, abusive, and over-controlling parenting, may not be modifiable within the context of higher education, it is important for counsellors and mental health service providers within the higher education setting to recognise that these experiences can have long-lasting implications on student's mental health and resilience. In summary, higher education institutions which embed personal, social, and environmental resources (which includes family and faculty members) within and beyond the academic curriculum can increase the likelihood of successful adaptation to the stressors and challenges associated with life at university (Baik et al., 2019; Lipson, Abelson, Ceglarek, Phillips, & Eisenberg, 2019). In terms of interventions for resilience, there is a need to focus on a range of socio-ecological factors that cultivate support networks and raise awareness of the use of adaptive emotion regulation strategies to cultivate resilience (Sippel et al., 2015).

8.7 Conclusions

The promotion of resilience in young people, including university students, is increasingly being adopted in policy and research in the UK for its focus on strengths and competencies (MHPC, 2019; Public Health England, 2015; UUK, 2020). To enhance the overall understanding of the pathways to resilience, the results of this thesis contribute significantly to the theoretical and empirical conceptualisation and operationalisation of resilience for university students. Firstly, by adopting a socio-ecological approach, the thesis decentralises resilience from being individual-focused to being determined by family as well as social factors. The findings support the arguments against resilience being conceptualised as a trait. Specifically, the thesis proposed that while students by themselves have the capacity to positively adapt to adversities, this capacity was influenced by a range of interacting systems, such as social and family factors. Secondly, the multidimensional conceptualisation of resilience emphasised on the dynamic and context-specific variability in how resilience can be expressed by university students. Thirdly, the thesis went beyond descriptive and correlational associations and explored the underlying mechanism that can explain how risk and protective factors and domains of resilience are related. Finally, the thesis provided preliminary evidence for the influences of different gender and ethnicity identities on the underlying role of cognitive reappraisal on the pathways to resilience.

Despite its limitations, the thesis supports existing theoretical frameworks and is an attempt to transform the focus of resilience research within the higher education context towards an ecological and multidimensional conceptualisation of resilience. Resilience is multifaceted and requires the study of the transactional nature and interplay of multiple variables, including the type of stressor, the psychosocial context, gender, culture, social networks, family functioning and so on (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). The model proposed in this thesis is not intended to be conclusive or prescriptive. Instead, it advances resilience research within the

higher education context by addressing the limitations of the existing resilience literature and providing a roadmap for the future longitudinal examination of ecologically-based models of resilience. It raises critical questions about the contextualisation of the complex construct of resilience, and it hopes that future research will explore the many facets of resilience in university student populations.

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Appendices

Appendix A Emails and survey dissemination

Emails sent to Chemical Engineering, Economics, Health Sciences, Law, English, Geography, History, Physiotherapy and Sports Rehabilitation, Computer Sciences, Pharmacy, Education, Medicine, Medical Physiology and Therapeutics, Politics and Sociology, Music, Life Sciences, Veterinary Medicine, Biosciences, and Physics and Astronomy.

Hello,

My name is Snigdha Dutta and I am a second year PhD student at the School of Health Sciences at the University of Nottingham.

I would like to invite you to participate in a study titled, '**Understanding Pathways to Resilience in University Students in a Higher Education Setting: A Theoretical Approach**', as you are an **undergraduate student** at the University of Nottingham. The **purpose of this study** is to understand how undergraduate students are able to develop resilience, i.e., the capacity to overcome significant adversity and achieve positive adjustment, during their time at university.

A comprehensive information about the process of resilience can inform strategies and interventions to enhance mental health and resilience of students, in order to cope better with university life.

If you choose to participate, I request you to complete the **survey (link below)** now during the autumn term (baseline) and after six months follow-up (during the spring term). The survey should take approximately **15- 20 minutes** to complete at both time points.

There is a **£50 prize draw** for completing the baseline survey and a **£100 prize draw** for completing **both** baseline **and** follow-up survey, provided by the Students' Union of the University of Nottingham. You can choose not to participate in the prize draw. You will have access to **more information about the study** and your role as a participant once you click on the link below.

<https://nottingham.onlinesurveys.ac.uk/pathways-to-resilience-in-university-students-in-a-higher-2>

Your participation in this study is **entirely voluntary** and you can **withdraw** at any time by clicking the browser exit button. Your responses will be **anonymous**. **Withdrawing from this study will not impact your course of study at the University of Nottingham.**

Thank you taking time to read this email.

I look forward to hearing from you if you have any queries or concerns.

Kind regards,
Snigdha Dutta
snigdha.dutta@nottingham.ac.uk

Dear Student,

I hope you have had a good start to the year!

Thank you for participating in the baseline phase of the study titled, '*Understanding Pathways to Resilience in University Students in a Higher Education Setting: A Theoretical Approach*'. You are receiving this email as you have expressed an interest to participate in the **follow-up phase** of the above study.

There is a chance to win **£100** for completing **BOTH** the baseline and follow-up survey, generously provided by the Students' Union. You have already completed the baseline survey. Now it is time for the follow-up survey!

Here is what to expect next:

If you are an undergraduate student, you will receive an email from me on the 5th of March, 2018. I will attach a link to the **follow-up survey** in the email. It is the same survey that you completed in the autumn term and should take around 15-20 minutes to complete. |

I will also send two reminder emails over the next two months before closing the survey at the end of April, 2018. You only need to attempt the survey once.

If you are NOT an undergraduate student, i.e., if you are a postgraduate student (Masters/PhD), an exchange student, or a foundation student, please email me back and let me know. This will ensure that I do not send you the follow-up survey as the survey is meant for undergraduate students only.

I look forward to contacting you again soon. I am grateful for your contribution to better understand the process of resilience in undergraduate students in a university setting.

Kind regards,
Snigdha Dutta

PS: If you are receiving this email on your personal email ID and would like to receive the follow-up survey on your registered university email ID, please let me know.



**University of
Nottingham**
UK | CHINA | MALAYSIA

Dear Student,

Hope your Easter break went well and you are making the most of the time away from university!

If you have already participated in the follow-up phase of the study titled, '*Understanding Pathways to Resilience in University Students in a Higher Education Setting: A Theoretical Approach*', please ignore this email.

If not, here is a reminder that there is a chance to win **£100** for completing **BOTH** the baseline and follow-up survey, generously provided by the Students' Union. You have already completed the baseline survey. Now it is time for the follow-up survey!

<https://nottingham.onlinesurveys.ac.uk/pathways-to-resilience-in-university-students>

Please note that this study is only for **undergraduate students** at the University of Nottingham. Please ignore my emails if you are NOT an undergraduate student, and/or let me know to stop receiving this email.

The survey closes at the end of April, 2018.

Do not hesitate to contact me if you have any questions. I am grateful for your contribution to better understand the process of resilience in undergraduate students in a university setting.

All the best preparing for your exams ☺

Kind regards,
Snigdha Dutta

Postgraduate Research Student
School of Health Sciences,
Queens Medical Centre
The University of Nottingham
Nottingham, NG7 2QL

Dear Student,

If you have already participated in the **follow-up phase** of the study titled, '*Understanding Pathways to Resilience in University Students in a Higher Education Setting: A Theoretical Approach*', please ignore this email.

If not, here is a reminder that there is a chance to contribute to better understand the process of resilience in undergraduate students. Plus, a chance to win **£100** for completing **BOTH** the baseline and follow-up survey, generously provided by the Students' Union. Link to the survey is below:

<https://nottingham.onlinesurveys.ac.uk/pathways-to-resilience-in-university-students>

Please note that this study is only for **undergraduate students** at the University of Nottingham. Please ignore my emails if you are NOT an undergraduate student, and/or let me know to stop receiving emails from me.

Participation is **voluntary** and you may **withdraw** at any time. Your responses will be **anonymous**.

I will send **another reminder** over the next month before the survey closes at the end of April, 2018. **You are requested to complete the survey just once.**

Do not hesitate to contact me if you have any questions.

Kind regards,
Snigdha Dutta



University of
Nottingham
UK | CHINA | MALAYSIA



University of Nottingham Students' Union

19 October 2017 · 🌐

Can you spare 15 minutes to fill out a quick survey out about the resilience of students at university? A £50 prize is up for grabs!

<https://nottingham.onlinesurveys.ac.uk/pathways-to-resilien...> ✓



...



University of Nottingham Students' Union

21 November 2017 · 🌐

We want to help explore how University of Nottingham students develop resilience. If you can spare 15 minutes please help us by filling in this survey.

<https://nottingham.onlinesurveys.ac.uk/pathways-to-resilien...> ✓



NOTTINGHAM.ONLINESURVEYS.AC.UK

Pathways to Resilience in University Students in a Higher Education Setting ✓



Information and Consent Page for Online Survey

School of Health Sciences, Queens Medical Centre, University of Nottingham
Nottingham, NG7 2UH

Title of research: Understanding Pathways to Resilience in University Students in a Higher Education Setting: A Theoretical Approach

Faculty of Medicine & Health Sciences Research Ethics Committee Ref: 107-1709

You are being invited to participate in a research study titled 'Understanding Pathways to Resilience in University Students in a Higher Education Setting: A Theoretical Approach' as you are a **registered undergraduate student** at the University of Nottingham. This study is being done by Snigdha Dutta, a PhD student from the School of Health Sciences, University of Nottingham and is supported by the University of Nottingham Student's Union. The information we get from this study may help contribute to obtain a holistic understanding of the development of resilience to inform and advance theory-driven interventions and strategies that can promote mental health well-being in university students.

The **purpose of this research study** is to investigate the processes involved in the development of resilience in the context of a higher education setting, and the potential variations to this process due to ethnicity and gender of university students. Resilience has been defined as the process of overcoming stressors and achieving positive functioning in the context of a higher education setting. The study is testing a new theoretical model of resilience in university students. To this aim, **if you choose to participate**, you will be asked to complete a baseline survey in the autumn term, and a follow-up survey after six months, at the end of the spring term. You will be asked to complete a total of 8 questionnaires which will take you approximately 10- 15 minutes to complete at both the times (i.e. baseline and six-month follow-up).

There is a **prize draw** at both time points for which you can choose to participate. For completing the first survey at baseline, if you wish to be contacted for the follow-up study and participate in the prize draw of £50, you will be asked to provide your university email ID. For completing the second survey at follow-up, you will be asked to provide your university email ID to be eligible for the £100 prize draw. **Your responses to the survey will not be affected by your decision to provide the university email ID.** If you choose to provide your email ID for the follow-up, you will be contacted by the PhD student, Snigdha, with the link the survey. If you choose not to provide your email ID, the Student's Union will advertise the study again at six months, and you can access the survey through the links provided by them. **There will no way to identify your responses by your university email ID. You will not be contacted further by the PhD student unless you wish to know the results of the study.**

Your participation in this study is **entirely voluntary** and you can **withdraw** at any time by clicking the browser exit button. **Withdrawing to this study will not impact your course of study at the University of Nottingham.** The data will only be uploaded on completion of the questionnaire by clicking the SUBMIT button. You are free to omit



any question. Usable responses for this study are those that have complete responses for both baseline and follow-up surveys. Should you withdraw from the study at any time, the data collected to date cannot be erased and may still be used in the final analysis.

We do not anticipate that the study will cause distress to you, however, if participating in this study causes you distress or discomfort, please contact the support organisations listed at the bottom of this sheet. As with any online related activity, the risk of data breach is always possible. However, **this study does not collect personal details and other identifiable information about you**, and your responses are anonymous. We will follow ethical and legal practice and all information will be kept **strictly confidential**, stored in a secure and locked office, and on a password protected database. If you choose to provide your university email ID for the prize draw and to be contacted for the follow-up survey, your email ID will be stored in an encrypted format and will be accessed only by the PhD student. All research data will be kept securely for 7 years. After this time, the data will be disposed of securely. During this time, all precautions will be taken by all those involved to maintain data confidentiality, only members of the research team will have access to participant responses.

The results of the study may be published in scientific journals and presented at scientific conferences. The results of the study will also be provided to the University of Nottingham Student's Union who have supported this study, allowing them to better understand the undergraduate student population here at the University of Nottingham, and provide the necessary support and guidance. The data will be reported anonymously, with any identifying information removed.

If you have any questions about this project or you wish to find out the results of this study, you may contact the Lead Researcher, Snigdha Dutta (Email: snigdha.dutta@nottingham.ac.uk), or if you have any concerns about any aspect of this study please contact the Research Supervisor, Dr. Aimee Aubeeluck (E-mail: aimee.aubeeluck@nottingham.ac.uk) or Dr. Maria Michail (E-mail: maria.michail@nottingham.ac.uk). If you remain unhappy and wish to complain formally, you should then contact the FMHS Research Ethics Committee Administrator, c/o The University of Nottingham, Faculty PVC Office, B Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH (E-mail: FMHS-ResearchEthics@nottingham.ac.uk).

This study has been reviewed and given a favourable opinion by the University of Nottingham, Faculty of Medicine & Health Sciences Research Ethics Committee (FMHS REC 107-1709).

I have read and understood the above information and consent form, I confirm that I am a registered undergraduate student at the University of Nottingham and by clicking the NEXT button to begin the online questionnaires, I indicate my willingness to voluntarily take part in the study.

Please, tick each box to continue:

- I confirm that I have read and understood the information on the previous page
 - I understand that my participation is voluntary and I can end the study at any time and withdraw my data by clicking the EXIT button.
 - I understand that my answers will be anonymous.
 - I understand the overall anonymized data from this study may be used in the future for research (with research ethics approval) and teaching purposes.
- NEXT – to be taken to the survey.

Thank you for participating!

NEXT – I consent to take part **EXIT** - I do not give consent

Thank you for completing the survey.

Enter your **registered university email ID** in the link below to be eligible for the **£50 prize draw** for completing the baseline survey and to be contacted for the **follow-up survey** in six months. **Your responses will not be identifiable by your disclosed university email ID.**

<https://nottingham.onlinesurveys.ac.uk/contact-information-for-follow-up-and-prize-draw-copy>

If you wish to know more about the study and the study results, do email **Snigdha Dutta** (snigdha.dutta@nottingham.ac.uk)

If participating in this study caused you distress or discomfort, please contact any of the following **support organisations**:

Nottingham Nightline

Phone: 0115 951 4985

Mobile: 07786 208 408

Skype: (voice only)

Nottingham.Nightline

Email (anonymous):

nightlineanon@nottingham.ac.uk [counselling/student-counselling.aspx](https://www.nottingham.ac.uk/counselling/student-counselling.aspx)

University of Nottingham Counselling Services

Phone: 0115 951 3695

Email: counselling.service@nottingham.ac.uk

Website: [https://www.nottingham.ac.uk/counselling/student-](https://www.nottingham.ac.uk/counselling/student-counselling.aspx)

[counselling/student-counselling.aspx](https://www.nottingham.ac.uk/counselling/student-counselling.aspx)

Samaritans

Phone: 116 123

Email: jo@samaritans.org

MIND

Phone: 0300 123 3393

Email: info@mind.org.uk

SGICs are particularly useful in electronic surveys as they contribute to the participant's confidence in the assurance of anonymity and confidentiality of the survey (Damrosch, 1986). This method of linking responses in longitudinal studies has been used in surveying various sensitive topics in adolescents and young people, including university students (Schnell, Bachteler, & Reiher, 2010). Some concerns with the SGICs are the possibilities of identical codes, inaccurately formed codes, and unmatched responses (Kristjansson et al., 2014). These concerns were addressed in the thesis by: a) having a limited duration between the two time-points (Grube, Morgan, & Kearney, 1989); b) ensuring that the pre-constructed statements would lead to stable intra-individual and variable inter-individual responses, i.e., the responses to the statements would not change over time and the codes would be sufficiently different amongst the participants (Yurek et al., 2008); c) and constructing statements which did not ask for responses that compromised the anonymity of the participant (Schnell et al., 2010; Yurek et al., 2008).

Six statements were provided to the participants to aid the formulation of the SGICs keeping in mind the above recommendations for increasing variability (Direnga, Timmermann, Lund, & Kautz, 2016; Schnell et al., 2010; Yurek et al., 2008), stability over time, and relevance (Diiorio et al., 2000; Yurek et al., 2008). Those participating in the follow-up phase recreated their SGICs by responding to the six statements again. The codes were checked and matched using Microsoft Excel and SPSS v.26 (IBM Corp, 2019).

Instructions:

On this page, you will be creating **your own unique code** that will help the researcher to match your baseline and follow-up responses while maintaining **anonymity and confidentiality**. The code will be unique to you and the research team will not be able to identify you by your codes. You will be asked this code again when you are contacted for the follow-up survey in six months. Therefore, **the purpose is to only match your responses over time**.

To create the code, you will be asked to answer 6 statements. Read the statements very carefully and answer accordingly. An example of how to create is code is given below:

Example (statement – answer)

Month born: SEPTEMBER

Number of **Older** Brothers (half-brother, living, or deceased, if none write X): 1

Number of **Older** Sisters (half-sister, living or deceased, if none write X): X

First initial of **Mother/Female Guardian's First Name**: S

First initial of **Father/Male Guardian's First Name**: V

First initial of your **middle name** (if none, write X): X

Therefore, the unique code is (no spaces): **SEPTEMBER1XSVX**

Now create your own code below!

Appendix D

Sample characteristics

Table D-1 Matched participants' demographic information obtained at baseline (n=362).

Demographic details (n=362)	
Age in years (n=354)	
Mean (SD)	20.74 (3.17)
Median	20.00
Range	18-46
<hr/>	
Gender (n=360)	
Female (n=287)	79.72%
Male (n=70)	19.44%
Prefer not to say (n=1)	.27%
Other (n=2)	.55%
<hr/>	
Ethnicity (n=361)	
White - (English/Welsh/Scottish/Northern Irish/Other White) (n=294)	81.44%
Mixed/multiple ethnic group (n=10)	2.77%
Asian/Asian British - Indian/Pakistani/Chinese/Other Asian (n=46)	12.74%
Black/Black British - Black/African/Caribbean/Other Black (n=8)	2.21%
Arab/Arab British (n=2)	.55%
Other (n=1)	.27%
<hr/>	
Year of Study (n=360)	
First year (n=133)	36.94%
Second year (n=96)	26.66%
Third year (n=92)	25.55%
Fourth year and beyond (n=39)	10.83%

Appendix E

Attrition analyses

Table E-1 Differences in scores between students who completed the study at both time-points (n=362) and students who did not complete the follow-up survey (n=412).

Variable	Mann-Whitney Test	
	U	p-value
Perception of stress	70187.00	.14
Perception of social support	74262.50	.87
Maternal dysfunctional parenting styles	72958.00	.56
Paternal dysfunctional parenting styles	70444.00	.27
Cognitive reappraisal	69191.50	.07
Mental well-being	69202.50	.07
Psychological distress	69604.00	.11
Campus connectedness	72555.50	.52
Positive affect	65677.00	.00*
Negative affect	73432.00	.76

Table E-2 Chi-square tests for independence to compare between students who completed both phases of assessments (Follow-up – Yes) and students who did not complete the follow-up assessment (Follow-up – No) along with the chi-square statistic and level of significance (**p≤.00).

	Follow-up (Yes) (n=359)	Follow-up (No) (n=411)	X ² (p)
Age in years (n=746)			
Mean (SD)	20.34 (3.14)	20.75 (3.27)	
Gender (n=770)			18.27 (.00)**
Female	80.78%	67.15%	
Male	19.22%	32.85%	

Ethnicity (n=773)			31.13 (.00)**
White - (English/Welsh/Scottish/Northern Irish/Other White)	81.76%	63.74%	
Other ethnic groups including mixed ethnic groups, Asian/Asian British, Black/African/Caribbean/Black British, Arab/Arab British	18.23%	36.25%	
Year of Study (n=771)			18.27 (.00)**
First year	37.01%	50.40%	
Second year	26.79%	23.00%	
Third year	24.86%	21.30%	
Fourth year and beyond	11.32%	5.40%	

Overall, across both time points, there was less than 5% of missingness in the dataset. All demographic information, apart from age (4.1% missing cases), had complete cases. To verify if missingness for the scales with item non-response was missing completely at random, Little's Missing Completely at Random (MCAR) test was conducted. This test examines the significant difference between the means of the missing value patterns (Little, Lang, Wu, & Rhemtulla, 2016), and a $p \leq .05$ suggests that the missing values are not completely at random.

For variables which had non-response to a few items i.e., the perceived stress scale (PSS-10) (3%) and the mental well-being scale (WEMWBS) (1.4%), both at follow-up, the Little's MCAR chi-square test was non-significant (perceived stress: $\chi^2 = 52.14$, $df = 71$, $p \leq .95$; mental well-being: $\chi^2 = 59.84$, $df = 65$, $p \leq .66$), indicating that the missingness is most likely completely at random. Non-response to an entire scale ($n=5$) was found for the measure of paternal dysfunctional parenting styles (FMOP) at both time-points ($n = 2$), psychological distress (CORE-GP) at baseline ($n=1$), positive and negative affect (PANAS) at baseline ($n = 1$), and PANAS at follow-up ($n = 2$). As expected, for these scales ($n = 5$), the results of Little's MCAR test suggested that the data were not missing at random. However, these accounted for .3% - .6% missingness and were not deemed a concern.

Outliers are extreme cases that are significantly different from the rest of the observations and can influence inferences made about the data (Elsner et al., 1996). They can lead to Type I and Type II errors and reduce the generalisability of the results to other samples unless they have similar outliers (Tabachnick & Fidell, 2013). It has been argued that Likert scale data does not produce outliers as these might be genuine and true responses of the sample population (Gaskin, 2016). Further, the presence of a few outliers which have been found to exert little influence on the data is a minor concern (Kline, 2015). Without any evidence of any measurement errors or inaccurate data entry, outliers should be retained (Hair et al., 2016). Therefore, if multivariate outliers were identified, the possible reasons for these extreme cases were investigated to check if they were a legitimate part of the sample (Tabachnick & Fidell, 2013).

Multivariate outliers were identified by calculating the Mahalanobis Distance, wherein large distances from the mean vector are representative of multivariate outliers. Cook's distance was estimated to examine the change in parameter coefficients if an identified outlier is deleted (Tabachnick & Fidell, 2013). If the influence scores were larger than 1.00, they were identified as outliers, indicating that they would exert significant influence in the regression models. 8 and 11 multivariate outliers were identified at baseline and follow-up, respectively (Mahalanobis Distance greater than $\chi^2 = 20.51$, $p \leq .001$; Tabachnick & Fidell, 2013). Of these, 3 participants were outliers at both time-points, and therefore there were a total of 16 multivariate outliers.

Cook's distance was examined to check for their level of influence. None of the outlier cases had influence scores larger than 1.00 (Tabachnick & Fidell, 2013, p.109), indicating that they would not exert significant influence in the regression models. Therefore, considering the lack of undue influence, all 16 participants were assumed to be a legitimate representation of the population and were retained in the dataset.

The Shapiro-Wilk test of normality suggested that all variables significantly deviated from normal distribution as their *p*-values were significant. Transformations (logarithmic and inverse logarithmic) were explored but these did not improve the distribution for the skewed data. Some estimation techniques in structural equation modelling are robust towards non-normality, such as MLR (Satorra & Bentler, 1994; Ullman & Bentler, 2013). (Model estimation has been discussed in detail in Chapter 6, section 6.6.4.3). Additionally, the assumptions of normality are dependent on the sample — in this thesis, a non-clinical sample of UK based undergraduate students—and the measuring instrument. Assumptions of normality are frequently violated in Likert-type scales that measure sensitive information in general populations, such as the incidence of sexual harassment, abuse, and so on (cf. Nye & Drasgow, 2011). It is expected for some of the variables to be highly skewed with or without transformations (cf. Ullman & Bentler, 2013a). Researchers have previously cautioned against the transformation of data without theoretical justification since the results deviate from reflecting the true population (Norris & Aroian, 2004; Wheeler, 2009). Therefore, non-parametric tests were conducted for all preliminary analyses of the data, and an estimator robust to the violations of normality, i.e., MLR, was used in path analyses as recommended in the literature (Byrne, 2013).

Multicollinearity was examined to check whether the predictor variables in the models are highly correlated (e.g., $>.90$). A highly correlated variable can inflate error terms and lead to redundant variable in the model by making it difficult to identify significant predictors (Field, 2009). Multicollinearity between the predictor and mediator variables were examined using collinearity indicators, such as variance inflation factor (VIF) and tolerance levels (Field, 2009, p.224). VIF is the indicator of strong linear relationships between predictors which can introduce bias to the regression models and tolerance values are the reciprocal of VIF (Field, 2009).

Diagnostic tests to check for multicollinearity showed that the VIF ranged between 1.26 to 1.98 at baseline and from 1.25 to 1.75 at follow-up, and the tolerance values were between .50 - .78 at baseline and from .57 - .79 at follow-up. The VIF values were >1 and <10.00 and tolerance values were above 0.20 indicating an absence of multicollinearity for the variables at both time-points (Field, 2009, p.224).

The homogeneity of variance was examined using Levene's test (Field, 2009). This test examines the equality of variances across groups, i.e., that the distribution around the mean are equal across groups (Salkind, 2012). For the purposes of examination, the group used to calculate Levene's test was gender. If the test indicates a non-significance, homogeneity of variances is not violated. Considering that moderate to large sample sizes can lead to significant p values, the Levene's test is interpreted in conjunction with the variance ratio method, i.e., Hartley's F_{\max} (Pearson & Hartley, 1954). In this method, a variance ratio is estimated by dividing the variance of the largest group (in this study, female students) by the smallest group (in this study, male students). This value should be less than 2 for the assumption of homogeneity of variance to be tenable (Field, 2009). The Levene's statistic was non-significant for all variables apart from the measures of positive affect at baseline, $f(1, 358) = 4.26, p \leq 0.04$. However, since the variance ratio was less than 2 for this variable, it suggests that the variances are not significantly different between the two groups (Field, 2009) regarding positive affect.

Appendix I

Descriptive statistics

Table I-1 Comparison of mean rank scores between gender identities at baseline and follow-up (* $p \leq .05$, ** $p \leq .001$), $n=362$.

Variable	Mann-Whitney Test (baseline)		Mann-Whitney Test (follow-up)	
	U	p-value	U	p-value
Perception of stress	8017.00	.01*	8321.00	.03*
Perception of social support	6356.50	.00**	7523.00	.00*
Maternal dysfunctional parenting styles	9254.00	.33	8814.50	.12
Paternal dysfunctional parenting styles	9932.50	.99	9426.50	.50
Cognitive reappraisal	9994.50	.99	9983.00	.98
Mental well-being	9464.00	.48	8930.00	.16
Psychological distress	9774.00	.80	9866.50	.86
Campus connectedness	9061.50	.22	9560.50	.57
Positive affect	9471.50	.52	9066.00	.24
Negative affect	9357.00	.43	9818.00	.84

Table 1-2 Comparison of mean rank scores between ethnic backgrounds at baseline and follow-up (* $p \leq .05$, ** $p \leq .001$), $n=362$.

Variable	Mann-Whitney Test (baseline)		Mann-Whitney Test (follow-up)	
	U	<i>p</i> -value	U	<i>p</i> -value
Perception of stress	9645.50	.87	9312.50	.55
Perception of social support	8861.00	.24	7315.00	.00*
Maternal dysfunctional parenting styles	6923.00	.00**	7330.50	.00**
Paternal dysfunctional parenting styles	7877.00	.02*	8318.50	.07
Cognitive reappraisal	8845.00	.23	9223.00	.48
Mental well-being	9093.00	.38	9098.50	.38
Psychological distress	8734.50	.24	9213.50	.47
Campus connectedness	8806.50	.21	9418.50	.65
Positive affect	8969.50	.32	9563.50	.82
Negative affect	8891.00	.27	9245.50	.52

For the tests of longitudinal measurement invariance, the measurement models were specified based on the guidelines in the User Guide v.8 (Muthén & Muthén, 1998-2019, p.545) as follows:

- a) **Configural invariance:** Factor loadings and threshold parameters were freely estimated across the two-time points. The factor means were fixed to 0 at both time-points. Item residual variances were fixed to 1 across the two-time points. The factor variances were freely estimated. The metric of the latent variable was set by fixing the first item of the scale to 1.
- b) **Metric invariance:** Factor loadings are constrained to be equal across the two time-points. The factor loading of the first item is constrained by default to set the metric of the latent variable. The first threshold of each item is constrained to be equal across the two-time points. The second threshold of the item that is used to set the metric of the latent variable is held equal at both time-points. The factor means were fixed to 0 at one time-point (Time 1) and freely estimated in the other time-point (Time 2). Item residual variances were fixed to 1 at one time-point (Time 1) and freely estimated in the other time-point (Time 2). The factor variance was freely estimated across the two time-points.
- c) **Scalar invariance:** Factor loadings and thresholds are constrained to be equal across the two time-points. The factor loading of the first item is constrained by default to set the metric of the latent variable. The factor means were fixed to 0 at one time-point (Time 1) and freely estimated in the other time-point (Time 2). Item residual variances were fixed to 1 at one time-point (Time 1) and freely estimated in the other time-point (Time 2). The factor variance was freely estimated across the two time-points.

PERCEIVED STRESS SCALE

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

Name _____ Date _____

Age _____ Gender (Circle): M F Other _____

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly? 0 1 2 3 4
2. In the last month, how often have you felt that you were unable to control the important things in your life? 0 1 2 3 4
3. In the last month, how often have you felt nervous and "stressed"? 0 1 2 3 4
4. In the last month, how often have you felt confident about your ability to handle your personal problems? 0 1 2 3 4
5. In the last month, how often have you felt that things were going your way? 0 1 2 3 4
6. In the last month, how often have you found that you could not cope with all the things that you had to do? 0 1 2 3 4
7. In the last month, how often have you been able to control irritations in your life? 0 1 2 3 4
8. In the last month, how often have you felt that you were on top of things? 0 1 2 3 4
9. In the last month, how often have you been angered because of things that were outside of your control? 0 1 2 3 4
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them? 0 1 2 3 4

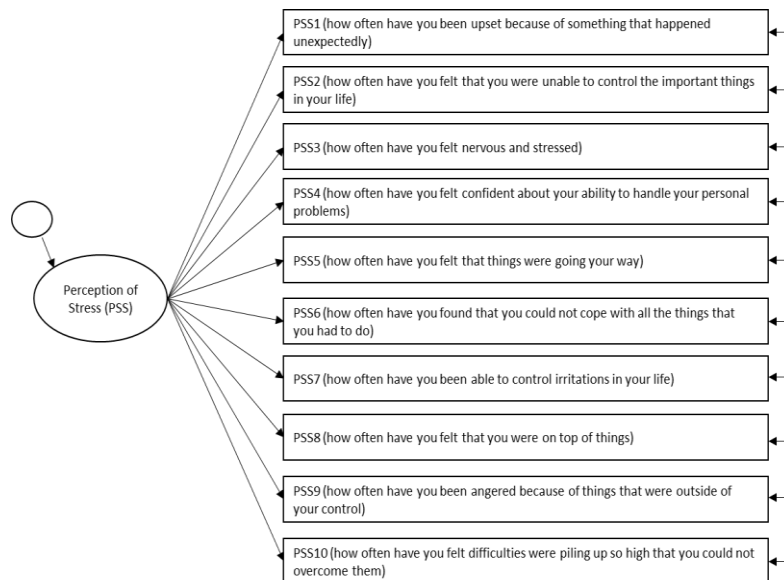


Figure K-1 Schematic representation of the one-factor model of the Perceived Stress Scale (PSS-10) as hypothesised by the authors of the scale.

Table K-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the 10 item Perceived Stress Scale (PSS-10).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (df, p)	RMSEA (90% CI)	CFI	TLI	SRMR
Perceived stress (one-factor model, 10 items)					
<u>Configural</u>	1393.40 (169, $p \leq .00$)	0.14 (0.13, 0.15)	0.91	0.90	0.09
<i>Model modification 1:</i> Removed item 7 from both time-points (Unexpected negative correlation between the item and the latent variable)	1061.96 (134, $p \leq .00$)	0.14 (0.13, 0.14)	0.90	0.88	0.08
<i>Model modification 2:</i> Correlated error terms for items 5 and 4 at both time-points (The perception of similar wordings of the items can lead to same responses to both items)	526.27 (132, $p \leq .00$)	0.09 (0.08, 0.10)	0.96	0.95	0.05
<i>Model modification 3:</i> Correlated error terms for item 9 across time-points.	474.33 (131, $p \leq .00$)	0.14 (0.13, 0.14)	0.96	0.96	0.05
<u>Metric</u>	84.20 (84, $p \leq .00$)	0.08 (0.08, 0.09)	0.96	0.95	0.05
<u>Scalar</u> (one-factor model, 9 items)	100.18 (26, $p \leq .00$)	0.08 (0.08, 0.09)	0.95	0.95	0.05

*Note: Item 7 (“in your last month, how often have you been able to control irritations in your life”); Item 5 (“in the last month, how often have you felt that things were going your way?”); Item 4 (“in the last month, how often have you felt confident about your ability to handle your personal problems?”); Item 9 (“in the last month, how often have you been angered because of things that were outside of your control?”).

Appendix L Multidimensional Scale of Perceived Social Support (Zimet et al., 1988)

Multidimensional Scale of Perceived Social Support (Zimet, Dahlem, Zimet & Farley, 1988)

Instructions: We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Circle the "1" if you **Very Strongly Disagree**
 Circle the "2" if you **Strongly Disagree**
 Circle the "3" if you **Mildly Disagree**
 Circle the "4" if you are **Neutral**
 Circle the "5" if you **Mildly Agree**
 Circle the "6" if you **Strongly Agree**
 Circle the "7" if you **Very Strongly Agree**

1.	There is a special person who is around when I am in need.	1	2	3	4	5	6	7	SO
2.	There is a special person with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	SO
3.	My family really tries to help me.	1	2	3	4	5	6	7	Fam
4.	I get the emotional help and support I need from my family.	1	2	3	4	5	6	7	Fam
5.	I have a special person who is a real source of comfort to me.	1	2	3	4	5	6	7	SO
6.	My friends really try to help me.	1	2	3	4	5	6	7	Fri
7.	I can count on my friends when things go wrong.	1	2	3	4	5	6	7	Fri
8.	I can talk about my problems with my family.	1	2	3	4	5	6	7	Fam
9.	I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7	Fri
10.	There is a special person in my life who cares about my feelings.	1	2	3	4	5	6	7	SO
11.	My family is willing to help me make decisions.	1	2	3	4	5	6	7	Fam
12.	I can talk about my problems with my friends.	1	2	3	4	5	6	7	Fri

The items tended to divide into factor groups relating to the source of the social support, namely family (Fam), friends (Fri) or significant other (SO).

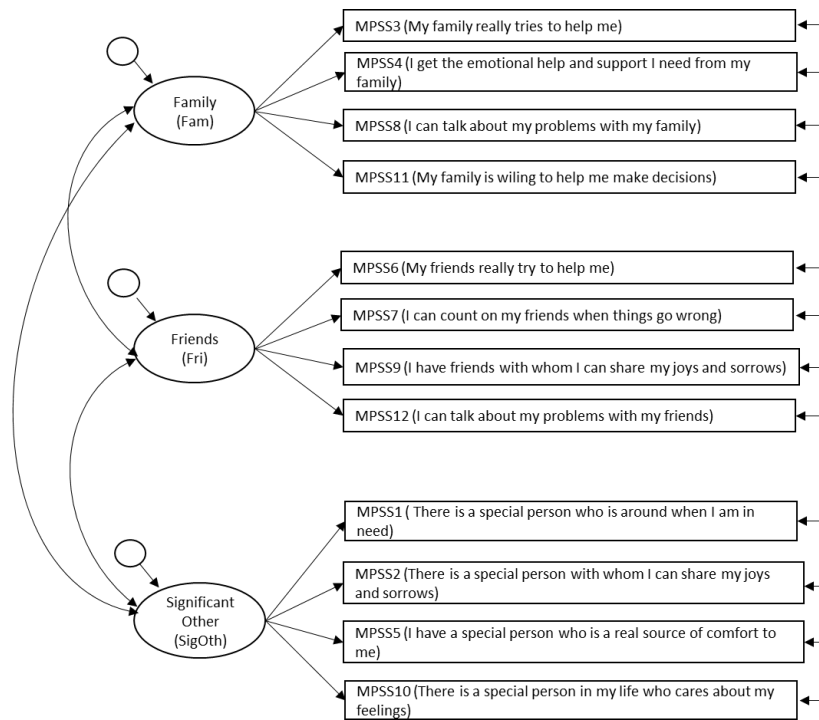


Figure L-1 Schematic representation of the three-factor model of the Multidimensional Scale of Perceived Social Support (MSPSS) as proposed by the authors of the scale.

Table L-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the Multidimensional Scale of Perceived Social Support (MSPSS).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (<i>df</i> , <i>p</i>)	RMSEA (90% CI)	CFI	TLI	SRMR
Perceived social support (three-factor model, 12 items)					
<u>Configural</u>	543.83 (237, $p \leq .00$)	0.06 (0.05, 0.07)	0.99	0.99	0.03
<u>Metric</u>	4.62 (9, $p = .86$)	0.06 (0.05, 0.06)	0.99	0.99	0.06
<u>Scalar</u> (three-factor model, 12 items)	73.50 (57, $p = .07$)	0.05 (0.05, 0.06)	0.99	0.99	0.03

Appendix M

Measure of Parenting Style (Parker et al., 1997)

Black Dog Institute – Measure of Parental Style (MOPS)
<http://www.blackdoginstitute.org.au/>

During your first 16 years how 'true' are the following statements about your MOTHER's behaviour towards you

Rate each statement either as:

- 0 - not true at all
- 1 - slightly true
- 2 - moderately true
- 3 - extremely true

1. Overprotective of me
2. Verbally abusive of me
3. Over controlling of me
4. Sought to make me feel guilty
5. Ignored me
6. Critical of me
7. Unpredictable towards me
8. Uncaring of me
9. Physically violent or abusive of me
10. Rejecting of me
11. Left me on my own a lot
12. Would forget about me
13. Was uninterested in me
14. Made me feel in danger
15. Made me feel unsafe

During your first 16 years how 'true' are the following statements about your FATHER's behaviour towards you

Rate each statement either as:

- 0 - not true at all
- 1 - slightly true
- 2 - moderately true
- 3 - extremely true

1. Overprotective of me
2. Verbally abusive of me
3. Over controlling of me
4. Sought to make me feel guilty
5. Ignored me
6. Critical of me
7. Unpredictable towards me
8. Uncaring of me
9. Physically violent or abusive of me
10. Rejecting of me
11. Left me on my own a lot
12. Would forget about me
13. Was uninterested in me
14. Made me feel in danger
15. Made me feel unsafe

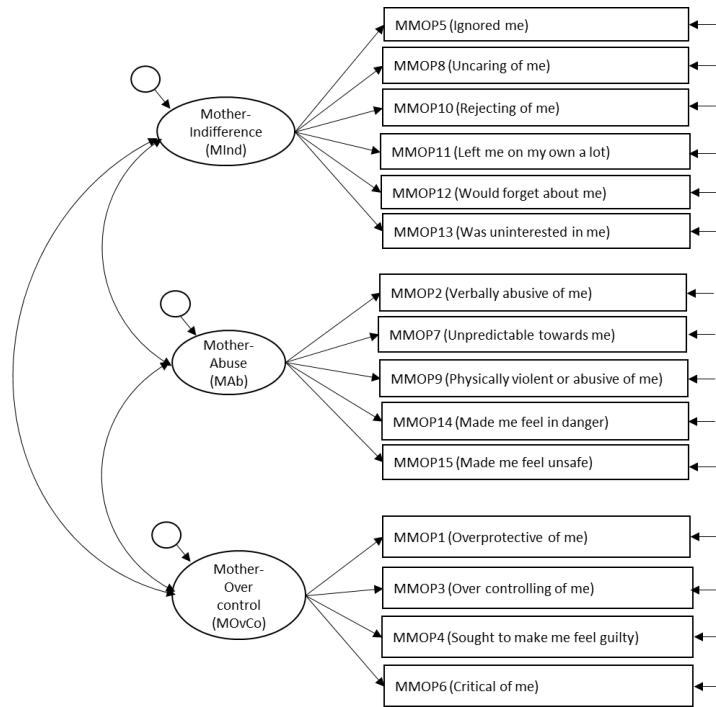


Figure M-1 Schematic representation of the three-factor model for the mother/female guardian subscale (MMOPS) as proposed by the authors of the scale.

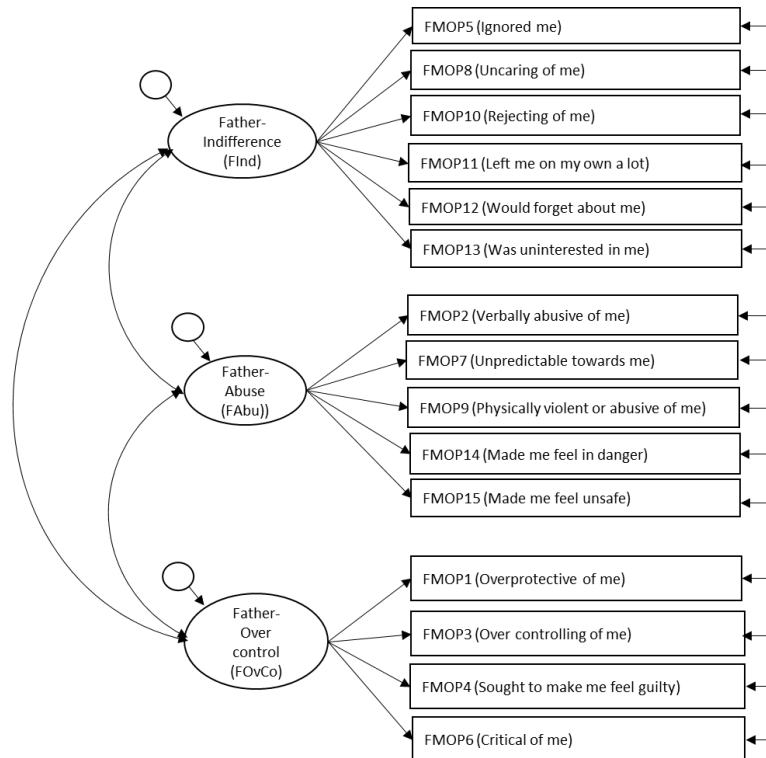


Figure M-2 Schematic representation of the three-factor model for the father/male guardian subscale (FMOPS) as proposed by the authors of the scale.

Table M-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the Measure of Parenting Style (MOPS).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (df, p)	RMSEA (90% CI)	CFI	TLI	SRMR
Parenting style – Mother (three-factor model, 15 items)					
<u>Configural</u>	1471.36 (390, $p \leq .00$)	0.09 (0.08, 0.09)	0.94	0.93	0.09
<i>Model modification 1:</i> one-factor model (High correlation between the three latent factors ranging from 0.73-0.93 at both time-points)	1809.27 (349, $p \leq .00$)	0.10 (0.09, 0.10)	0.92	0.91	0.11
<i>Model modification 2:</i> one-factor model without item 15 at both time-points (High correlations between items 14 and items 15. Inspection of the words indicated that they can be perceived to have the same meaning).	177.98 ($p \leq .00$)	0.10 (0.10, 0.11)	0.91	0.91	0.11
<i>Model modification 3:</i> one-factor model without items 1 at both time-points (Weak factor loading at both time-points relative to other items).	982.11 ($p \leq .00$)	0.08 (0.07, 0.08)	0.95	0.95	0.09
<i>Model modification 4:</i> Correlated error terms of item 3 across time-points	903.83 ($p \leq .00$)	0.07 (0.07, 0.08)	0.96	0.96	0.08
<u>Metric</u>	12.50 (12, $p = .41$)	0.07 (0.07, 0.08)	0.96	0.96	0.08
<u>Scalar</u> (one-factor model, 13 items)	30.33 (25, $p = 0.21$)	0.07 (0.06, 0.07)	0.96	0.96	0.08

Parenting style – Father
(Three-factor model, 15 items)

Configural

Model modification 1:
one-factor model

(High correlation between the three latent factors ranging from 0.60-0.92 at both time-points)

1732.63 (390, $p < .00$) 0.10 (0.09-0.10) 0.94 0.93 0.09

2107.36 (404, $p < .00$) 0.11 (0.10-0.11) 0.92 0.91 0.12

Model modification 2:

one-factor model without items 1 at both time-points
(Weak factor loading at both time-points relative to other items).

1326.02 ($p < .00$) 0.08 (0.08-0.09) 0.95 0.95 0.11

Model modification 3:

Correlated error terms of item 3 across time-points

1258.45 ($p < .00$) 0.08 (0.08-0.09) 0.95 0.95 0.10

Model modification 4:

Correlated error terms of item 6 across time-points

1196.65 ($p < .00$) 0.08 (0.07-0.08) 0.96 0.95 0.10

Model modification 4:

Correlated error terms of item 11 across time-points

1146.80 ($p < .00$) 0.08 (0.07-0.08) 0.96 0.96 0.10

Metric

123.96 (14, $p < .00$) 0.08 (0.07-0.08) 0.96 0.96 0.10

Scalar

(one-factor model, 14 items)

32.66 (27, $p = .20$) 0.07 (0.07-0.08) 0.96 0.96 0.10

*Note: Item 14 (“made me feel in danger”); Item 15 (“made me feel unsafe”); Item 1 (“overprotective of me”); Item 3 (“overcontrolling of me”); Item 6 (“critical of me”); Item 11 (“left me on my own a lot”).

Appendix N

Emotional Regulation Questionnaire – Cognitive Reappraisal subscale (Gross & John, 2003)

Cognitive reappraisal

We would like to ask you some questions about your emotional life, in particular, how you control (i.e., regulate and manage) your emotions. Although some of the following questions may seem similar to one another, they differ in important ways. For each item, please answer using the following scale.

	1 Strongly disagree	2	3	4 Neutral	5	6	7 Strongly agree
When I want to feel more positive emotion (such as joy or amusement), I change what I am thinking about.							
When I want to feel less negative emotion (such as sadness or anger), I change what I am thinking about.							
When I am faced with a stressful situation, I make myself think about it in a way that helps me stay calm.							
When I want to feel more positive emotion (such as joy or amusement), I change the way I am thinking about the situation.							
I control my emotions by changing the way I think about the situation I am in							
When I want to feel less negative emotion (such as sadness or anger), I change the way I am thinking about the situation.							

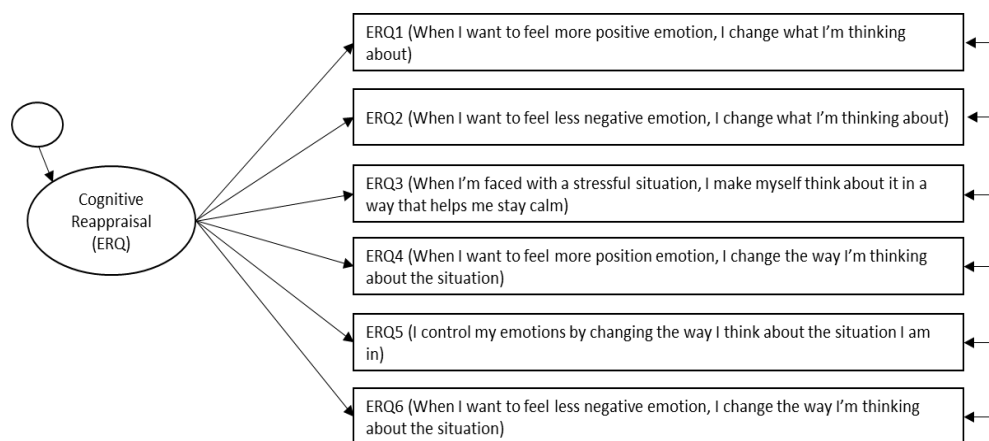


Figure N-1 Schematic representation of the one-factor model of cognitive reappraisal subscale (ERQ-CR) as hypothesised by the authors of the scale.

Table N-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the Emotion Regulation Questionnaire (Cognitive Reappraisal subscale – ERQ-CR).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (<i>df</i> , <i>p</i>)	RMSEA (90% CI)	CFI	TLI	SRMR
Cognitive reappraisal (one-factor model, 6 items)					
<u>Configural</u>	506.31 (53, $p \leq .00$)	0.15 (0.14, 0.16)	0.94	0.93	0.04
<i>Model modification 1:</i> Correlated error terms of items 2 and items 1 at both time-points (Modification index for the error covariance was very high at a value of 148.34. Item wordings suggest that they could be perceived to be a similar way)	245.92 (52, $p \leq .00$)	0.10 (0.09, 0.11)	0.97	0.97	0.03
<i>Model modification 2:</i> Correlated error terms of item 3 across time-points	187.53 (50, $p \leq .00$)	0.09 (0.07, 0.10)	0.98	0.98	0.03
<u>Metric</u>	2.75 (6, $p = 0.83$)	0.08 (0.07, 0.09)	0.98	0.98	0.03
<u>Scalar</u> (one-factor model, 6 items)	63.01 (29, $p \leq .00$)	0.07 (0.07, 0.08)	0.98	0.98	0.03

*Note: Item 1 (“when I want to feel more positive emotion, I change what I’m thinking about”); Item 2 (“when I want to feel less negative emotion, I change what I’m thinking about”); Item 3 (“when I am faced with a stressful situation, I make myself think about it in a way that helps me stay calm”).

Appendix O

Warwick Edinburgh Mental Well-being Scale
(Tennant et al., 2007)

Below are some statements about feelings and thoughts.

Please tick (✓) the box that best describes your experience of each over the last 2 weeks

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

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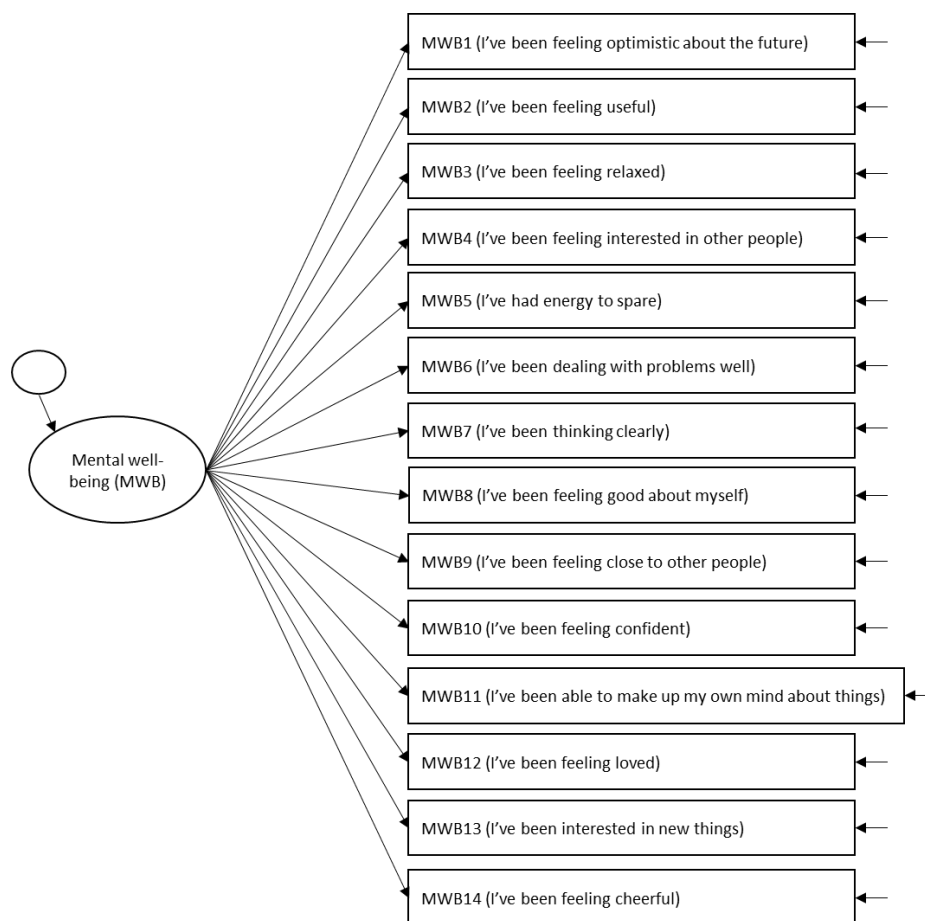


Figure O-1 Schematic representation of the one-factor model of the Warwick Edinburgh Mental Well-being Scale (WEMWBS) as hypothesised by the authors of the scale.

Table O-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the Warwick Edinburgh Mental Well-being Scale (WEMWBS).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (df, p)	RMSEA (90% CI)	CFI	TLI	SRMR
Mental well-being (one-factor model, 14 items)					
<u>Configural</u>	1545.41 (349, $p \leq .00$)	0.10 (0.09, 0.10)	0.94	0.93	0.06
<i>Model modification 1:</i> Correlated error terms of item 12 across time-points	1455.69 (348, $p \leq .00$)	0.09 (0.09, 0.10)	0.94	0.94	0.06
<u>Metric</u>	23.31 (13, $p = .04$)	0.09 (0.09, 0.10)	0.94	0.94	0.06
<u>Scalar</u> (one-factor model, 14 items)	113.05 (41, $p \leq .00$)	0.09 (0.08, 0.09)	0.94	0.95	0.06

*Note: Item 12 ("I've been feeling loved")

Over the last week		OVER THE LAST WEEK.				
		Please read each statement and think how often you felt that way last week. Then tick the box which is closest to this.				
		Please use a dark pen (not pencil) and tick clearly within the boxes.				
		Not at all	Only Occasionally	Sometimes	Often	Most of all the time
1	I have felt tense, anxious or nervous	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2	I have felt I have someone to turn to for support when needed	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
3	I have felt O.K. about myself	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
4	I have felt able to cope when things go wrong	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
5	I have been troubled by aches, pains or other physical problems	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6	I have been happy with the things I have done.	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
7	I have had difficulty getting to sleep or staying asleep	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
8	I have felt warmth or affection for someone	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
9	I have been able to do most things I needed to	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
10	I have felt criticised by other people	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
11	I have felt unhappy	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
12	I have been irritable when with other people	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
13	I have felt optimistic about my future	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
14	I have achieved the things I wanted to	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0

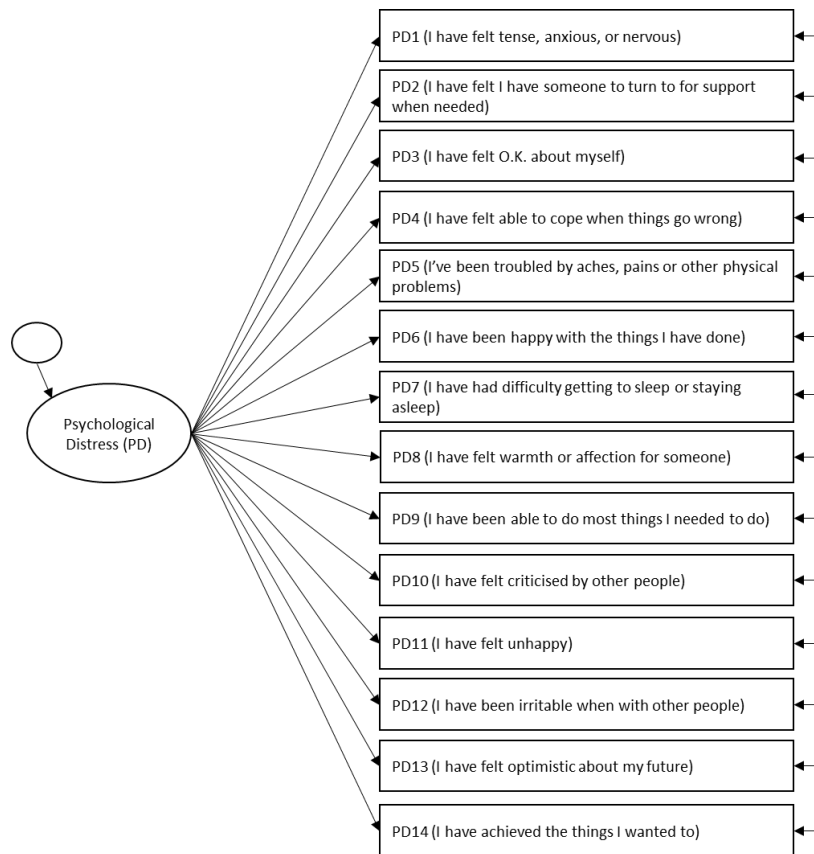


Figure P-1 Schematic representation of the one-factor model of the General Population Clinical Outcomes Routine Evaluation (CORE-GP) as hypothesised by the authors of the scale.

Table P-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the General Population Clinical Outcomes Routine Evaluation (CORE-GP).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (df, p)	RMSEA (90% CI)	CFI	TLI	SRMR
Psychological distress (one-factor model, 14 items)					
<u>Configural</u>	1989.71 (349, $p \leq .00$)	0.14 (0.10-0.12)	0.85	0.84	0.09
<i>Model modification 1:</i> Correlated error terms for all items across time-points	1471.88 (335, $p \leq .00$)	0.09 (0.09-0.10)	0.90	0.88	0.07
<i>Model modification 2:</i> Removed non-significant error covariances (item 6 and item 14)	1471.45 ($p \leq .00$)	0.09 (0.09-0.10)	0.90	0.88	0.07
<i>Model modification 3:</i> Correlated error terms of items 8 and items 2 at both time-points. (The perception of similar wordings of the items can lead to same responses to both items)	1271.58 ($p \leq .00$)	0.09 (0.08-0.09)	0.91	0.90	0.07
<u>Metric</u>	18.50 ($p = .13$)	0.09 (0.08-0.09)	0.92	0.91	0.07
<u>Scalar</u> (one-factor model, 14 items)	56.65 (41, $p \leq .05$)	0.08 (0.07-0.08)	0.92	0.92	0.07

*Note: Item 2 (“I have felt I have someone to turn to for support when needed”); Item 8 (“I have felt warmth or affection for someone”).

Appendix Q

Campus Connectedness Scale (revised Social Connected Scale – Lee & Robbins, 1995)

Campus Connectedness

Choose the answer that shows how much you agree or disagree with each of the following statements.

	1 Strongly agree	2	3	4	5	6 Strongly disagree
I feel disconnected from the campus around me.						
Even around people I know on campus, I don't feel that I really belong.						
I feel so distant from the campus.						
I have no sense of togetherness from my peers on campus.						
I don't feel related to anyone on campus.						
I catch myself losing all sense of connectedness with the campus						
Even among my friends, there is no sense of brother/sisterhood						
I don't feel that I participate with anyone or any groups on campus						

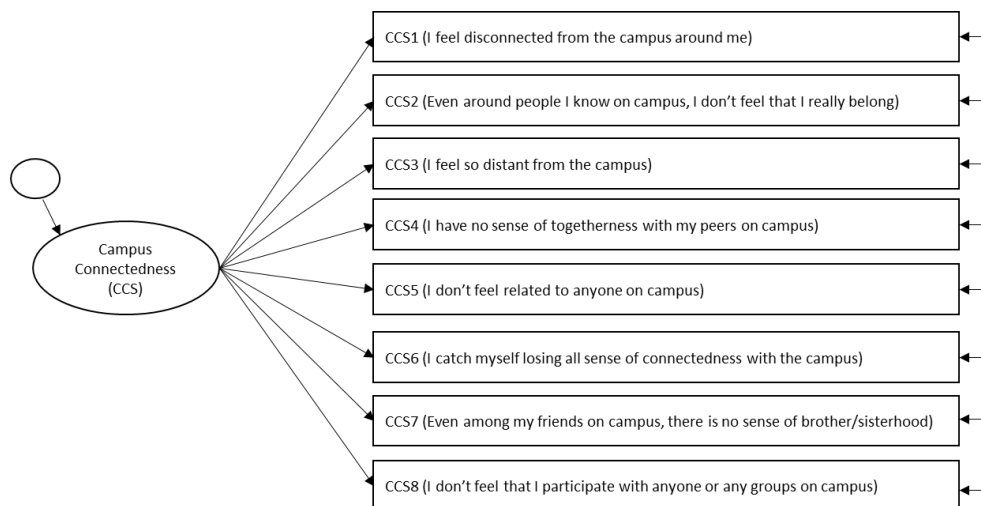


Figure Q-1 Schematic representation of the one-factor model of the Campus Connectedness Scale (CCS) as hypothesised by the authors of the scale.

Table Q-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the Campus Connectedness Scale (CCS).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (df, p)	RMSEA (90% CI)	CFI	TLI	SRMR
Campus connectedness (one-factor model, 8 items)					
<u>Configural</u>	654.41 (103, $p \leq .00$)	0.12 (0.11-0.13)	0.98	0.97	0.03
<i>Model modification 1:</i> Correlated error terms of items 3 and items 1 at both time-points (The perception of similar wordings of the items can lead to same responses to both items)	455.77 (101, $p \leq .00$)	0.10 (0.09-0.11)	0.99	0.98	0.03
<i>Model modification 2:</i> Correlating error terms of items 5 and items 4 at both time-points (The perception of similar wordings of the items can lead to same responses to both items)	391.20 (100, $p \leq .00$)	0.09 (0.08-0.10)	0.99	0.99	0.03
<u>Metric</u>	11.48 (7, $p = .12$)	0.09 (0.08-0.09)	0.99	0.99	0.03
<u>Scalar</u> (one-factor model, 8 items)	55.34 (31, $p \leq .00$)	0.08 (0.07-0.08)	0.99	0.99	0.03

*Note: Item 1 (“*I feel disconnected from the campus around me*”); Item 3 (“*I feel so distant from people on campus*”) Item 4 (“*I have no sense of together with my peers at university*”); Item 5 (“*I don’t feel related to anyone on campus*”).

Appendix R

Positive and Negative Affect Scale (Watson et al., 1988)

Positive and Negative Affect Schedule (PANAS-SF)

Indicate the extent you have felt this way over the past week.		Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
PANAS ₁	Interested	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₂	Distressed	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₃	Excited	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₄	Upset	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₅	Strong	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₆	Guilty	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₇	Scared	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₈	Hostile	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₉	Enthusiastic	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₀	Proud	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₁	Irritable	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₂	Alert	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₃	Ashamed	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₄	Inspired	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₅	Nervous	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₆	Determined	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₇	Attentive	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₈	Jittery	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₁₉	Active	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
PANAS ₂₀	Afraid	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

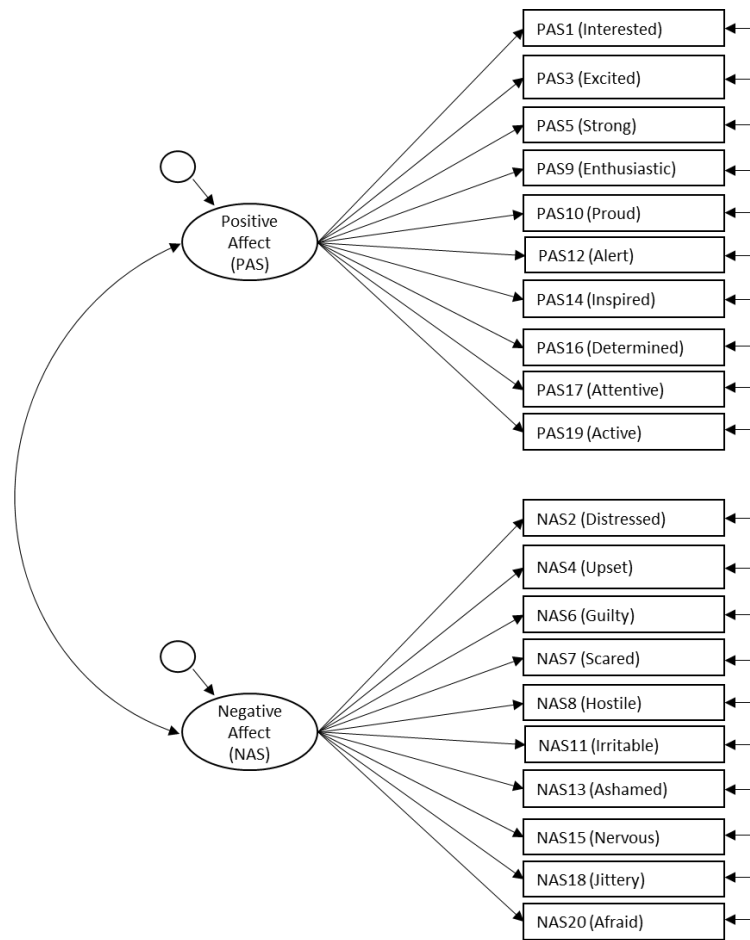


Figure R-1 Schematic representation of the two-factor model of the Positive and Negative Affect Scale (PANAS) as hypothesised by the authors of the scale.

Table R-1 Model estimation and evaluation of configural, metric, and scalar measurement invariance of the Positive and Negative Affect Scale (PANAS).

Latent variable	Goodness-of-fit indices				
	WLSMV χ^2 (df , p)	RMSEA (90% CI)	CFI	TLI	SRMR
Positive and negative emotions (two-factor model, 20 items)					
<u>Configural</u>	1565.74 (734, $p \leq .00$)	0.05 (0.05, 0.06)	0.94	0.94	0.06
<u>Metric</u>	30.94 (18, $p = .03$)	0.05 (0.05, 0.06)	0.94	0.94	0.06
<u>Scalar</u> (two-factor model, 20 items)	76.66 (58, $p = .05$)	0.05 (0.05, 0.06)	0.94	0.94	0.06

Appendix S

Path models

Table S-1 Standardised path coefficients for the direct effects model of predictor variables at baseline on outcome variables at follow-up, statistically significant at ** $p \leq .001$, * $p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.50**	0.03	.00**
Perceived social support (Friend)	0.07*	0.04	.01*
Perceived social support (Significant other)	0.16**	0.03	.00**
Maternal dysfunctional parenting styles	-0.10	0.03	.00*
Psychological distress			
Perceived stress	0.60	0.25	.00**
Perceived social support (Significant other)	-0.16	0.04	.00**
Maternal dysfunctional parenting styles	-0.10	0.03	.00*
Campus connectedness			
Perceived stress	-0.31	0.05	.00**
Perceived social support (Friend)	0.24	0.04	.00**
Maternal dysfunctional parenting styles	-0.21	0.04	.00**
Positive affect			
Perceived stress	-0.41	0.04	.00**
Perceived social support (Significant other)	0.22	0.04	.00**
Negative affect			
Perceived stress	0.50	0.04	.00**
Maternal dysfunctional parenting styles	0.20	0.04	.00**

Table S-2 Standardised path coefficients of the direct effects of the baseline model for male students (n=69), statistically significant at **p≤.001, *p≤.05.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.61	0.08	.00**
Perceived social support (Family)	0.29	0.14	.04*
Maternal dysfunctional parenting styles [^]	0.23	0.11	.04*
Psychological distress			
Perceived stress	0.76	0.07	.00**
Perceived social support (Family)	-0.18	0.09	.04*
Perceived social support (Significant other)	-0.22	0.07	.00**
Positive affect			
Perceived stress	-0.43	0.10	.00**
Perceived social support (Significant other)	0.29	0.12	.01*
Negative affect			
Perceived stress	0.70	0.07	.00**
Maternal dysfunctional parenting styles	0.27	0.13	.03*
Cognitive reappraisal			
Perceived stress	-0.28	0.11	.01*
Perceived social support (Friends)	0.27	0.10	.00**
Perceived social support (Significant other)	0.21	0.11	.05*
Maternal dysfunctional parenting styles [^]	0.28	0.13	.03*
Paternal dysfunctional parenting styles	-0.32	0.13	.01*

*Note: [^] unexpected direction of relationships

Table S-3 Standardised path coefficients of the direct effect of the baseline model for female students ($n=288$), statistically significant at $**p \leq .01$, $*p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.53	0.04	.00**
Perceived social support (Friend)	0.10	0.05	.05*
Cognitive reappraisal	0.24	0.05	.00**
Psychological distress			
Perceived stress	0.65	0.03	.00**
Perceived social support (Friend)	-0.10	0.04	.03*
Cognitive reappraisal	-0.16	0.04	.00**
Campus connectedness			
Perceived stress	-0.23	0.06	.00**
Perceived social support (Friend)	0.35	0.06	.00**
Maternal dysfunctional parenting styles	-0.22	0.06	.00**
Cognitive reappraisal	0.15	0.05	.00**
Positive affect			
Perceived stress	-0.47	0.05	.00**
Perceived social support (Friend)	0.14	0.06	.02*
Cognitive reappraisal	0.21	0.05	.00**
Negative affect			
Perceived stress	0.66	0.04	.00**
Cognitive reappraisal	-0.08	0.04	.03*
Cognitive reappraisal			
Perceived stress	-0.24	0.06	.00**
Perceived social support (Friends)	0.23	0.06	.00**

Table S-4 Standardised path coefficients of the direct effects of the baseline model for students of White/White British ethnic background (n=284), statistically significant at ** $p \leq .01$, * $p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.50	0.04	.00**
Perceived social support (Family)	0.14	0.07	.05*
Perceived social support (Friend)	0.13	0.06	.02*
Cognitive reappraisal	0.19	0.05	.00**
Psychological distress			
Perceived stress	0.66	0.03	.00**
Perceived social support (Significant other)	-0.09	0.04	.03*
Cognitive reappraisal	-0.12	0.04	.00**
Campus connectedness			
Perceived stress	-0.20	0.06	.00**
Perceived social support (Friend)	0.36	0.06	.00**
Maternal dysfunctional parenting styles	-0.17	0.06	.01*
Cognitive reappraisal	0.12	0.06	.03*
Positive affect			
Perceived stress	-0.45	0.05	.00**
Cognitive reappraisal	0.15	0.05	.00*
Negative affect			
Perceived stress	0.66	0.03	.00**
Perceived social support (Friend)	-0.09	0.04	.04*
Cognitive reappraisal			
Perceived stress	-0.27	0.05	.00**
Perceived social support (Friend)	0.16	0.06	.01*

Table S-5 Standardised path coefficients of the direct effects of the baseline model for students of other ethnic backgrounds (n=66), statistically significant at ** $p \leq .01$, * $p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.61	0.08	.00**
Maternal dysfunctional parenting styles	-0.16	0.07	.03*
Cognitive reappraisal	0.27	0.07	.00**
Psychological distress			
Perceived stress	0.74	0.06	.00**
Cognitive reappraisal	-0.14	0.07	.05*
Campus connectedness			
Maternal dysfunctional parenting styles	-0.38	0.11	.00**
Paternal dysfunctional parenting styles [^]	0.30	0.11	.01*
Cognitive reappraisal	0.35	0.11	.00**
Positive affect			
Perceived stress	-0.47	0.09	.00**
Perceived social support (Friend)	0.15	0.07	.04*
Cognitive reappraisal	0.31	0.08	.00**
Negative affect			
Perceived stress	0.61	0.10	.00**
Maternal dysfunctional parenting styles	0.25	0.10	.02*
Cognitive reappraisal			
Perceived stress	-0.33	0.08	.00**
Perceived social support (Family)	0.34	0.14	.01*
Perceived social support (Friends)	0.41	0.10	.00**
Perceived social support (Significant other) [^]	-0.28	0.13	.03*

*Note: [^] unexpected direction of relationships

Table S-6 Standardised path coefficients of the direct effects of the longitudinal model for male students ($n=69$), statistically significant at $**p \leq .01$, $*p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.42	0.16	.01*
Perceived social support (Significant other)	0.21	0.08	.00**
Paternal dysfunctional parenting styles	-0.21	0.12	.05*
Psychological distress			
Perceived stress	0.52	0.17	.00**
Perceived social support (Family)	-0.23	0.10	.03*
Campus connectedness			
Perceived stress	-0.27	0.14	.05*
Positive affect			
Perceived social support (Significant other)	0.24	0.10	.02*
Negative affect			
Perceived stress	0.36	0.14	.01*
Cognitive reappraisal			
Perceived stress	-0.28	0.11	.01*
Perceived social support (Friends)	0.27	0.10	.00**
Perceived social support (Significant other)	0.21	0.11	.05*
Maternal dysfunctional parenting styles [^]	0.28	0.13	.03*
Paternal dysfunctional parenting styles	-0.32	0.13	.01*

*Note: [^] unexpected direction of relationships

Table S-7 Standardised path coefficients of the direct effects of the longitudinal model for female students ($n=288$), statistically significant at $**p \leq .01$, $*p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.40	0.05	.00**
Perceived social support (Friend)	0.16	0.06	.00**
Cognitive reappraisal	0.15	0.05	.00**
Psychological distress			
Perceived stress	0.53	0.05	.00**
Cognitive reappraisal	-0.16	0.05	.00**
Campus connectedness			
Perceived stress	-0.29	0.06	.00**
Perceived social support (Friend)	0.30	0.07	.00**
Maternal dysfunctional parenting styles	-0.26	0.06	.00**
Positive affect			
Perceived stress	-0.32	0.06	.00**
Cognitive reappraisal	0.17	0.05	.00**
Negative affect			
Perceived stress	0.48	0.05	.00**
Perceived social support (Significant other)^	0.13	0.06	.04*
Cognitive reappraisal			
Perceived stress	-0.24	0.06	.00**
Perceived social support (Friend)	0.23	0.06	.00**

*Note: ^ unexpected direction of relationships

Table S-8 Standardised path coefficients of the direct effects of the longitudinal model for students of White/White British ethnic background, (n=292), statistically significant at **p≤.01, *p≤.05.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.41	0.06	.00**
Perceived social support (Friend)	0.14	0.05	.01*
Cognitive reappraisal	0.15	0.05	.00**
Psychological distress			
Perceived stress	0.51	0.05	.00**
Cognitive reappraisal	-0.13	0.05	.01*
Campus connectedness			
Perceived stress	-0.26	0.06	.00**
Perceived social support (Friend)	0.27	0.06	.00**
Maternal dysfunctional parenting styles	-0.19	0.06	.00**
Positive affect			
Perceived stress	-0.32	0.06	.00**
Cognitive reappraisal	0.15	0.06	.01*
Negative affect			
Perceived stress	0.48	0.05	.00**
Perceived social support (Family)	-0.13	0.06	.05*
Cognitive reappraisal			
Perceived stress	-0.26	0.05	.00**
Perceived social support (Friend)	0.17	0.06	.01*

Table S-9 Standardised path coefficients of the direct effects of the longitudinal model for students of other ethnic backgrounds (n=65), statistically significant at ** $p \leq .01$, * $p \leq .05$.

Hypothesised paths	β	Standard error	p-value
Mental well-being			
Perceived stress	-0.45	0.09	.00**
Psychological distress			
Perceived stress	0.59	0.09	.00**
Campus connectedness			
Maternal dysfunctional parenting styles	-0.34	0.14	.02*
Paternal dysfunctional parenting styles [^]	0.27	0.12	.03*
Positive affect			
Perceived stress	-0.37	0.11	.00**
Perceived social support (Friend)	0.27	0.10	.01*
Maternal dysfunctional parenting styles	-0.25	0.12	.05*
Negative affect			
Perceived stress	0.44	0.14	.00**
Cognitive reappraisal			
Perceived stress	-0.34	0.08	.00**
Perceived social support (Family)	0.32	0.14	.02*
Perceived social support (Friend)	0.41	0.10	.00**
Perceived social support (Significant other)	-0.27	0.13	.04*

*Note: [^] unexpected direction of relationship