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INVESTIGATING THE DYNAMICS OF RESILIENCE IN THE CONTEXT OF WORK AND SPORT

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**Thesis submitted in fulfilment of the requirements for the degree of
Doctor of Philosophy**

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June 11th, 2019

Declaration

I hereby certify that this material, which I now submit for assessment on the programme of study leading to the award of Doctor of Philosophy is entirely my own work, and that I have exercised reasonable care to ensure that the work is original, and does not to the best of my knowledge breach any law of copyright, and has not been taken from the work of others save and to the extent that such work has been cited and acknowledged within the text of my work.

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SUMMARY OF PUBLICATIONS AND CONFERENCES

PEER REVIEWED PUBLICATIONS

1. **Bryan, C., O'Shea, D. & MacIntyre, T. (2017).** Stressing the relevance of resilience: A systematic review of resilience across the domains of sport and work. *International Review of Sport & Exercise Psychology*, doi: 10.1080/1750984X.2017.1381140
 - **ISI IF = 6.905**; Quartile 1
 - Scopus SJR: 1.463
 - Altmetric score: 4
2. **Bryan, C., MacIntyre, T., & O'Shea, D. (2018).** Invited commentary: The what, why, where and when of resilience as a dynamic, episodic, self-regulating system: A response to Hill et al. (2018), *Sport, Exercise and Performance Psychology*, 7(4), 355-362. Special Section: Perspectives on the dynamics of resilience. doi: 10.1037/spy0000133
 - **ISI IF = 1.930**; Quartile 2
 - Scopus SJR: 0.841

CONFERENCE PROCEEDINGS/PRESENTATIONS (PEER-REVIEWED)

2019

1. **Bryan, C., O'Shea, D. & MacIntyre, T. (2019).** Resilience, stress appraisals and the influences of past sporting experiences on future workplace success. Oral presentation at the 19th Congress of the European Association of Work and Organisational Psychology, Torino, 30th May – 1st June.
2. **Bryan, C., O'Shea, D. & MacIntyre, T. (2019).** The regulation of resilience at work: growth curve models of resilience during major and on-going life events. Oral

presentation at the 19th Congress of the European Association of Work and Organisational Psychology, Torino, 30th May – 1st June.

3. **Bryan, C., O’Shea, D. & MacIntyre, T. (2019).** Quantifying resilience as a state-like process: Longitudinal growth curve analysis of resilience in the workplace. Oral presentation as part of a symposium at the 15th The European Federation of Sport Psychology, Munster, 15th July – 20th July.
4. **Bryan, C., O’Shea, D. & MacIntyre, T. (2019).** Developing more than elite athletes in sport: The influence of past sporting experience on later life resilience processes in the workplace. Oral presentation as part of a symposium at the 15th The European Federation of Sport Psychology, Munster, 15th July – 20th July.

2017

5. **Bryan, C., MacIntyre, T. & O’Shea, D. (2017).** *The fluctuations of employee resilience during short-term adversity in proactive workplace goal pursuits.* Oral Presentation at the 18th Congress of the European Association of Work and Organisational Psychology, 17th – 20th May.

2015

6. **Bryan, C. MacIntyre, T. & O’Shea, D. (2015).** *Resilience as a resource toward sustainable success.* Oral presentation at 17th Congress of the European Association of Work and Organizational Psychology, Oslo, 20th – 23rd May.

ABSTRACT

The construct of psychological resilience across both work and sports contexts has been inconsistently conceptualised. Increasingly, a dynamic model of resilience is described in order to address varying experiences in which performers in both contexts sustain and rebound from diverse challenges. Psychological resource theories explain how various resources coincide with resilience and may interact with one another to facilitate the maintenance, disruption and reintegration of resilience. The aim of this research is to examine the dynamics of resilience and to explain change over both short and longer timeframes in two achievement contexts (work and sport). Using a four wave longitudinal study with 101 participants, this research investigates how resilience changes both over time and in relation to varying magnitudes of adversity. It is also hypothesised that both threat and challenge appraisals would be predicted by resilience and that a history of competitive sports would positively influence resilience processes at work, later in life. Latent growth modelling reveals statistically significant variation in resilience across time in the elevation and rate of change of the individual resilience growth trajectories. Furthermore, the findings indicate that employees' resilience capacity and their ability to maintain in goal directed work during stress was strongly predicted by higher challenge appraisals and lower threat appraisals. Those employees who had persisted in sport past secondary education were significantly better predictors of resilience processes rather than those who had disengaged earlier. Results offer empirical evidence of individual resilience change as a function of both time and adversity. The multi-wave design permits comprehensive assessment of the change in resilience over time in relation to adversity, appraisals and past life experiences. Researchers and practitioners are encouraged to develop resilience interventions for specific predictable adversities in sport and work. Building strategies around the dual pathway model will promote

preventive and reintegrative resilience approaches, optimising performance episodes and well-being in ongoing sport and work endeavours.

Keywords: resilience; dynamic process; longitudinal; work; organisational stress, adversity, sport psychology.

CHAPTER 1

INTRODUCTION

Failure is a nearly inevitable part of work; and along with dashed romance, it is one of life's most common traumas.

(Seligman, 2011, p. 101)

1.1 Overview of research area

For decades, the fields of neuroscience, mental health, medicine, psychology, and sociology have been collectively focused on the short-term and long-term consequences of stress. In addition to the focus of what goes wrong with people after adversity, researchers have begun to ask what are the natural mechanisms that allow people to cope successfully and even thrive from adversity (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014). Stress is ubiquitous and a reality of our daily lives. At some point, most people will be exposed to one (or more) potentially life-threatening traumatic experiences that can influence mental health and result in conditions such as post-traumatic stress disorder (PTSD; Karam et al., 2014) . On the other hand, the positive psychology movement has long identified *resilience* as a psychosocial strength which revealed how performers, facing similar adversities, can sustain healthy and capable lifestyles, while others cannot (Machida, Irwin, & Feltz, 2013). Within certain contexts, these potentially life-threatening traumatic experiences may never occur which bring the relevance of resilience into question. Two such contexts where such traumatic experiences are unlikely to occur are work and sporting environments, with a few notable exceptions such as the military (Xue et al., 2015) and extreme sport activities (MacIntyre, Walkin, Beckmann, Calogiuri, Gritzka, Oliver, Donnelly & Warrington, 2019). Both work and sport environments are associated with stress, a multiplicity of obstacles and uncertainty regarding outcomes; where individuals need to adapt, recover and bounce-back from stress. Thus, the concept of resilience would appear to hold some relevance in these contexts, regardless of the level of trauma.

Resilience is seen to play a major role in attaining positive outcomes, such as the ability to withstand and quickly overcome adversity (Manzano-Garcia & Ayala Calvo, 2013).

Resilience research is moving towards a more personalised approach that is more embedded in context (Southwick et al., 2014). Work and sport are two of these emerging contexts where scholars have taken an interest in how resilience operates (Galli & Gonzalez, 2015; Robertson, Cooper, Sarkar, & Curran, 2015). The need for a more context specific conceptualisation of resilience is evident across research in both sport and work contexts. Furthermore global conceptualisation of resilience still has much to learn about on-going processes of resilience (Southwick et al., 2014). Work and sport may play an important role in illuminating our understanding by providing a natural laboratory for the assessment and observation of successful individuals who regularly function at high levels during stress (Uphill, Lane, & Jones, 2012).

Decades ago resilience was defined as "maintaining adaptive functioning in spite of serious risk hazards"(Rutter, 1987, p. 209). Establishing the concept of resilience involves the identification of whether it should be defined in terms of the nature of the outcomes responding to stress or the personal resources that moderate the effect on positive outcomes. In recent years, the field of psychology has witnessed several calls to supplement traditional trait approaches, focusing on how people feel, think, and behave in general. A more dynamic approach is necessary to take into account within person fluctuations in these feelings, thoughts, and behaviours (Cervone & Little, 2019; Fleeson & Jayawickreme, 2015) that may influence resilience over time.

Similarly, research on psychological resilience has begun to transition away from trait approaches (Masten, 2001; Rutter, 2006). For example, work and organizational psychology is embracing the idea of within individual fluctuations in personality research and resilience (Britt, Shen, Sinclair, Grossman, & Klieger, 2016; Debusscher, Hofmans, & De Fruyt, 2016). Meanwhile, sport psychology research has begun to embrace a dynamic process of resilience

which encompasses associated resources and mental processes (Fletcher & Sarkar, 2012; Hill, den Hartigh, Meijer, de Jonge, & Van Yperen, 2018b). In order to elucidate how resilience concepts interact with environment related phenomena, an integrative perspective is needed in which stable between person differences and dynamic within person fluctuations are reconciled (Kiefer, Silva, Harrison, & Araújo, 2018).

Despite the appeal of the integrative approach to resilience, its implementation proves to be challenging, requiring novel theories, state of the art longitudinal research designs, and complex data analytical methods (latent change modelling, multilevel models) (Southwick et al., 2014). Therefore, this research seeks to advance the psychological concept of resilience by exploring state of the art knowledge related to dynamic theory, methodology, and statistical analyses in the contexts of sport and work.

1.2 Roadmap of the thesis

Defining the concept of resilience in achievement contexts requires analyses at different points: the magnitude of resilience change in response to stress over time; and the associated effects of personal resources which may influence resilience interactions. This thesis combines a systematic review and a major empirical study in order to contribute to knowledge in the study of psychological resilience across both sport and work contexts. This research contributes to our understanding of resilience literature in a number of ways. Firstly, through a systematic review of research within work and sport I summarise the relevant theories, psychological resources and a new dynamic model of resilience interaction (dual-pathway model) for future research; Second, it investigates the interactive processes of how, what, when and where of a dynamic process of resilience to contribute to theory building (Whetten, 1989), which contributes to the understanding of how resilience functions across a variety of long-term acute and short-term on-

going stressful episodes. Finally, these short and long term dynamic pathways of resilience spanning from performance episodes to youth sport development pathways are examined through the analysis of longitudinal study data, this offers researchers the first quantitative evidence of how resilience may fluctuate as a process in achievement contexts.

The thesis has been divided into four main sections comprising ten chapters. Section 1 (Chapters 1 through 6) provides an overview of relevant literature, theory and issues in past research, and builds the theoretical model of dynamic resilience developed from the present research. Chapter 1 provides a brief overview of the need for clarification of the resilience concept in achievement contexts. Chapter 2 systematically reviews the literature across sport and work in parallel in order to derive synergistic concepts and develop theory of resilience as a developable capacity. Chapter 3 outlines the dynamical model of resilience integrating self-regulation theory and conservation of resources theory in order to explain the fluctuations and developable capacity of resilience. Chapter 4 explores the role of sport from a youth development perspective and how resilience experiences in one domain may be beneficial in another (e.g. work). Finally, Chapter 5 summarises the theoretical model in its entirety, the main research questions and hypotheses to be investigated. As such it serves an orienting function for the reader, prior to moving on to discuss the methodology and findings.

Section 2 (chapter 6) discusses the methodological and measurement issues that were necessary to consider in the design of the study. It integrates design, measurement and analysis issues, as well as issues of methodological fit (Edmondson & McManus, 2007), in order to provide a rationale for the decisions made with regard to the study design, implementation and analysis of the research. It describes the methodology, and includes information regarding the

participants, the research design, how each of the variables were operationalised, the procedure and the main analytical techniques employed.

Section 3 (chapters 7 through 9) describes the main empirical findings of the longitudinal research conducted with office workers. In order to maintain a coherent structure, the research questions and hypotheses relating to the construct stability (chapter 7), associated resilience processes (chapter 8) and long-term developmental factors of resilience (chapter 9) are presented in separate chapters, corresponding to the presentation of each layer outlined in the literature review chapters (chapters 2, 3 and 4).

Finally, section 4 (chapter 10) pertains to the discussion of the findings, and the inferences which can be drawn from these. Chapter 10 discusses, contextualises and explains the findings, linking the results to past research, and drawing out the theoretical and practical implications that derive from the findings. Finally, this chapter summarises the major conclusions from the research, and discusses the limitations of the research. Recommendations for future research and new directions to advance our knowledge of resilience in both sport and organisational psychology are provided, in addition to discussion of the potential of the model for future research.

CHAPTER 2

**STRESSING THE RELEVANCE OF RESILIENCE: A SYSTEMATIC REVIEW OF
RESILIENCE ACROSS THE DOMAIN OF SPORT AND WORK***

Resilience is an emergent property of a hierarchically organized set of protective systems that cumulatively buffer the effects of adversity and can therefore rarely, if ever, be regarded as an intrinsic property of individuals.

(Roisman et al., 2002, p. 1216)

2.1 Introduction

Resilience is a concept that has become popular in both academic research and applied practice over the past 30 years (Estrada, Severt, & Jiménez-Rodríguez, 2016). However, our understanding of resilience has been hampered by inadequate conceptualisation and theorising, reflected in colloquialisms in applied practice and the conflation of resilience with other terms in previous research. Associated terms such as ‘mental toughness’, ‘emotional intelligence’, ‘hardiness’ and ‘grit’ are often used interchangeably with resilience (Andersen, 2011; Galli & Gonzalez, 2015), where both hardiness and grit connote a ‘hardy constitution’, absent of any reflective meta-cognitive appraisals (Fleming & Ledogar, 2008), rather than an adaptive response to stress, which is a fundamental aspect of resilience (Masten, 1994). These misconceptions have led to related measurements which have been identified in past reviews (Britt, Shen, Sinclair, Grossman, & Klieger, 2016; Fletcher and Sarkar, 2013). These methodological issues are highlighted in a review of measures of resilience cited by Estrada et al. (2016), who conclude that 89% of instruments used to measure resilience did so indirectly (e.g. antecedents, outcomes, and covariates closely related to resilience), or through measures thought to align with resilience (Estrada & Severt, 2014). It is imperative that resilience as a concept is accurately defined within and across corresponding domains of research. Once we understand the mechanisms regarding when and how resilience operates, future research will be able to distinguish resilience from other psychological terms in the first instance, and then more directly understand how it can be measured and how it can be developed. Moreover, it is important that resilience can be distinguished from other stress-related responses in order for us to understand its unique contribution to psychological health and well-being.

STRESSING THE RELEVANCE OF RESILIENCE: A SYSTEMATIC REVIEW

The contexts of sport and work can both be characterised as environments focused on achievement and goal-oriented behaviour (Mael & Ashforth, 2001). Studies have shown that having a meaningful and valued purpose can enhance resilience to stress (Southwick & Charney, 2012), and that engagement in mastery motivation tasks can also be a very powerful driver of learning and resilience (Masten, 2014). Employment and competitive sport can provide such meaning and purpose (Maher, O'Shea, & Igou, 2019). However, these environments can be stressful as they are characterised by achievement goals and pressures, with uncertain chances of success (Seery, 2011). For example, both organisational stress and competition-related stress in sports settings can impact psychological well-being (Fletcher & Wagstaff, 2009). Despite support for the importance of resilience in achievement contexts, many gaps remain in the research literature on how to conceptualise and develop resilience (Zellars, Justice, & Beck, 2011). Currently, within published literature there are eight existing conceptual and methodological reviews throughout the two important achievement contexts (i.e. sport and work) including: a review of definitions, concepts and theories (Fletcher & Sarkar, 2013); reviews of resilience in sport (Galli & Gonzalez, 2015; Sarkar & Fletcher, 2014a); reviews of resilience measurement (Pangallo, Zibarras, Lewis, & Flaxman, 2015; Sarkar & Fletcher, 2013; Windle, Bennett, & Noyes, 2011); and reviews of resilience (interventions) in the workplace (Robertson, Cooper, Sarkar, & Curran, 2015; Vanhove, Herian, Perez, Harms, & Lester, 2016). A recent conceptual article in the sport psychology literature concluded that resilience is 'the ability to use personal qualities to withstand pressure' (Fletcher & Sarkar, 2016, p.136), where these qualities include a combination of process-driven states, (malleable skills e.g. goal-setting, imagery) and outcome-oriented traits (less malleable e.g. general self-confidence, optimism). In this chapter, a systematic review of past resilience research in two contexts is presented: competitive sport and

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the workplace. In doing so, past conceptualisations are reviewed and form an overview of the pathways through which resilience develops in these specific contexts. This can be used by future researchers throughout work and sport to more fruitfully expand research in the area.

Resilience – An overview.

Resilience is an interdisciplinary construct that is often defined in a broad manner, from a stationary trait to a dynamic capacity, which helps individuals to deal with and adjust positively to adversity (Hill et al., 2018b). Previous research has lacked clarity regarding the question of whether resilience should be conceptualised as a state-like process or a trait-like outcome to stress (Bonanno & Diminich, 2013; Masten, 2001; Wagnild & Young, 1993). Recent ideologies suggest that resilience may be influenced by both stationary trait factors (e.g. positive personality) and malleable state factors (e.g. social resources) (Fletcher & Sarkar, 2016; Vanhove et al., 2016), which may react differently depending on both the magnitude of, and exposure to, adversity (Biron, Ivers, Brun, & Cooper, 2006). However, this is still unclear. Zautra, Arewasikporn, and Davis (2010) defined resilience as an adaptive response to adversity and identified three key components of these positive adaptations: recovery, sustainability, and growth. In their conceptualisations, resilience is evidenced by the speed and thoroughness of an individual's recovery from an adverse event, by their ability to sustain valued engagements, and through new learning, growth and advancement as a consequence of adversity. However, these positive responses to stress are dependent on both the magnitude of adversity and the availability of personal psychological resources (Estrada et al., 2016; Fletcher & Sarkar, 2016).

On the contrary, Bonanno (2004) points out that resilience research in adult populations is often characterised by overcoming acute stress which occurs as a result of catastrophic events. Similarly, Vanhove et al. (2016) asserts that some occupational groups, such as firefighters,

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police officers and disaster relief personnel, are at elevated risk for acute stress and trauma. Similarly, resilience interventions tend to focus on protecting individuals from acute and chronic stress, particularly in occupations with high responsibility and high social interaction, such as the medicine and teaching (Clarke & Cooper, 2000; Robertson, Cooper, Sarkar, & Curran, 2015). Finally, military organisations have been at the forefront of research on the subject of resilience, and there exist a number of narrative reviews identifying protective factors (e.g. hope) that contribute to people's resilience (Meredith et al. 2011; Mulligan, Fear, Jones, Wessely, & Greenberg, 2011). Britt et al. (2016) question whether resilience is appropriate at all when examining traditional work stress (e.g. work overload, organisational constraints) because this type of stress does not typically involve significant adversity at a high intensity and/or for a long duration. However, in this review we suggest that building resilience and its associated resources is as important in these less extreme employment contexts (Seligman, 2011) and in sporting contexts (Sarkar & Fletcher, 2014a).

This chapter systematically reviews existing research on resilience in the contexts of work and sport to identify the key trends and conceptual and methodological limitations. Consequently, it presents a roadmap for the empirical research needed in this thesis which focuses on examining resilience as an ongoing process in response to both chronic and acute adversities influenced by other psychological and contextual resources (Bonanno & Diminich, 2013). The aims of this review are thus three-fold: (1) to review the evidence for resilience as a state or a trait; (2) to investigate the resources that have been associated with resilience processes and outcomes and (3) to identify the positive adaptations that result from a variety of adverse magnitudes and exposures.

Strength of an interdisciplinary review.

In order to identify universal concepts, psychological researchers in different applied contexts (e.g. work psychology, sport psychology) have been encouraged to review, borrow and build on research within both domains (Jones, 2002). Both contexts involve achievement-motivated environments with chronic stressors in which individuals are required to regulate their emotions (Tugade & Fredrickson, 2007). Achievement contexts involve ongoing goal-oriented behaviours challenged by a variety of chronic stressors (Shoenfelt, 2016), and so both the working and sporting environments can be considered achievement contexts. These parallel contexts offer a rich and dynamic natural laboratory for the assessment and observation of resilience in mentally healthy individuals exhibiting goal-oriented behaviour (Uphill, Lane, & Jones, 2012). Positive organisational behaviour has already adopted cross-disciplinary views, drawing from established theory-building and findings across clinical and developmental psychology (Luthans, 2002). There are hypotheses that resilience which is developed and learned through adverse goal-focused endeavours in one domain may be applicable across others and life situations (Block & Kremen, 1996). In a recent article Shoenfelt (2016) highlighted the importance of comparing sport and work psychology. The review discussed a multitude of conceptual parallels including: mentally healthy adult populations, adaptations to chronic adversity (e.g. performance deadlines, organisational stress); dealing with acute negative events (e.g. personal life event, poor performance); and resilience required to adapt to the demands of some common positive events (e.g. promotion, marriage). In both sport and work contexts, situational adversities should not have to be so severe that they result in psychological trauma before being of interest to resilience researchers. Rather, achieving positive functioning in the face of adversity should serve as an appropriate criterion for investigation. Furthermore, Britt et

al. (2016) outline how resilience research in sport suffers from many of the same issues identified through the most recent work psychology research.

Consequently, incorporating research from these parallel domains adds strength and much needed clarification to the extant resilience research literature. In the subsequent sections, the systematic review method, results and ensuing discussion and conclusions are outlined.

2.2 Method

Frameworks and procedure.

Using the seven-stage model provided by Pluye and Hong (2014) for analysing mixed study reviews, this review can be classified as a convergent, mixed methods design in which qualitative coding analysis involved an integration of both quantitative and qualitative data during collection. To ensure methodological rigour, a second internal search of all databases with key terms was performed by myself and checked by two PhD supervisors to confirm replication. The quality of the included studies (Appendix B) was then appraised using a mixed methods appraisal tool (MMAT) under the guidance of recent systematic review methodology which met criteria outlined by Pluye, Gagnon, Griffiths and Johnson-Lafleur (2009) (cf. Gledhill, Harwood, & Forsdyke, 2017).

Eligibility criteria.

The following inclusion criteria were deployed for the papers: (1) published in the English language; (2) original, peer reviewed; (3) full-text; (4) examining resilience at the level of the individual; (5) either quantitative or qualitative and including resilience as a factor of analysis/discussion.

Sport and work studies examining resilience but focused solely on overcoming acute stress due to acute catastrophic events (e.g. life-threatening circumstances) were excluded due to

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the aims of the research question, which was to analyse the appropriateness of resilience in less-severe work and sporting arenas (Shoenfelt, 2016; Tugade & Fredrickson, 2007). Coinciding with sensitivity and agency concerns expressed by Masten (2014) in the globalisation of resilience research, workplace studies dealing with significant carergiver stress (e.g. those relating to nurses, doctors, social workers, mental health education) were excluded in order to keep the sample precisely to the parallels within the sporting context being studied (Southwick, Bonanno, Masten, Panter-Brick, & Yehuda, 2014).

Research strategy.

The initial search extended from 23 March to 16 December 2016 and involved the following processes: (1) the use of the following electronic online databases: Academic Search Complete, Business Source Complete, PsychARTICLES, PsychINFO and SPORTDiscus; (2) the application of further searches using Google Scholar to ensure that no key papers were omitted; (3) the scanning of the reference sections of all retained papers to ensure a comprehensive search of the literature (Greenhalagh & Peacock, 2005).

The following keyword combinations were used: Resil* AND work* AND success; Resil* AND athlete* AND success; Resil* AND success; Resil* AND work; Resil* AND sport; Resil* AND perform*; Resil* AND Player; Resil* AND Employ*. In order to capture all relevant previous research, no publication date limitation was set. The search generated 1,391 articles which were assessed for inclusion in three stages: initially by title, then by abstract and introduction and finally by full text. This process is highlighted in the flow diagram in Figure 2.1.

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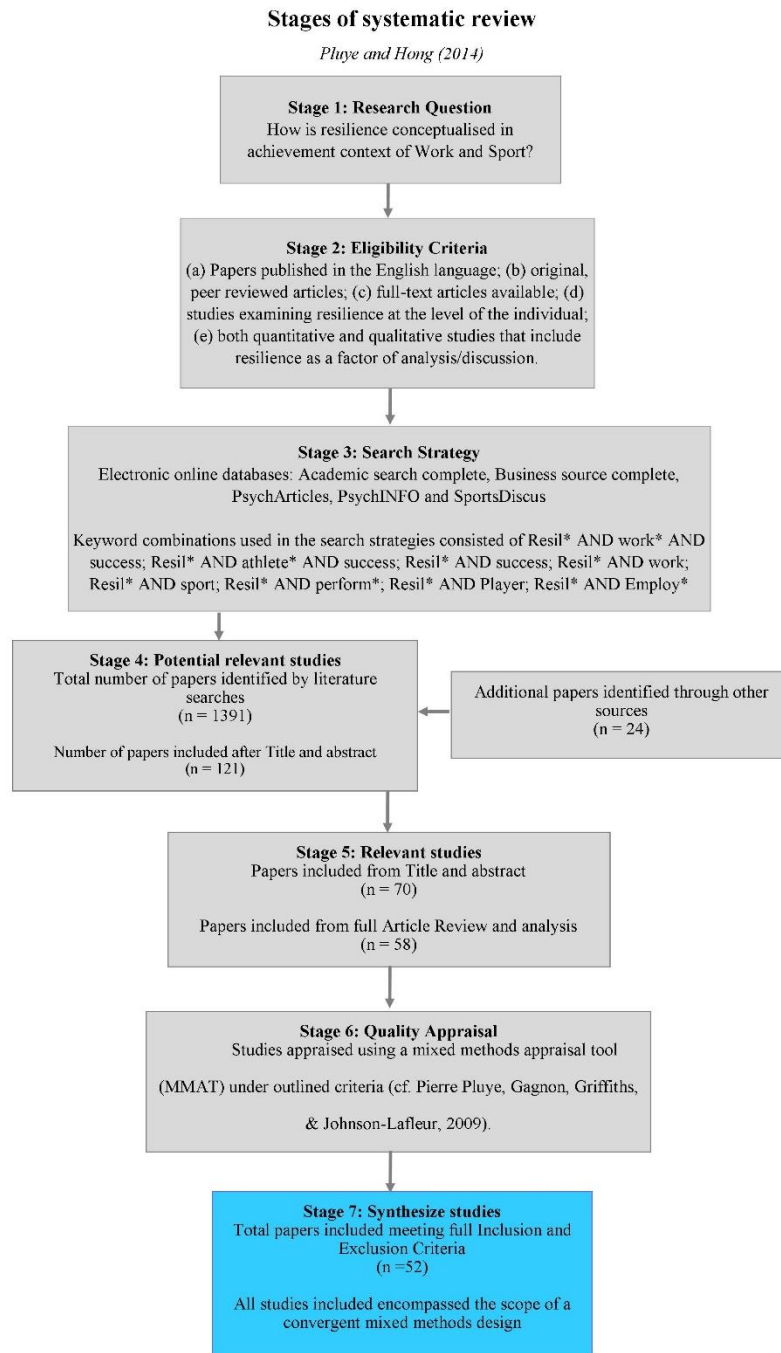


Figure 2.1 Search results flow diagram.

Thematic coding procedure.

In order to analyse the final set of papers, a thematic analysis approach was used, following the guidelines of Braun and Clarke (2006). The content of the included papers was semantically coded (Boyatzis, 1998) as follows:

- (1) Definition of resilience: the primary statement used to guide the researchers' theoretical conceptualisation of resilience.
- (2) Resilience construct placement: guidelines drawn up by Luthans, Avolio, Avey, and Norman (2007) and Chen, Gully, Whiteman, and Kilcullen (2000) were used to classify where on the state-trait construct continuum each article conceptualised resilience. Chen et al. (2000) described traits as distal from behaviour and stable over time and states as proximal to behaviour and variable over time. Four categories were used: (i) states, i.e. very changeable; (ii) 'state-like', i.e. relatively malleable; (iii) trait-like, i.e. difficult to change; and (iv) trait, i.e. very stable.
- (3) Theoretical Orientation: theoretical frameworks used to understand resilience in the articles.
- (4) Adversity was coded to capture both magnitude and exposure levels as posited by Biron et al. (2006), ranging from minor, moderate, to high and from short term, medium term, to long term, respectively.
- (5) Resources: specific psychological and contextual resources that were highlighted by the authors throughout each article were recorded, in which a clear relationship with resilience processes was drawn. Resources were summarised under a single encompassing term, e.g. support encompasses several related terms, including social support, social networks, perceived social support, emotional social support, coach and

staff support, social resources, socially supportive environments. This allowed us to summarise relevant pools of resources, rather than outlining a vast array of similar terms. However, the original author terms are recorded in supplementary Table 2.1.

2.3 Results

Synthesis of included studies.

The final sample composed of 52 papers, 28 of which were focused on sport, 23 on work and one incorporating both work and sport. Amongst these, articles six were of mixed methods design, 12 were of qualitative design and 34 were quantitative. The average MMAT (mixed methods appraisal tool) score for the included articles was high, at 82% (see Appendix B). All papers are summarised in the supplementary information (Table 2.1), outlining (1) construct placement; (2) the specific context of the research; (3) theoretical orientation; (4) adversity (exposure and magnitude); (5) psychological resources influencing resilience in existing research; and (6) the research design. The papers included were published between March 1990 and July 2016, although no timeframe limits were set. The age of study participants ranged from 14-70 in sport articles and 19-74 in work articles. Sample sizes ranged from 7-451 participants in sporting contexts and 30-1,032 participants in work contexts.

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Table 2.1 *Summary of Included Papers in the Systematic Review*

Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Quantitative: Cross-sectional studies								
Arora and Rangnekar (2014)	Workplace Mentoring and Career Resilience: An Empirical Test	Trait-like	Work	Richardson (2002) model of resiliency; social cognitive theory (Bandura, 1986); London’s (1997) career motivation theory	Medium-Term	Minor	Social Support	Cross-Sectional, Survey
Ayala and Manzano (2010)	Established Business Owners’ Success: Influencing Factors	Trait	Work		Long-term	Moderate	No outline of influence with other psychological resources	Cross-Sectional, Survey
Belem, Caruzzo et al. (2014)	Impact of Coping Strategies on Resilience of Elite Beach Volleyball Athletes	State-like	Sport	Richardson et al. (1990); Richardson (2002) model of resiliency	Long-term	Moderate	Confidence, Achievement motivation, optimism, Coping skills	Cross-Sectional, survey
Burke and Attridge (2011)	Pathways to Career and Leadership Success: Part 1- A Psychosocial Profile of \$100k Professionals	Trait	Work		Long-term	Minor	No specific resources outlined	Cross-Sectional, surveys

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Burton et al. (2010)	Feasibility and Effectiveness of Psychosocial Resilience Training: A Pilot Study of the Ready Program	State-like	Work		Long-term	Minor	Positive emotions, cognitive flexibility, social support, life meaning, and active coping	Longitudinal, survey and biomarkers at 2 points (13 weeks)
Cardoso and Sacomori (2014)	Resilience of Athletes with Physical Disabilities: A Cross Sectional Study	Trait-like	Sport		Long-term	Moderate	Self-efficacy	Cross-Sectional, survey
Cowden et al. (2016)	Self-Reflection and Self-Insight Predict Resilience and Stress in Competitive Tennis	State-like	Sport	Resilience grounded theory (Fletcher and Sarkar, 2012)	Long-term	Moderate	Self-insight and Self-reflection	Cross-Sectional
Gillispie, et al. (2016)	Employee Mental Health Treatment Seeking: Perceptions of Responsibility and Resilience	Trait	Work		Short-term	Moderate	Self-sufficient and proactive	Cross-Sectional, Survey
Gonzalez et al. (2016)	Validity and Reliability of the Connor-Davidson Resilience Scale (CD-RISC) in Competitive Sport	State-like	Sport	Resilience grounded theory (Fletcher and Sarkar, 2012)	Medium-Term	Moderate	Positive Emotions	Cross-Sectional

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Gould, Dieffenbach et al. (2002)	Psychological Characteristics and Their Development in Olympic Champions.	Trait-like	Sport		Long-term	Moderate	Coping strategies and optimism	Cross-Sectional
Gucciardi, Jackson et al. (2011)	The Connor-Davidson Resilience Scale (CD-RISC): Dimensionality and Age-Related Measurement Invariance with Australian Cricketers	State-like	Sport		Medium-Term	Moderate	Social Support, self-efficacy, hardiness	Cross-Sectional, survey
Hosseini and Besharat (2010)	Relation Of Resilience with Sport Achievement and Mental Health in a Sample of Athletes	Trait-like	Sport		Medium-Term	Minor	Positive emotions and social support	Cross-Sectional, surveys
Jones and Jetten (2011)	Recovering from Strain and Enduring Pain Multiple Group Memberships Promote Resilience in the Face of Physical Challenges	Trait-like	Sport		Short-term	Moderate	Social Support	Cross-Sectional, Surveys and biological measures
Martin-Krumm et al. (2003)	Explanatory Style and Resilience After Sports Failure	Trait-like	Sport		Short-term	Minor	Optimism	Cross-Sectional, Task specific actions

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Liossis et al. (2009)	The Promoting Adult Resilience (PAR) Program: The Effectiveness of the Second, Shorter Pilot of a Workplace Prevention Program	State-like	Work		Medium-Term	Minor	Optimism, coping self-efficacy,	Longitudinal - 3 points(7 weeks)
Lu et al. (2016)	Interaction of Athletes' Resilience and Coaches' Social Support on the Stress-Burnout Relationship: A Conjunctive Moderation Perspective	State-like	Sport	Smith's (1986) cognitive-affective model of athletic burnout; Resilience grounded theory (Fletcher and Sarkar, 2012)	Long-Term	Moderate	Coach informational support and Coach Tangible support	Cross-Sectional
Luthans, Avolio et al. (2007)	Positive Psychological Capital: Measurement and Relationship with Performance and Satisfaction	State-like	Work	Richardson (2002) model of resiliency, Hobfoll (2002) resource theory, Fredrickson (2001) Broaden and Build	Long-term	Minor	Hope, optimism, self-efficacy and positive emotions	Cross-Sectional
Manzano and Ayala (2013)	Psychometric Properties of Connor-Davidson Resilience Scale in a Spanish Sample of Entrepreneurs	Trait-like	Work		Long-term	Moderate	Optimism, Hardiness, resourcefulness	Cross-Sectional

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
McLarnon and Rothstein (2013)	Development and Initial Validation of the Workplace Resilience Inventory	State	Work	Richardson (2002) resiliency model ; King and Rothstein (2010) resilience model and Luthans, Youssef, et al., (2007) resilience related theory in the workplace	Medium-Term	Moderate	Cognitive self-regulation, Social Support, self-efficacy, positive mindset, resourcefulness, proactiveness	Cross-Sectional, surveys
Meggs et al. (2016)	The Cortisol Awakening Response and Resilience in Elite Swimmers	Trait-like	Sport	Resilience grounded theory (Fletcher and Sarkar, 2012)	Short-term	Moderate	Self-reflection, confidence and self-control	Cross-Sectional
Millear et al., (2008)	Being on Par: Outcomes of A Pilot Trial to Improve Mental Health and Wellbeing in the Workplace with the Promoting Adult Resilience (PAR) Program	State-like	Work		Medium-Term	Minor	Self-efficacy	Longitudinal - 3 points(9 month follow up)
Nezhad and Besharat (2010)	Relations of Resilience and Hardiness with Sport Achievement and Mental Health in a Sample of Athletes	State-like	Sport	Mancini & Bonanno (2009) individual differences resilience model	Medium-Term	Moderate	Self-efficacy, coping strategies, positive emotion and locus of control	Cross-Sectional, survey

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Paul, Khanna et al. (2012)	Psycho-Motor Analysis of Athletes Under Overtraining Stress	State	Sport	Easterbrook (1959) Attention Theory	Short-term	Moderate	No specific resources outlined	Cross-Sectional, Survey / Motor Task
Pidgeon et al. (2014)	Evaluating the Effectiveness of Enhancing Resilience in Human Service Professionals Using a Retreat-Based Mindfulness with Metta Training Program: A Randomised Control Trial	State-like	Work	Fredrickson (2001) Broaden and Build	Medium-Term	Minor	Perspective	Longitudinal, survey at 3 points (16 weeks follow up)
Roche, Haar et al. (2014)	The Role of Mindfulness and Psychological Capital on the Well-Being of Leaders	Trait-like	Work		Medium-Term	Minor	Optimism, self-efficacy, coping skills, hope, self-regulation	Cross-Sectional, Survey
Shin and Seo (2012)	Resources for Change: The Relationships of Organizational Inducements and Psychological Resilience to Employees'	Trait	Work	Conservation of resources theory (Hobfoll, 1988, 1989, 2001)	Medium-Term	Moderate	Positive emotions, social support	Longitudinal Survey

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Smith, Smoll and Ptacek (1990)	Conjunctive Moderator Variables in Vulnerability and Resiliency Research: Life Stress, Social Support and Coping Skills, and Adolescent Sport Injuries	State-like	Sport		Medium-Term	Moderate	Social support and coping skills	Cross-Sectional, Survey
Subhan and Ijaz (2012)	Resilience Scale for Athletes	State-like	Sport		Short-term	Moderate	Physical Toughness, emotional control, self-confidence and maturity	Cross-Sectional, survey
Vitali, et al. (2015)	Motivational Climate, Resilience, and Burnout in Youth Sport	Trait-like	Sport		Medium-Term	Moderate	Mastery motivation, team support	Cross-Sectional, Survey
Waite and Richardson (2004)	Determining the Efficacy of Resiliency Training in the Work Site	Trait-like	Work	Richardson et al. (1990); Richardson (2002) model of resiliency	Medium term	Minor	Inter personal relations, life purpose, locus of control, and self esteem	Longitudinal, survey 3 points (16 weeks)
Youssef and Luthans (2007)	Positive Organizational Behaviour in the Workplace: The Impact of Hope,	State-like	Work	Resource Caravan' Model (Hobfoll, 2002) and Broaden and Build Theory (Fredrickson, 2001)	Long-term	Minor	Confidence and social support	Cross-Sectional, survey

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
	Optimism, and Resilience							
Quantitative Studies: Longitudinal								
Ayala and Manzano (2014)	The Resilience of the Entrepreneur. Influence on the Success of the Business. A Longitudinal Analysis	Trait	Work		Long-Term	Moderate	Resourcefulness, optimism and hardiness	Longitudinal (resilience cross-sectional collection), Survey
Secades et al. (2016)	Relationship Between Resilience and Coping Strategies in Competitive Sport	Trait-like	Sport	Resilience grounded theory (Fletcher and Sarkar, 2012)	Medium-Term	Moderate	Coping strategies	Longitudinal survey (beginning of competitive mesocycle and immediately after the end of the most important competition of the season)

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Yi, Smith et al. (2005)	Stress-Resilience, Illness, and Coping: A Person-Focused Investigation of Young Women Athletes	State-like	Sport		Medium-Term	Moderate	Coping strategies and social support	Longitudinal illness record (resilience associated survey cross-sectional pre-collection)
Seligman and Nolen-Hoeksema (1990)	Explanatory Style as a Mechanism of Disappointing Athletic Performance	Trait	Sport		Short-term	Moderate	Optimism	Longitudinal task performance (resilience cross-sectional collection), Survey and coach rated performance
Mummery, Schofield et al. (2004)	Bouncing Back: The Role of Coping Style, Social Support and Self-Concept in Resilience of Sport Performance.	Trait-like	Sport		Short-term	Moderate	Self-perception, perceived social support, coping skills	Longitudinal task performance (resilience cross-sectional collection), Survey and swim performance

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Abbot et al. (2009)	The Impact of Online Resilience Training for Sales Managers on Wellbeing and Performance	State-like	Work		Medium-term	Moderate	Emotion-regulation, Self-efficacy, optimism	Longitudinal, intervention
Luthans and Avey (2010)	The Development and Resulting Performance Impact of Positive Psychology Capital	State-like	Work	Resource Caravan' Model (Hobfoll, 2002) and Broaden and Build Theory (Fredrickson, 2001)	Medium-term	Minor	Social networks	Longitudinal, intervention
Sherlock-Storey, Moss, and Timson (2013)	Brief Coaching for Resilience During Organisational Change- An Exploratory Study	State-like	Work		Medium-term	Moderate	Social Support, hope and optimism	Longitudinal, intervention and survey
Grant, Curtayne, and Burton (2009)	Executive Coaching Enhances Goal Attainment, Resilience and Workplace Well-Being: A Randomised Controlled Study	State-like	Work		Medium-Term	Moderate	Social Support	Longitudinal, Survey
Qualitative Studies								
Brown, Lafferty, and Triggs (2015)	In the Face of Adversity: Resiliency in Winter Sport Athletes	State-like	Sport	Ricahrdson et al. (1990); Richardson (2002) model of resiliency	Long-term	Moderate	Confidence, intrinsic motivation, Social support, Self-regulation,	Cross-Sectional, Structured interviews

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
							perceived control	
Fletcher and Sarkar (2012)	A Grounded Theory of Psychological Resilience in Olympic Champions	State-like	Sport	Ricahrdson et al. (1990); Richardson (2002) model of resiliency	Long-term	Moderate	Positive personality, motivation, confidence, focus, perceived social support	Cross-Sectional, Semi-structured interview
Galli and Reel (2012)	‘It Was Hard, But It Was Good’: A Qualitative Exploration of Stress-Related Growth in Division I Intercollegiate Athletes	State-like	Sport	Richardson (2002) model of resiliency	Medium-term	Moderate	Social support, Life perspective	Cross-Sectional, Semi-structured interview
Galli and Vealey (2008)	‘Bouncing Back’ from Adversity: Athletes’ Experiences of Resilience	State-like	Sport	Ricahrdson et al. (1990); Richardson (2002) model of resiliency	Medium-term	Moderate	Social support, being positive, determination and competitiveness and maturity	Cross-Sectional, Semi-structured interview

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Holt and Dunn (2004)	Toward a Grounded Theory of the Psychosocial Competencies and Environmental Conditions Associated with Soccer Success	State-like	Sport		Medium-term	Moderate	Social Support and coping strategies	Cross-Sectional, Structured interviews
Loh and Dahesihari (2013)	Resilience and Economic Empowerment: A Qualitative Investigation of Entrepreneurial Indonesian Women	Trait	Work		Medium-term	Moderate	Motivation to succeed, optimism, self-confidence, proactive and Positive thinking	Cross-Sectional, Structured interviews
Machida and Irwin (2013)	Resilience in Competitive Athletes with Spinal Cord Injury the Role of Sport Participation	State-like	Sport	Richardson (2002) model of resiliency	Medium-term	Moderate	Multiple types of social support, motivation to adapt, behavioural and cognitive coping strategies	Cross-Sectional, Structured interviews
Mills, Butt, et al. (2012)	Identifying Factors Perceived to Influence the Development of Elite Youth Football Academy Players	State-like	Sport		Long-term	Moderate	Optimism and confidence	Cross-Sectional, Structured interviews

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Author	Title	Construct placement	Context	Theoretical orientation	Adversity Exposure	Adversity Magnitude	Resources	Research design
Sarkar and Fletcher (2014)	Ordinary Magic, Extraordinary Performance: Psychological Resilience and Thriving In High Achievers	State-like	Sport AND Work		Long-term	Moderate	Positive personality, Pro-activeness, Balance and perspective, sense of control, flexibility and perceived social support.	Cross-Sectional, Structured interviews
Sarkar et al. (2015)	What Doesn't Kill Me...: Adversity-Related Experiences are Vital in the Development Of Superior Olympic Performance	State-like	Sport		Long-term	Moderate	Self-distanced Perspective, motivation	Cross-Sectional, Structured interviews
Vries and Sheilds (2006)	Towards a Theory of Entrepreneurial Resilience: A Case Study Analysis Of New Zealand SME Owners Operators	State-like	Work		Long-term	Moderate	Optimism, hardiness, achievement motivation, flexibility	Cross-Sectional, Structured interviews
White & Bennie (2015)	Resilience in Youth Sport: A Qualitative Investigation of Gymnastics Coach and Athlete Perceptions	State-like	Sport	Fergus and Zimmerman (2005) 3 stage model of resilience	Medium-term	Moderate	Self-efficacy, Positive thinking, Coping strategies, Social support	Cross-Sectional, Structured interviews

Defining resilience.

A myriad of different definitions were cited across the 52 articles. Nine papers introduced resilience by citing numerous examples of how resilience is defined and then noting the diverse and inconsistent definitions available (Arora & Rangnekar, 2014; White & Bennie, 2015). Thirty-six papers cited at least one clear definition of resilience; five outlined their own definition; and 11 failed to provide any operational definition at all (summarised in supplementary information, Table 1). Corresponding definitions of resilience across both sport and work contexts were found. Where papers offered multiple definitions, only the guiding definition of the article was recorded. We conducted a frequency word analysis on each author's guiding definition of resilience (see Table 1). The results indicated that most definitions included three core concepts in relation to adversity: positive adaptation, bouncing back (cf. rebound) and maintenance of well-being (also noted by Fletcher & Sarkar, 2013; Britt et al., 2016).

Table 2.2. *Common Definitions of Resilience*

Frequency	Most Common wording constructs
15	positive or successful adaptation to adversity
14	a process
11	'bounce back' quickly from adversity
7	An individual 'capacity'
5	ability to maintain well-being in face of adversity

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Frequency	Most Common wording constructs
Frequency	Most common authors cited
9	Luthar et al., (2000): <i>“dynamic process encompassing positive adaptation within the context of significant adversity”</i>
4	Luthans et al., (2007): <i>“When beset by problems and adversity, sustaining and bouncing back and even beyond to attain success”</i>
3	Fletcher and Sarkar (2012): <i>“The role of mental processes and behaviour in promoting personal assets and protecting an individual from the potential negative effect of stressors”</i>
Resulting definition:	<i>“A dynamic process encompassing the capacity to maintain regular functioning through diverse challenges or to rebound through the use of facilitative resources”</i>

The definitions of resilience provided by Luthar, Cicchetti and Becker, (2000), Luthans et al. (2007) and Fletcher and Sarkar (2012) were the most commonly used definitions, and were included in nine, four and three papers respectively. A further 22 definitions were used across the remaining papers: five authors provided their own interpretations of resilience and 11 papers failed to provide any definition. The summary of guiding definitions is outlined in Appendix A. It is evident in the samples of both work and sport studies that little agreement exists on how to define resilience, and this corresponds with the conclusion of Pangallo (2015). In this review, the most prominent and frequently occurring conceptual issues were synthesised. A multitude of definitions across the reviewed published work defined resilience ‘A dynamic process

encompassing the capacity to maintain regular functioning through diverse challenges or to rebound through the use of facilitative resources’. This definition combines the most common aspects of existing definitions of resilience. It mirrors perspectives found in both qualitative and quantitative studies, in which the researchers focused on chronic adaptations to adversity versus an acute ability to persist in the face of adversity.

Stability versus change in the construct placement of resilience.

Thirty articles classified resilience as state-like, 13 articles as trait-like, seven articles as a trait and two articles as a state (see Figure 2.2). Most of these studies suggest that resilience acts as a dynamic state (‘state-like’) subject to both change and development over time through repetitive learned adaptations with adverse situations (McLarnon & Rothstein, 2013).

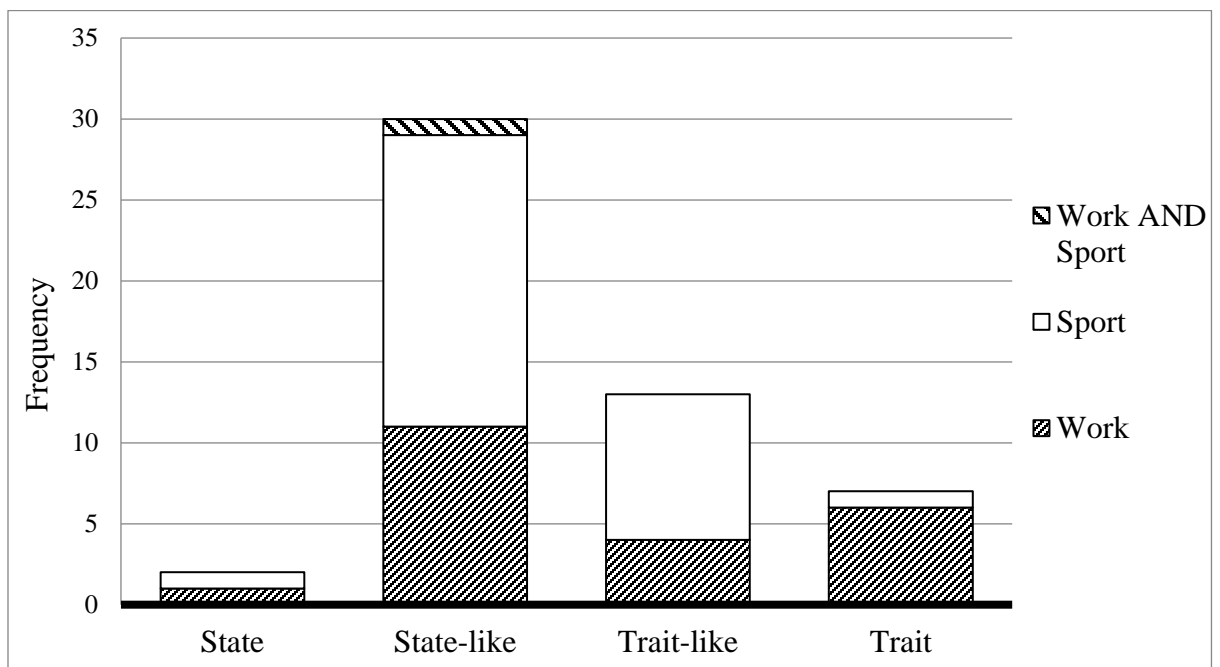


Figure 2.2 Construct placement of resilience along state-trait construct continuum of resilience

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Regarding the dynamics of resilience development, researchers focused on two core concepts: the ability to sustain both well-being and performance in the face of adversity and positive adaptations to stress, ranging from potentially traumatic life events to daily hassles. Resilience as a process describes the state-like disruption and reintegration of resilience together with its associated resource factors, whereas considering resilience as an outcome implies a stationary capacity to overcome adversity. Twenty-one articles in this review focused specifically on developing/building resilience, further highlighting the evidence that a trait conceptualisation is outdated. In order for more effective intervention studies to be conducted, the placement of resilience as a malleable state-like construct is critical to the underpinnings of future research.

Theoretical approaches to understanding resilience.

The included articles reflect a paradigm shift away from conceptualising resilience as a trait towards a state-like process. When defining resilience as a dynamic or state-like construct, researchers used several different theoretical frameworks. The most commonly used resilience model was Richardson's (2002) three waves of resiliency enquiry, employed in a total of 10 articles. Richardson (2002) describes resilience processes in three layers of stress-resilience interaction: (1) an ability to identify protective resources; (2) the disruptive and integrative process for attaining and reinforcing those resources; and (3) the motivational force to reintegrate from life's negative traumas. Richardson's (2002) *Second-Wave Resiliency Metatheory* represents resilience as a process and is thus pivotal in answering how resilience qualities are acquired and developed (Galli & Vealey, 2008; Luthans et al., 2007).

Before any stress-resilience interaction occurs, a stable homeostatic state of resilience is thought to precede any perturbation. A perturbation can be thought of as any external interaction

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which causes a subsequent change in resting or homeostatic resilience. In Richardson's (2002) theory, there are two separate resource waves that attend to resilience interactions: wave 1 comprises more trait-like personal qualities and wave 2 focuses on more state-like skills towards resilience reintegration. However, the exclusion of any meta-cognitive appraisals or emotive processes are significant limitations of the theory (Fletcher & Sarkar, 2012).

Fletcher and Sarkar (2016) posit that resilience is both proactive and protective (cf. robust resilience) and reactive and integrative (cf. rebound resilience), in which a combination of both personal psychological factors and developable skills (e.g. goal-setting, self-talk) offer an individual capacity or flexible 'bandwidth' in nature and target before, during, and after stressful or adverse encounters. This model also reflects aspects of Bonanno and Diminich's (2013) resilience trajectories used in previous reviews (Galli & Gonzalez, 2015). Bonanno and Diminich (2013) theorise that resilience has two potential pathways, depending on the magnitude and relevance of the adversity. The first pathway is referred to as 'minimal impact resilience' (p. 380), in which identified resources help to maintain well-being throughout adverse situations. The second pathway is referred to as 'emergent resilience' (p. 379), in which these resources may undergo depletion and disruption before reintegrating with stronger learned qualities.

Other prominent resilience theories include Fletcher and Sarkar's (2012) *Grounded Resilience Theory*, which was cited in three articles. This grounded theory approach proposes that positive personality, motivation, confidence, focus and perceived social support contribute to resilience as major protective resources during adversity and periods of stress, in the context of successful sporting careers. The authors postulate that protective resources are under the influence of both challenge appraisals and metacognitions, to protect against the potential

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negative effects of stress where these processes promote facilitative responses that precede sport performance.

Further resilience theories cited once throughout the review included Fergus and Zimmerman's (2005) *Three-stage Model of Resilience* (White & Bennie, 2015); Mancini and Bonanno's (2009) *Individual Differences Resilience Model* (Nezhad & Besharat, 2010); King and Rothstein's (2010) *Resilience Model* (McLarnon & Rothstein, 2013); and Luthans, et. al. (2007) *Resilience-related Theory in the Workplace* (McLarnon & Rothstein, 2013).

In addition to these specific resilience theories, a number of related theories were included in order to better understand resilience processes, although interestingly they were only utilised in studies focused on the workplace. These included two psychological resource- based theories: the *Conservation of Resources Theory* (Hobfoll, 1989, 2001) was cited in four articles and the *Broaden and Build Theory* (Fredrickson, 2001) was cited in three articles. Resources are loosely defined as objects, states, conditions, and other things people value (Hobfoll, 2001). In line with Fredrickson's (2001) *Broaden and Build Theory*, building and developing psychological resources may result in a subsequent increase in resilience. For example, Hobfoll (2001) identified resource caravans to represent how patterns of resources may typically occur together, which may contribute to the development of resilience (Youssef & Luthans, 2007), by helping individuals to deal with adversity.

Social Cognitive Theory (Bandura, 1986) was cited as an explanatory base for the role of mentoring and environmental influences on career resilience (Arora & Rangnekar, 2014). Arora and Rangnekar (2014) also employed London's (1997) career motivation theory to link the use of the *Career Commitment Scale* as part of career resilience. Furthermore, the *Job*

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Demands/Resources Theory (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) was used to explain how resilience assists individuals in dealing with workplace stressors and performing effectively in the workplace (King, Newman & Luthans, 2016). Finally, Easterbrook's (1959) attention theory (Paul, Khanna, & Sandhu, 2012) was used to explain how attention span shortens during the execution of fine motor skills in high stress situations, while resilience training may improve this psychomotor performance.

To summarise, repeated exposure to stressful experiences may wear down an individual's homeostatic resilience capacity. Recently established state-like conceptualisations of resilience support the promotion of appropriate psychological theories which describe this resilience process, in line with Richardson's (2002) *Second-wave Metatheory*. Here, psychological resources are at the nexus of understanding the fluctuations and development of resilience within achievement contexts. Researchers are encouraged to build on resource theories (e.g. Hobfoll, 2001; Fredrickson, 2001), together with grounded theories (e.g. Fletcher & Sarkar, 2012), to optimally build effective resilience interventions in sport.

The relevance of adversity.

Past reviews of resilience have considered 'significant adversity' as a necessary condition for resilience (Luthans, Vogelgesang, & Lester, 2006; Britt et al., 2016). However, the literature is not clear on what constitutes a significant adversity (Estrada et al., 2016). The present review coded both the adverse magnitude and exposure (cf. Biron, Ivers, Brun, & Cooper, 2006) in each article, and created a spectrum of challenging events in sport and work contexts. A combination of short- to long-term adversities was evident in this review, where both sport and work circumstances did not exceed minor to moderate adversity. Figure 2.3 portrays this adversity-exposure matrix, as found in this review, in line with Bonanno's (2013) resilience trajectories

speculating the most probable pathway, with more dark-shaded areas representing the most prominent adversities recorded.

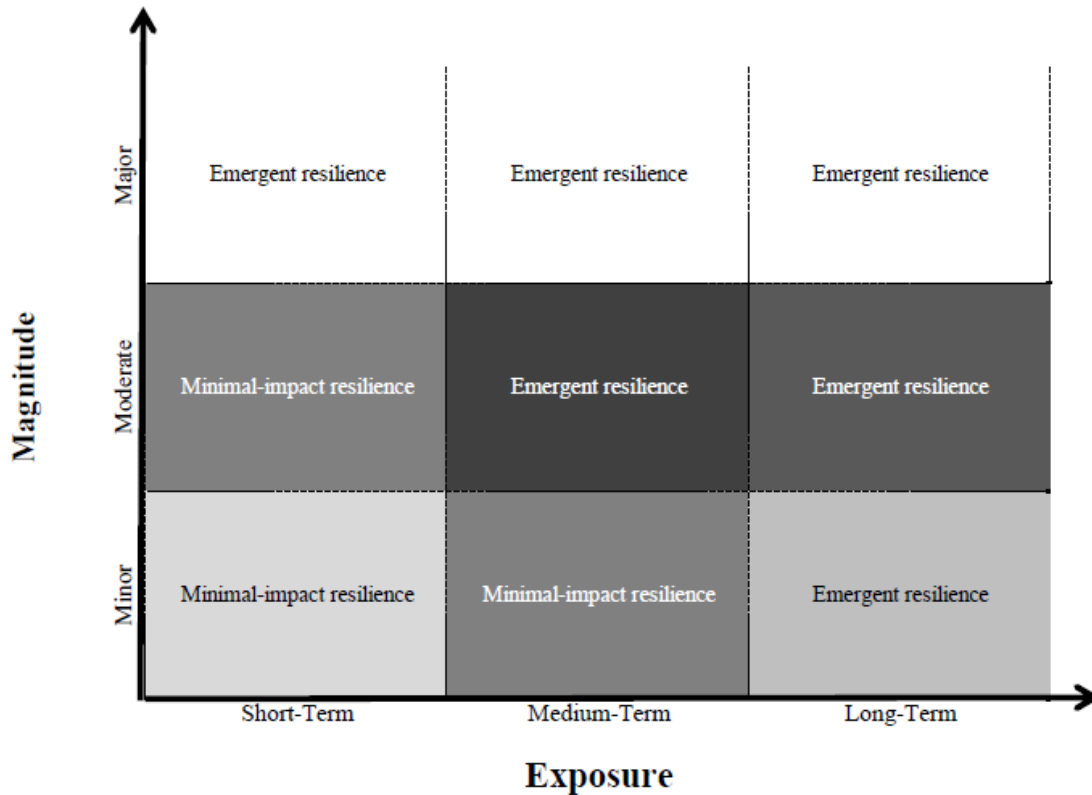


Figure 2.3 Adversity–exposure matrix.

The trajectory of adjustment associated with minimal impact adversity is characterised by consistently low levels of challenge or proactive adjustment both before and after the event (cf. robust resilience), whereas emergent resilience involves a facilitated rebound (cf. reintegration) from disruptive acute or chronic aversive circumstances. These minor chronic circumstances tended to consist of regular everyday family, training and work stress (White & Bennie, 2014; Roche, Haar, & Luthans, 2014), in which the majority of moderate chronic circumstances involved injury (Machida, Irwin, & Feltz, 2013; Yi, Smith, & Vitaliano, 2005) or organisational

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change (Sherlock-Storey, Moss, & Timson, 2013; Shin, Taylor, & Seo, 2012). The relevance of short-term adversity was investigated, primarily within the sporting context, to specific tasks (e.g. swimming performance) and task failures (Martin-Krumm, Sarrazin, Peterson, & Famose, 2003) incorporating some physiological measures. However, this should be of importance amongst work researchers in similar pressure-performance circumstance (e.g. job interviews, performance reviews).

We represent these dual resilience trajectories, together with adverse magnitude and exposure results, in Figure 2.4. This figure reflects the proposed definition of resilience, whereby individuals both ‘maintain functioning’ and ‘rebound’ through ‘facilitated resource factors’. The rebound of the model is representative of the ability to ‘bounce back’ quickly from adversity (cf. table 2.2). This ‘bounce back’ attribute is defined as a return to previous capacities of functioning post minor, moderate or major disruptions to performance or well-being (Fletcher & Sarkar, 2016). This ‘dual-pathway effect’ of resilience offers expected pathway processes during minor, moderate and major adversities. This model offers favourable resilience responses focused on the constant dynamic reactions to varying environmental demands, and utilises a state-like conceptualisation of resilience. Sport and work contexts reflect both these pathways in ongoing daily routines as well as during acute pressurised situations, in which the ability to perform under pressure is instrumental. In these pressure situations, the ability to buffer stress and maintain immediate performance may be the optimal pathway, rather than suffering any initial disruption in functioning.

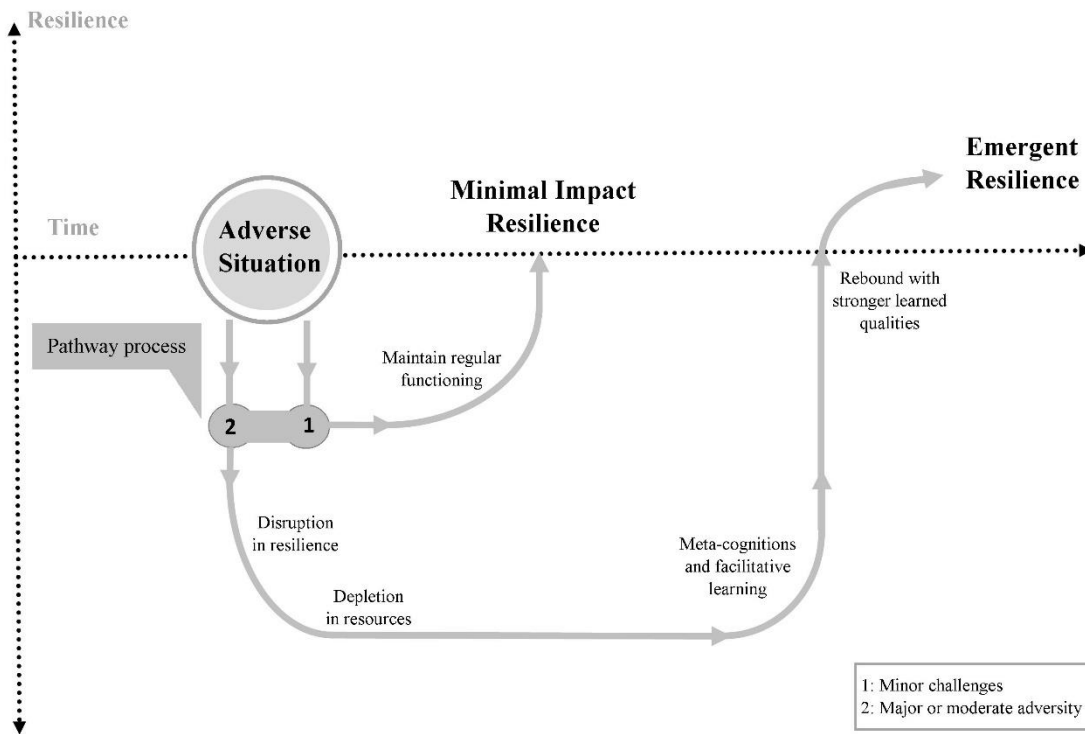


Figure 2.4 Dual-pathway model of resilience.

The capacity of resilience and relationships with other psychological resources.

Across the papers in our review, resilience was associated with a plethora of other psychological and environmental resources, which were frequently considered as either antecedents to resilience or as buffers against stress. Figure 2.5 outlines the resources associated with both building and maintaining resilience, and these can be summarised under 13 main headings: (1) Support; (2) Self-efficacy; (3) Optimism; (4) Coping Skills; (5) Motivation; (6) Perspective; (7) Self-regulation; (8) Hardiness; (9) Proactiveness; (10) Adaptability; (11) Sense of Control; (12) Positive mind-set; and (13) Other, which included focus (2 papers), hope (1 paper) and self-sufficiency (1 paper).

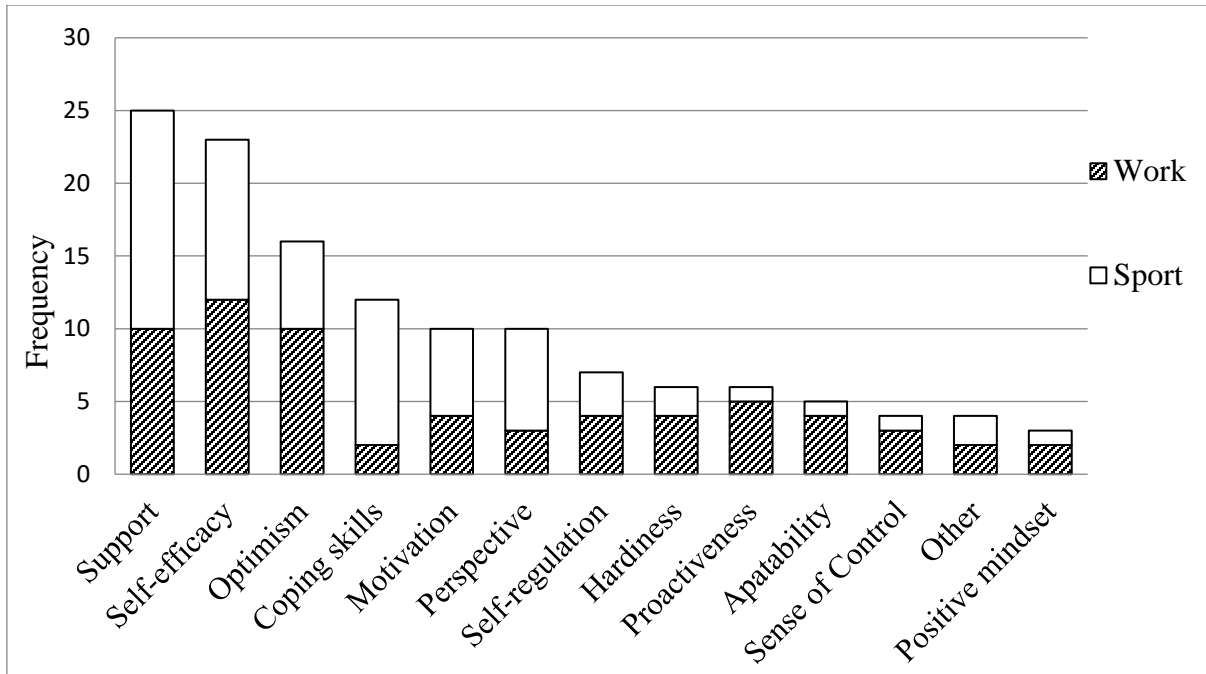


Figure 2.5 Thematic analysis of psychological resources associated with resilience processes

In line with resource theories associated with resilience (King et al., 2016), some researchers described changes in psychological resources in order to understand changes in resilience. These theories were used to explain the synergistic processes through which resilience may persist and grow (Fletcher & Sarkar, 2012). Researchers (McLarnon & Rothstein, 2013; Secades et al., 2016) discussed the various ‘protective resources’ (see Figure 2.5) that have a positive effect on resilience, such as the ability to persist during ongoing stress (Ayala & Manzano, 2014) and to help promote growth following adverse experiences (Sarkar, Fletcher, & Brown, 2015). Resilience was also investigated alongside self-regulatory processes, where self-regulation was cited as a key resource aiding the development of resilience in seven papers (Brown et al., 2015; Roche et al., 2014).

Four papers used the *Conservation of Resources Theory* (Hobfoll, 2011) to propose a pattern of how resources (including resilience) occur together, which provides an explanation of the role

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of resources in resilience (Shin & Seo, 2012; Smith, Smoll, & Ptacek, 1990). For example, Luthans et al. (2007) studied how each of the four psychological capital resources (hope, resilience, optimism and self-efficacy), both individually and as a composite higher-order factor, predicted work performance and satisfaction. Their results indicated that not only were the four resources positively related to performance and satisfaction, but the four combined were a better predictor than the four individual facets.

Smith et al. (1990) studied individual resources in the context of stress reactions in dealing with sports injuries. They proposed that resources must co-occur and interact with one another to decrease vulnerability or increase resilience. Their results indicated that resources such as coping skills and social support are independent but operate in a synergetic manner to reduce stress. For example, only individuals low in both resources exhibited significantly lower resilience responses to injury stress.

Support emerged as the number one resource associated with resilience for sustained success and overall well-being. Support enables individuals to develop their personal resources and aids learning and build trust (Fletcher & Sarkar, 2016), which appears to be beneficial in medium- to long-term exposure to moderate stress (in a similar fashion to the challenge-environment matrix postulated by Fletcher and Sarkar, 2016). These parallel findings across work and sport contexts are important in highlighting the conceptual overlaps on which researchers can focus. The resources of support and the development of coping skills were more prominent in the sporting literature, which strengthens the importance of their continued development in the work-context. Similarly, optimism, adaptability and proactiveness offer further promise in the area of sports resilience research from the reflections of synergistic work-resilience research results.

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Combined, these results represent empirical information about the development of resilience that may involve combinations of resources that act as buffers against the negative effects of stress, and help individuals to rebound or maintain resilience after and through adversity.

Research design.

Quantitative design.

Quantitative research designs were the most common across our reviewed papers ($n = 40$). The majority of these ($n = 39$) used surveys, while one study incorporated physiological data (heart-rate variability and a basketball dribbling task; Martin-Krumm, et al., 2003), and others included saliva cortisol levels (Meggs, Golby, Mallett, Gucciardi, & Polman, 2016), and heart-rate variability (Jones & Jetten, 2011) in addition to surveys. There were four further mixed methods papers combining surveys and interviews (Gould, Dieffenbach, & Moffett, 2002; Mummery, Schofield, & Perry, 2004; Paul et al., 2012; Seligman, Nolen-Hoeksema, Thornton, & Thornton, 1990).

Across the 40 papers were a wide range of aims, which could be summarised into three main themes. First, resilience was investigated as a predictor of achievement or success ($n=6$). Five of the six papers that focused on predicting achievement or success conceptualised resilience as a characteristic trait. Across these studies, resilience was found to be a significant predictor of success in sport (Gould et al., 2002; Hosseini & Besharat, 2010), as well as in entrepreneurial and career success (Ayala & Manzano, 2010, 2014; Burke & Attridge, 2011). Only one study (Ayala & Manzano, 2014) used a longitudinal design, although it did not measure resilience longitudinally.

Second, resilience was examined as a mediator between stress and the performance of a specific activity (seven papers). These papers focused on resilience and performance during

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specific activities, and all of these were conducted within the sporting domain. Tasks studied included motor performance of the finger, hand and arm (Paul et al., 2012), competitive game performance in individual and team sports (Subhan & Ijaz, 2012), and swimming performance (Jones & Jetten, 2011; Mummery et al., 2004; Seligman et al., 1990; Megg et al., 2016). Notably, results from this sample within each specific activity mirrored resources such as support (Mummery et al., 2004) and optimism (Krumm et al., 2002) in broader events.

Third, 27 papers focused on resilience as a moderator of the stress-performance relationship. Resilience was more frequently included to assess relationships with performance (Burke & Attridge, 2011), mental-health (Nezhad & Besharat, 2010), sport injuries (Smith, Smoll & Ptacek, 1990) and other resources (Shin & Seo, 2012) in cross-sectional designs. Results showed a mixture of considering resilience as a trait or a state. Yet again, psychological resources associated with resilience were reflected in these quantitative papers. This suggests that multiple resources are related to resilience across a multitude of acute and chronic adverse events.

Longitudinal studies.

The majority of cross-sectional articles claimed a need for more longitudinal designs in order to study resilience over more than one point in time (Nezhad & Besharat, 2010). A total of nine longitudinal studies met the criteria for inclusion in this review. However, three of these longitudinal designs did not obtain a follow-up measure for resilience (Burton, Pakenham, & Brown, 2010; Yi et al., 2005). For example, a resilience intervention study by Abbott, Klein, Hamilton, and Rosenthal (2009) only recorded a pre-measure of resilience during a 10-week online resilience intervention programme. Results then concluded that resilience levels had improved, despite the fact that this was not demonstrated by any quantitative data.

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A total of six papers assessed resilience on more than one occasion. Three papers reported the effect of interventions on employee/manager resilience levels (Grant, Curtayne, & Burton, 2009; Luthans, Avey, Avolio, & Peterson, 2010; Sherlock-Storey et al., 2013). These interventions focused on developing specific resources in order to increase individual resilience capacities. Grant et al. (2009) investigated the effectiveness of a half-day workshop followed by a series of four individual coaching sessions over 10 weeks. Results showed positive effects of the intervention on both resilience and goal-attainment, when compared to the control group which did not receive the intervention. Additionally, qualitative responses indicated that participants found building personal skills towards resilience was beneficial. Sherlock-Storey et al. (2013) designed a one-to-one resilience intervention in middle-aged managers over a 6-week period and demonstrated positive changes in resilience and confidence towards organisational change. Finally, Luthans et al. (2010) implemented a two-hour training intervention focused on developing each of the four psychological capital resources. This construct is well established in the work psychology literature and shows strong links to performance and well-being at both the individual and organisational level (Luthans et al., 2010). Luthans et al. (2010) found significant positive changes in the *Resilience Sub-scale of the Psychological Capital Questionnaire* (Luthans et al., 2007), compared with the pre-intervention measure.

Both Waite and Richardson (2004) and Burton et al. (2010) used a variety of weekly workshops ('Personal resilience and reintegration relationships' and 'Resilience and activity for every day ready' programmes respectively) of 1-2 hours over 5 and 10 weeks respectively, aimed at developing protective factors of resilience and increasing positive well-being at work. Waite and Richardson (2004) obtained both baseline and follow-up measures that showed a significant increase in resilience after 5 weeks. In contrast, Burton et al. (2010) did not obtain

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any baseline or follow-up measure of resilience, but highlighted significant improvements in factors associated with resilience (i.e. positive emotions, cognitive flexibility, social support, life meaning and active coping). Finally, in the work context, Pidgeon, Ford and Klaassen (2014) designed a 2.5-day mindfulness workshop aimed at promoting resilience. Results showed no change in resilience 1-month post intervention, but found significant lagged effects at the 4-month follow-up.

Secades et al. (2016) produced the only paper in a sporting context to conduct a longitudinal study while controlling for differences in resilience capacities. They recorded resilience measures at the beginning of the competitive season and again immediately after the competitive season. Here, no significant differences were found in resilience levels. However, the need for a sport-specific scale of resilience was highlighted.

Collectively, these studies conceptualised resilience as a malleable concept that can change over time through positive adaptation and is amenable to intervention. Given the proportion of longitudinal work studies finding significant positive changes in resilience, there is a clear opportunity for similar approaches in sport contexts. These results offer researchers a starting point for resilience intervention strategies from 2 hours to 10 weeks through a variety of resource and skill factors associated with resilience outlined in this review.

Measuring psychological resilience.

The measurement of resilience is a limitation in current and existing research on resilience. This was highlighted in a recent review of sport-specific measures of resilience by Sarkar and Fletcher (2013), who identified three pivotal components that researchers need to separately assess when measuring psychological resilience: adversity, positive adaptation, and protective factors. Among

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the 30 papers that included a survey in our review, only 21 used scales designed to specifically measure resilience, despite their stated focus on psychological resilience. All included measures are summarised in Table 2.

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Table 2.3. *Measurement of Resilience*

Scales designed to measure resilience	Number items	Factors	Papers which have used scales
Block and Kremen (1996)	14-item	Ego-resiliency	Shin et al., (2012); Youssef & Luthans, (2007)
'Ego-resiliency scale'			
Connor and Davidson (2003) and 10-item (Gonzalez & Newton, 2013)	25-item	Personal competence, high standards and tenacity; trust in one's instincts, tolerance of negative affect and strengthening effects of stress; positive acceptance of change and secure relationships; control; and spiritual influences.	Ayala & Manzano, (2010); Ayala & Manzano, (2014); Gillispie et al., (2016); Gonzalez et al., (2016); Gucciardi et al., (2011); Hosseini & Besharat, (2010); Lu et al., (2016); Manzano & Ayala, (2013); Nezhad & Besharat, (2010); Vitali et al., (2015)
'The resilience scale'			

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Table 2.3. *Measurement of Resilience*

Scales designed to measure resilience	Number items	Factors	Papers which have used scales
Friborg et al., (2005) 'The resilience scale for adults'	33-item	Social competence; social resources; family cohesion; structured style; personal strength/perception of self; and personal strength/perception of future.	Cowden et al., (2016)
Jackson and Watkin (2004) 'The resilience inventory'	60-item	Emotion regulation; impulse control; optimism; causal analysis; empathy; self-efficacy; and reaching out	Abbott et al., (2009)

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Table 2.3. *Measurement of Resilience*

Scales designed to measure resilience	Number items	Factors	Papers which have used scales
Luthans et al. (2007) 'Psychological Capital Questionnaire'*	24-item	Self-efficacy; hope; resiliency; and optimism	Peterson et al., (2011); Roche et al., (2014); Sherlock-Storey et al., (2013); Luthans et al., (2007); Luthans et al., (2010)
Marsh and Marsh (2006) 'The academic resilience scale'	6-item	Enjoment; participation; and self-esteem	Meggs et al., 2016
Sinclair and Wallston (2004) 'The brief resilience coping scale'	9-item	Personal coping resources; pain coping resources; psychological well-being	Bullough et al., (2014)
Wagnild (1993) 'The resilience scale'	25-item	Personal competence; acceptance of self and life.	Cardoso & Sacomori, (2014); Secades et al., (2016); Pidgeon et al., (2014)
Proxy measures used to assess resilience			

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Table 2.3. *Measurement of Resilience*

Scales designed to measure resilience	Number items	Factors	Papers which have used scales
Bartone (2007) ‘The dispositional resilience scale’ (sub-scale)	15-item	Flexibility; and openness to change	Burke & Attridge (2011)
Carson and Bedeian (1994) ‘Career Commitment Measure’ (sub-scale used)	21-item	Career mentoring; psychosocial mentoring	Arora & Rangnekar (2014)
Goldberg (1999) ‘The Mental toughness questionnaire’ (sub-scale used)	6-item	Reboundability	Paul et al., (2012)

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Table 2.3. *Measurement of Resilience*

Scales designed to measure resilience	Number items	Factors	Papers which have used scales
Nowack (1989) 'The cognitive hardiness scale'	18-item	Sense of personal control; propensity to rise to meet challenges; commitment to action	Grant et al., (2009)
Smith et al. (1995) 'The athletic coping skills inventory'	42-item	Ability to control arousal and to concentrate and think clearly under stress; the tendency to set specific goals and to engage in problem-solving strategies; and the ability to relate effectively to authority figures and to profit from corrective feedback.	Belem et al., (2014); Mummery et al., (2004); Smith, et al., (1990); Gould et al., (2002)

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Table 2.3. *Measurement of Resilience*

Scales designed to measure resilience	Number items	Factors	Papers which have used scales
Vitaliano et al. (1985) 'The revised ways of coping checklist'	45-item	Problem-focused coping; seeking social support; minimise threat; wishful thinking; blame others, and Avoidance	Yi et al., (2005)
Scale development articles			
156-items	Individual's personal characteristics; social support network; initial responses to a significant and life changing event; and self-regulatory processes.	McLarnon and Rothstein (2013): 'Work resiliency inventory'	
27-items	Self determination; physical toughness; emotional control and maturity	Subhan and Ijaz (2012): 'Resilience scale for athletes'	

*= Psychological Capital Questionnaire comprising hope, resilience, optimism and self-efficacy. The resilience sub-scale based on Wagnild (1993)

Due to the diverse range of instruments used it is difficult to draw conclusions about the effectiveness of any one measure of resilience. The Connor and Davidson (2003) 25-item measure of resilience was the most popular, and was used in 10 studies. The Connor-Davidson (2003) *Resilience Scale*, Subhan and Ijaz' (2012) *Resilience Scale for Athletes*, and McLarnon and Rothstein's (2013) *Work Resilience Inventory* were the only scales which adopted a state-like conceptualisation of resilience, and thus have the potential to capture resilience changes over time. However, Sarkar and Fletcher's (2013) review queries some of the theoretical basis of the Connor and Davidson (2003) *Resilience Scale*, such as gathering theoretical underpinnings from memoirs of Sir Edward Shackleton's expedition to the Antarctic in 1912. Manzano-Garcia and Ayala Calvo (2013) also failed to provide support for the original five factors in a sample of 783 Spanish entrepreneurs. Consequently, they yielded a better-fitting three-factor structure of resources associated with resilience, comprising hardiness, resourcefulness and optimism. Arguably, this three-factor structure may better reflect the adaptive and maintenance perceptions of a state-like resilience construct. Furthermore, Gucciardi, Jackson, Coulter and Mallett (2011) also found positive moderate correlations with hardiness, while supporting the psychometric superiority of a revised 10-item scale over the original 25-item scale in a large sample (n=321) of adolescent Australian cricket players. Finally, Gonzalez et al. (2016) verified an effective 10-item scale in a population of long-distance runners (n=405).

The *Resilience Scale*, developed by Wagnild (1993), was used in two articles in our review (Cardoso & Sacomori, 2014; Secades et al., 2016) and was also used (in a shortened version) in the *Psychological Capital Scale* (Luthans et al., 2007) in four articles. These articles

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conceptualised resilience as a state-like concept when using this measure. Wagnild (1993) discussed the ability of resilient individuals to adapt and grow through adverse experience and proposed the ability of building resilience through repeated mastery. However, the scale itself does not contain any items where positive adaptation would be required. The items included in the resilience scale were drawn from interviews in which participants were asked to describe a person characterised as resilient (Wagnild, 1993, p. 168), which would suggest a trait perspective. The test-retest reliability has only been reported once in unpublished raw data (Killien & Jarrett, 1993). In this longitudinal study, spanning an 18-month period, Killien and Jarrett (1993) recorded women during pregnancy at 1, 4, 8 and 12 months postpartum using the *Resilience Scale* (Wagnild, 1993). This was published by Killien Habermann, and Jarrett (2001) but did not report the test-retest reliability data presented and cited in the original *Resilience Scale* paper (Wagnild, 1993).

Several papers did not measure resilience directly, but assessed similar concepts as a proxy for resilience. These alternative scales comprised two coping skills questionnaires: the Smith, Schutz, Smoll and Ptacek (1995) *Athletic Coping Skills Inventory* and the Vitaliano, Russo, Carr, Maiuro, and Becker (1985) *Ways of Coping Checklist*. Two hardiness based scales were used, the Bartone (2007) *Dispositional Resilience Scale* and the *Cognitive Hardiness Scale* (Nowack, 1989). Coping is characterised as a responsive ability to reduce or tolerate external demands, where resilience is characterised prior to emotional and coping responses and is evident by its positive process of learning adaptations from all adverse experience (Leipold & Greve, 2006).

Finally, a further two studies validated their own specific scale of resilience. Subhan and Ijaz (2012) devised their own scale following an interview with five athletes and five coaches and validated their own measure of resilience in a sporting context. Entitled the *Resilience Scale for*

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Athletes, this specifically focused on competitive game resilience. McLarnon and Rothstein (2013) validated their *Work Resiliency Inventory*, based on theories developed by King and Rothstein (2010). This scale represents a state measure of resilience encompassing psychological resources, situational resources and cognitive regulatory processes. It is for these reasons that the *Work Resiliency Inventory* (McLarnon & Rothstein, 2013) provides a positive step towards measures aimed at the assessment of a dynamic state of resilience. However, the scale to date has only been tested for reliability and validity in work psychology context. The Connor-Davidson (2003) *Resilience Scale*, then, seems to offer more strength than the others, including the *Resilience Scale* (Wagnild, 1993), as the latter assesses subjective resilience capacities rather than dynamic aspects of resilience.

Estrada et al. (2016) posited that in many cases when resilience is measured cross-sectionally, it is contaminated, as the significant adversity is often measured as part of the resilience process itself. It would be beneficial for future researchers to measure adversity by documenting the exposure and magnitude, enhancing their ability to make causal inferences regarding the specific process and trajectory of both resilience and adversity over time.

Qualitative designs.

Twelve qualitative papers were included in the review, all of which used a semi-structured interview design. From these, six used a reflective approach, incorporating a long-term review of entire past-career adversities and developmental backgrounds (Brown, Lafferty, & Triggs, 2015; Fletcher & Sarkar, 2012; Galli & Vealey, 2008; Mills, Butt, Maynard, & Harwood, 2012; Sarkar & Fletcher, 2014b; Sarkar et al., 2015) and six studies focused on current medium-term career endeavours and adversities (Galli & Reel, 2012; Holt & Dunn, 2004; Loh & Dahesihsari, 2013; Machida et al., 2013; Vries & Sheilds, 2006; White & Bennie, 2015). In both cases, researchers

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reported several key psychological resources utilised by participants, which they believed contributed to resilience. Interestingly, similar resources were reported regardless of whether resilience was examined as a response to chronic everyday adversity or to major acute stressors over a lengthy career. Some of these resources included perspective (Galli & Reel, 2012; Sarkar et al., 2015) and motivation (Brown et al., 2015; Loh & Dahesihsari, 2013).

While 12 total qualitative studies were conducted, 10 focused on the sport context and two on the work context. One study focused on female entrepreneurs in Indonesia (Loh & Dahesihsari, 2013) and another on small to medium enterprise owners in New Zealand (Vries & Sheilds, 2006). These two studies showed strong overlap in their conceptualisation of resilience, and reflected similar findings and adversities to those in the sporting literature, including several components of Fletcher and Sarkar's (2012) *Grounded Theory of Psychological Resilience*. Galli and Vealey (2008) suggested that qualitative studies of resilience should adopt a longitudinal interview schedule that would not only make recall bias less likely, but would allow for a deeper examination of the dynamic thoughts and processes during adverse situations. They suggested that reflective collection of past-career setbacks, coupled with a number of recent stressor reports, may best capture a state-like concept of resilience. Results from this qualitative sample show how psychological resilience, along with certain resources, can protect individuals from negative impacts of stressors and facilitate the reintegration process (Brown, Lafferty & Triggs, 2015); enable high achievers to excel in demanding contexts (Sarkar et al., 2015); and harness adverse experiences to develop dynamic abilities to learn and develop (Galli & Reel, 2012).

2.4 Discussion

Definition and conceptualisation.

Our results revealed a myriad of different definitions of resilience and, overall, demonstrated a lack of consensus with regard to how to conceptualise the concept. However, definitions consistently focused on an adaptive process to adversity and/or maintenance of function in the face of challenges. Thus, we proposed a definition of resilience that combines the major themes of existing research in our review: ‘A dynamic process encompassing the capacity to maintain regular functioning through diverse challenges or to rebound through the use of facilitative resources’.

In order to augment resilience as distinct construct, it is imperative that researchers can distinguish it from other, related constructs. For example, existing research has made clear distinctions between growth and resilience (Lepore & Revenson, 2006); Westphal & Bonanno, 2007). While a certain level of trauma is necessary for growth (Tedeschi & Calhoun, 2004), resistance (which showed overlap with resilience definitions here) reflects an ability to maintain well-being in the face of adversity. Resilience enables individuals to maintain functioning through diverse experiences of stress, by means of facilitative adaptations, without undergoing significant trauma in the process.

Resilience was predominantly characterised as a state-like concept, where individuals continuously develop their regulatory responses and monitor their perceptions of themselves, their available resources and their environment through ongoing interactions with various stressors (Sarkar & Fletcher, 2014a). Richardson’s (2002) *Metatheory of Resiliency* was at the forefront of explaining this process, whereby resilience can be seen as a metacognitive process that can be disrupted through threatening challenges, similar to self-regulation constructs where,

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in a condition of resilience depletion, individuals may be rendered less able and willing to work or function optimally (Rothstein et al., 2016).

A dual-pathway portrayal of resilience offers two outcomes, whereby the individuals can maintain functioning (minimal impact resilience, cf. robust resilience; Bonanno & Diminich, 2013; Fletcher & Sarkar, 2016) or rebound through learned facilitative adaptations (emergent resilience; Bonanno & Diminich, 2013; Fletcher & Sarkar, 2016) (c.f. rebound resilience), depending on the situational needs, magnitudes and exposures of each adverse experience. For example, a metacognitive attempt to reflect on errors during certain pressurised situations could be detrimental to immediate performance outcomes. These results are important in order for researchers and practitioners alike to develop effective resilience-building programmes for specific situations, particularly in high-pressure environments such as competitive sport arenas.

Psychological resources.

Currently, resource theories such as the *Broaden and Build Theory* (Fredrickson, 2001) and *Conservation of Resources Theory* (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Hobfoll, 2001) have been used alongside self-regulatory processes (Rothstein, McLarnon & King, 2016) to explain dynamic perspectives on resilience. Fletcher and Sarkar (2013) advise psychologists to develop the protective and promotive factors that individuals can use to proactively build resilience in response to adverse events. Protective factors refer to resources denoting a ‘shielding effect’ and promotive factors refer to resources denoting a ‘steeling’ or strengthening effect after resilience-stress interactions.

The structured interview panel of Southwick et al. (2014), with interdisciplinary experts on resilience, collectively hypothesises that resource theories may help to explain resilience

processes. Results from this review show that *support* is the most frequent resource associated with positive resilience processes. However, *support* encompasses several related concepts, including emotional and environmental support, so further clarity is needed in future research. Halbesleben et al. (2014, p. 8) suggested that the value of a resource is relevant through two approaches: (1) to an individual's personal values (cf. the 'idiographic approach') and (2) the value during challenges they are trying to overcome (cf. the 'nomothetic approach'). Therefore, when developing resilience associated resources in both sport and work, we need to consider the effect it will have both chronically to the individual, over time, and acutely to upcoming adverse circumstances.

Drawing on resource based theories, it is likely that psychological resources contribute to the development of resilience over time. The results of this review indicate the resources of support, self-efficacy, optimism, coping skills, motivation and perspective (cf. Figure 2.5) are consistently beneficial in response to both chronic and acute adverse situations. This review offers a basis for future research investigating the role of psychological resources in the development of resilience.

2.5 Limitations and future research

This research has presented a qualitative systematic review of both quantitative and qualitative resilience research. One limitation was that due to the heterogeneity of research designs and measures, as well as the variety of contrasting perspectives of resilience it was not deemed appropriate to conduct a meta-analysis. However, future research would benefit from quantitative integration of empirical research on resilience, although this is dependent upon the quality of the available literature and commonality in methodologies.

In the absence of longitudinal studies, the predictive validity of state-like conceptualisations of resilience has yet to be verified (Galli & Gonzalez, 2015). Longitudinal research can examine

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dynamic aspects of resilience in response to specific adverse events, as well as appraisals, emotions and resources that may influence the recovery and reintegration of resilience.

Existing research has highlighted the need for an improved measure of psychological resilience. The review has established that the majority of measures are assessing resilience as a trait, which is a limitation for future research. It is recommended that future research should draw on the definition of resilience proposed in this review as an operational definition of resilience, which is the starting point for developing a measure (Hinkin, 2005). In addition to assessing resilience, and furthermore recommended that researchers measure adversity by documenting the magnitude of exposure enhancing the ability of researchers to make causal inferences regarding the specific process phenomena to both minor and major adverse events.

An array of commonalities was found across sport and work contexts regarding resilience. Sport psychologists can borrow and build on the steps already taken in work contexts to incorporate resource theories and create effective interventions in resilience research. Work psychologists would benefit from investigating short-term adversity processes and psychological support associations with resilience.

2.6 Chapter Conclusion

For individuals working in chronic high-pressure and goal-oriented environments, the ability to manage reactions to all types of stressors and adversity can have a major impact on well-being and performance. This chapter presented a systematic review of resilience carried out across the contexts of both work and sport between 1990 and 2016. Results demonstrate that there are considerable contrasts in how researchers conceptualise and define psychological resilience. However, the findings also convey a paradigm shift towards a state-like concept of resilience and a commensurate revised definition of resilience. This state-like conceptualisation of resilience is

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explained using both process models of resilience and psychological resource theories. These theories highlight the relationship of resilience which influence psychological resources before, during, and after minor to moderate adverse experiences. The findings indicate 12 main resources that were prevalent throughout the review of 52 articles. There is evidence that analogous resources are important for developing resilience across both work and sporting contexts.

CHAPTER 3

DEVELOPING THE CONCEPT OF DYNAMIC RESILIENCE

Ever tried. Ever failed. No matter. Try Again. Fail again. Fail better.

Samuel Beckett (playwright)

(*This chapter is an adaption of the published work: Bryan, C., O'Shea, D., & MacIntyre, T. E. (2018). The what, how, where and when of resilience as a dynamic, episodic, self-regulating system: A response to Hill et al. (2018). *Sport, Exercise, and Performance Psychology*, 7(4), 355-362. doi:10.1037/spy0000133)

3.1 Introducing dynamic resilience

Achievement environments can create significant adversity and researchers are increasingly interested in how we respond to such adversity both in the short and long term. As a consequence, mental toughness (Gucciardi, Jackson, Hodge, Anthony, & Brooke, 2015) and resilience (Decroos et al., 2017; Sarkar & Fletcher, 2014) have become topics of interest among applied psychologists. However, as these topics have grown in popularity, there has been much debate regarding their conceptualisation. For instance, is resilience a trait or a state, how is resilience developed (e.g. whether significant adversity is a requirement), and in what context it is required (see Chapter 2.3)?

In this chapter, we develop a theoretical framework for understanding resilience as a state-like construct, building further the dynamic approach to resilience recently developed by Hill et al. (2018b). In developing this theoretical framework, Whetten's (1989) model is employed of what constitutes a theoretical contribution to examine and advance a dynamic approach to resilience. In sum, although a dynamical perspective addresses the *how*, we need to elucidate the *what*, *why when* and *where* of resilience processes in more depth. Theories of psychological resources (Fredrickson, 2001; Hobfoll, 2011) and conservation of resources (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014) are drawn upon to consider how concepts of resource trajectories can augment our understanding of dynamic approaches to resilience (the *how*). Furthermore, temporality and metacognition issues to demonstrate resilience at the momentary 'match play' level in comparison with other less pressurised or longer timeframes (the *when* and the *where*) are discussed.

3.2 The dynamical approach to resilience

The dynamical systems approach (Vallacher & Nowak, 1997; van Geert & Steenbeek, 2005) has been used by Hill et al. (2018b) to understand how resilience unfolds over time. There is emerging consensus among researchers that a dynamic approach is required to account for the temporal processes involved in resilience (Bryan et al., 2017; Hill et al., 2018b; Sarkar & Fletcher, 2014). Considering resilience over time helps researchers capture the *critical slowing down* of resilience for both chronic long-term stressors and more acute episodes. Hill et al. (2018b) suggest, this knowledge about the temporal dimension of resilience can assist researchers and practitioners to develop strategies to counter regulate incidents that would have a negative effect on resilience, well-being and performance. This proposed dynamical systems approach is marked by ongoing interactions overtime among multiple components (van Geert & Steenbeek, 2005). Hill et al. (2018b) highlight the complexity of a dynamical system meaning that the underlying components are constantly changing and interacting overtime (Den Hartigh, Cox, & Van Geert, 2017). However, it is suggested that the resilience process is determined by the functional way components interact with each other and the environment, rather than being driven by any one individual component (Egeland, Carlson, & Sroufe, 1993).

Whetten (1989) proposed that a complete theory must contain essential elements, summarised as *what, how, why, who, where* and *when*. *What* comprises which factors (e.g. variables, constructs, concepts) should logically be considered as part of the explanation of the phenomena of interest. The next question is *how* these factors are related, which is normally operationalised using arrows to connect to boxes, but also through the use of a visual representation has been highlighted or contextual application to clarify the authors thinking and in particular increase the readers comprehension. The *what* and the *how* constitute the domain of

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a theory. *Why* relates to the underlying psychological, economic or social dynamics that justify the selection of factors and the proposed causal relationships (Whetten, 1989). *Who*, *where* and *when* are conditions that place boundaries and define the generalisability of the propositions generated from a theoretical model. The dynamical systems approach to resilience examines primarily *how* resilience is a dynamic process, but we highlight below, areas where the *what*, *who*, *where* and *when* could be examined in more detail to deepen our theoretical understanding of a dynamic approach to resilience.

3.3 The *what* of a dynamic approach to resilience

If we establish that the development and maintenance of resilience is a dynamic process, we need to explain *what* resilience is from a dynamic process perspective. Hill and colleagues (2018) approach dynamic resilience with regards to the process of resilience disruption and depletion. However, this fails to attend to the basic principles of many resilience definitions. Based on the systematic review (chapter 2), resilience is defined here as “encompassing the capacity to maintain regular functioning through diverse challenges or to rebound through the use of facilitative resources”. This definition is conducive to examining resilience from a dynamic perspective because it emphasises the ability of positive reintegration (rebounding) following disruptions.

A core aspect of considering what resilience is from a dynamic perspective is to understand which aspects and components need to be considered in its development. Drawing on theories of self-regulation may be beneficial to better understand this. From a self-regulation perspective, performers regulate their day-to-day actions based on their own perceptions about themselves, their environment and progress towards their goal and current affect, which subsequently impacts their effort (Bonanno, 2004; Foo, Uy, & Baron, 2009; Tenenbaum,

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Edmonds, & Eccles, 2008). This type of self-regulation relies on meta-cognitive monitoring processes which orient an individual in their environment, and positive or negative emotional reactions provide feedback on the level of progress towards their goal, whether this is a short-term or long-term goal (MacIntyre, Igou, Campbell, Moran, & Matthews, 2014). However, self-regulatory resources can be depleted through use (Baron & Henry, 2010), and when depleted may render the individual less able or willing to work or perform optimally (Baumeister & Vohs, 2007), potentially leaving them at risk of resilience loss. Therefore, the ability to self-regulate effectively allows for higher resources levels throughout any resilience process leaving individuals more able to buffer adversity and rebound from stress.

Stress appraisal styles have been shown to be important in determining promotive responses to adversity (Armeli, Gunthert, & Cohen, 2001), in particular challenge appraisals (Galli & Gonzalez, 2015). In a study of 12 Olympic champions, Fletcher and Sarkar (2012) highlighted how challenge appraisals and meta-cognitive abilities may lead to increased task engagement and optimal sport performance. Cognitive reappraisal allows players to reflect and reframe adversities in a positive light (Lane, Beedie, Jones, Uphill, & Devonport, 2012). The extent to which an individual can reintegrate their resilience following stressful events by considering the positive meaning of a difficult experience seems to be particularly important for developing and maintaining resilience over time (Folkman & Moskowitz, 2000).

To understand the dynamics of resilience, it is beneficial to consider how resilience changes across key timepoints or performance episodes. A performance episode can be defined as a “within person temporal unit of performance”, which is a naturally segmented, relatively short episode, thematically organised around relevant immediate goals or desired end states (Beal, Weiss, Barros, & Macdermid, 2005, p. 1055). O'Shea, Buckley, and Halbesleben (2017)

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examined how the reciprocal regulation of action, cognition, emotion and motivation occurs in an episodic model of self-regulation (the A-CEM-A model). This model explains how these four elements dynamically interact during a self-regulatory episode and proposes that the sequence of regulation occurs through different performance episodes over time. For example, actions (A) from one performance episode influence subsequent psychological processes (CEM) in the next performance episode, which in turn influence subsequent actions (A). This model can be used to provide more depth and detail regarding the dynamics of resilience development. For example, within a tennis tournament where a tennis player consistently loses points using their backhand in the first match may cause the performer to cognitively reflect and believe their ability when performing this return is poor. This belief will then cause some emotion in the player which in turn motivates him/her to reduce their use of this skill or practice this skill better before future actions. This cyclical model demonstrates what mechanisms through which self-regulation may promote and deplete resilience during adversities, but *how* they are related and then developed needs to be understood.

3.4 The *how* of a dynamic approach to resilience

In addition to explaining the *what* of the dynamics of resilience, we need a more detailed understanding of the role of resources and resource trajectories to fully understand the *how* of a dynamical approach to resilience. The results of the systematic review (chapter 2.3) indicated that resilience is a complex process with a multitude of underlying variables. However, currently research across both work and sport do not explain in detail *what* these underlying variables are nor *how* they fit into the dynamic perspective on resilience. We use conservation of resource theory to explain this (Halbesleben et al., 2014; Hobfoll, 1989).

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Life changing stressors may result in maladaptation, which can be explained as a loss of facilitative resources leading to a dysfunctional resilience reintegration (Richardson, 2002). The brain's ability to create schemas for events from past experiences (Sarkar, Fletcher, & Brown, 2015) promotes the ability of positive adaptation from adverse opportunities. Hill et al. (2018) have pointed to the value of detecting early warning signals of critical transitions (e.g. critical slowing down, Scheffer et al., 2012) and take preventive actions before breakdowns in performances occur however, they have not explained *how* this might happen. An energy model of resources, defining a resource as anything that actors can use to enact a schema (Feldman & Worline, 2011; Quinn, Spreitzer, & Lam, 2012) can be considered, where both adequate resources and iterative schemas are required to take action (Feldman, 2004). Developing schema of signals that may warn of a critical transition may explain how players can detect critical transitions prior to their occurrence.

The concept of resources has been associated with notions of adaptation, coping and resilience since the inception of research in this area (Hobfoll, 2002). As noted by Hill et al. (2018b) a dynamical system can be defined as “a set of elements, which are in constant dynamic interactions and change over time”. However, there is a need to define these elements and the nature of their dynamic interactions. In terms of defining the elements, Hill et al. discussed past research on protective factors which include resources. Conservation of resources theory (Halbesleben et al., 2014; Hobfoll, 1989) defines resources as “anything perceived by the individual to help attain his or her goals” (Halbesleben et al., 2014; p. 1338). From this perspective, resilience can be seen as one type of psychological resource amongst many others (e.g. self-efficacy, optimism, hope, energetic resources; Hobfoll, 2002). In addition, elements, like resources, may not necessarily be a function of a person, but may also comprise resources

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outside the person or contextual resources, such as social support, resources required to perform one's sport, access to appropriate facilities, expertise and training, etc. (Hobfoll, 2002). To move forward, we need a more detailed exploration and modelling of how resources interact and change over time in a dynamic process to build resilience, and in turn, how building resilience has a reciprocal relationship in building more resources. One theoretical account that can illuminate this process is the conservation of resources theory.

Integrating conservation of resources with a dynamical perspective goes beyond identifying the relevant resources but explains how they can be enhanced or depleted. COR's principles are that resource loss is more salient than resource gain (principle 1) and that people must invest resources to gain resources and to protect themselves from losing resources or to recover from resource losses (principle 2). The *primacy of resource loss* (principle 1) is the idea that it is psychologically more harmful for individuals to lose resources than it is helpful for them to gain the resources they lost (Halbesleben et al., 2014) and may explain the dynamics of resilience loss versus gain. For example, this suggests that resilience may be consumed at a higher rate during adversity than can be developed or gained back. Hill et al, (2018b) discuss the property of iterativity implying that a state system develops out of the systems previous state and all future states will depend on the systems history. Specifically, following the exposure to several adverse events after another can lead to a system which takes increasingly more time. Similar to this iterative learning from past adverse events which is involved in tipping individual capacities between relatively low and high resilience; resource theories offer an accumulative capacity of resilience which explains *how* this capacity depletes, *how* it can be developed and *how* associated factors may work together in this dynamic process. COR is a dynamic theory and

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the fluctuation of resources is a natural part of this (Halbesleben et al., 2014). Thus, how resilience fluctuates over time is a dynamic process.

In particular it is likely that resilience is gained or lost in a similar fashion to resource trajectories posited in conservation of resources theory (Halbesleben et al., 2014). To explain resource trajectories, Halbesleben et al. (2014) take an episodic perspective (Beal et al., 2005), as we do here also. A resource trajectory may take the form of an upward spiral when individuals use current resources to acquire new resources (Halbesleben et al., 2014; Hobfoll, 1988). Thus, players may invest their resilience to gain other resources (e.g. optimism, hope etc.), or conversely may invest other resources (e.g. optimism, hope, social support) in order to gain resilience, especially in the face of adversity. Similar to resilience research (Smith et al., 1990), Halbesleben et al (2014) suggest that there is a fundamental allostatic load which means that while resources are being acquired, the investment required to achieve resource acquisition means that there is some downward pressure on the general upward trend in resources.

A second type of resource trajectory is where there is an initial gain in resources but over time this changes to a loss of resources. This may be where an initial investment in resources does not yield the expected returns (Halbesleben et al., 2014). For example, it may be where an investment in resources does not reduce or remove the adversity being experienced and so, over time, and with continued resource investment, resilience loss occurs.

Finally, resource passageways are a relatively unexplored aspects of resource trajectories, which emphasise environmental conditions that may accelerate the change in resource for either better or worse (Halbesleben et al., 2014). They may add to the allostatic load of preservation, leading to a “bad-to-worse scenario” (Halbesleben et al., 2014; p. 1352) or conversely may fuel

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broaden-and-build dynamics (Fredrickson, 2001) which benefits goal achievement and additional resources. For example, a reminder from a coach of a player's long-term goals when they are struggling (e.g. you have to win this race/match, to qualify for the world championships) may encourage a player to dig deep and invest more resources for an upcoming race/match. On the other hand, if it is perceived as just additional pressure from the coach and more than a player can deal with at the present time, it may have the opposite effect and just remind them of the challenges ahead and the costs of losing the race/match. Thus, resource trajectories have much to offer in terms of explaining the *how* of a dynamic approach to resilience.

If we integrate the *what*, *when* and *how*, an important consideration at different temporal levels of analysis is the type of resources that are being utilised in a performance episode. For example, Hobfoll (2002) distinguishes energetic resources from other personal resources (e.g. self-efficacy, self-esteem, optimism). Recent research seems to confirm this. Energetic activation (Quinn et al., 2012) and affective resources appear to be particularly amenable to change very quickly across the day, but may also build over time into more stable resources (Pogrebtsova, Craig, Chris, O'Shea, & González-Morales, 2017; Steidle, Gonzalez-Morales, Hoppe, Michel, & O'Shea, 2017). Resources such as optimism, and self-efficacy appear to change over longer time frames (Clauss et al., 2018). All of these resources are intra-individual. To change contextual or environmental resources, such as social support likely requires a more macro level of analysis such as changing a sport organisation (Nielsen & Randall, 2009; Nielsen, Randall, Yarker, & Brenner, 2008). Although such studies on psychological resources have yet to investigate how they may impact resilience, examining these interrelationships will move the field towards a deeper understanding of the *what*, *when* and *how* in a dynamic approach to resilience.

3.5 The *when* of a dynamic approach to resilience

Given the complexity of resilience where processes may depend on the situational needs, exposure to, and severity of an adverse experience, a comprehensive dynamic model of resilience needs to clearly address the issue of *when* resilience is happening. The dual-pathway portrayal of resilience (see Chapter 2.3) begins by offering two pathway processes, similar in scope to resource trajectories in conservation of resources. This model mirrors the two most common aspects of resilience interactions of maintenance and reintegration noted throughout work and sport contexts (Chapter 2.3). This dual-pathway model of resilience offers expected pathways during an array of minor to major adversities, highlighting a favourable response in certain minor to moderate acute pressurised situations (i.e. minimal impact resilience). It suggests that the temporal nature of the adversity, and in particular whether it is a short-term (e.g. acute, in the moment) or longer-term (e.g. chronic, over time) adversity influences the nature of the dynamic process itself.

A strong conceptual rationale is needed to explain how the ongoing daily process of resilience occurs both in the short to long term. However, we also need to consider the magnitude of the effect that various types of adversity have on resilience and the motivational and situational needs occurring during the adverse timespan. The *dual-pathway model* allows us to consider both constant dynamic reactions to varying environmental demands, as well as acute pressurised situations; where the ability to buffer stress and perform under pressure may be the optimal pathway and instrumental in athletic success. We explain below how the timespan of an adversity may result in two distinct dynamic pathways to resilience, and thus any dynamic approach to resilience must consider this. The temporal aspects of resilience are highlighted by Chapter 2's pathway model which illustrates *when* resilience processes occur. The pathway of

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maintenance of optimal functioning associated with minimal impact resilience is characterised by a short to medium term adversity whose magnitude is low enough not to exceed the individual's available resources. Whereas, the pathway involving a facilitated rebound with stronger learned qualities is characterised by significant adversities which does exceed the individual's available resources. For example, take a tennis player who loses the opening matches of a multiple match tournament; (a) a player with situational experience and broadened resources will have the resilience capacity to buffer any significance adverse effects on well-being or performance before the next match (minimal impact resilience) or (b) a player with lower situational experience and available resources will suffer a temporary disruption in performance and well-being leading into the next matches and with further loses may experience a depletion of personal resources and resilience capacity. However, over time and through appropriate cognitions a facilitated learned adaptation and reintegration will occur (emergent resilience). The importance of *when* resilience capacities may fluctuate allows practitioners to prepare accordingly in order to develop interventions aimed at maintaining functioning, rebounding faster and/or ensuring optimal reflection and reintegration post adverse situations.

The regulation of minimal impact resilience.

Hill et al. (2018) use the example of a tennis match to explain how situational demands constantly influence the protective resources and how the displayable level of resilience changes in accordance to the match plays setbacks and successes. It is unlikely that such situations are perceived as a significant adversity but may simply constitute performance variability that requires in-the-moment emotion regulation or coping. The process of minimal impact resilience may provide an explanation for what occurs during such situations. Minimal impact resilience occurs when stress is buffered in order to maintain normal functioning (Bonanno & Diminich,

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2013; Bryan et al., 2017). It is characterised by relatively low levels of challenge where a proactive adjustment even before an event may occur (Braver, 2012). Resilience will not necessarily be drawn upon unless the magnitude of adversity diminishes an individual's resources significantly. In contrast, a permanent reduction in resilience would be subject to time and may, for example, emerge during negative post-match reflections. To this end, Hammond, Gialloretto, Kubas and Davis (2013) reported that the prevalence of depression doubled among the elite top 25% of athletes assessed after team trials. Within this group, performance failure was significantly associated with depression. Minimal impact resilience occurs during short term "temporal units of performance" or within-day "performance episodes" (Beal, Weiss, Barros, & MacDermid, 2005; p. 1055). Again, using Hill's example of a tennis match, the ability to buffer adverse stress and negative emotions can be pivotal to task success (Beal et al., 2005).

Quantitative experimental research on task performance in sport has observed a resilient performer's ability to stay optimistic (Martin-Krumm, Sarrazin, Peterson, & Famose, 2003; Seligman, Nolen-Hoeksema, Thornton, & Thornton, 1990) and maintain both physiological and emotional levels (Jones & Jetten, 2011; Meggs, Golby, Mallett, Gucciardi, & Polman, 2016) in response to the task failure. Whether a player double-faults on their opening serve of a match or is a single point away from match point, the ability to maintain and display optimal emotion states and consistent performance is dependent on them managing this pathway of minimal impact resilience. In such circumstances, some meta-cognitions and emotions may be detrimental to performance, by redirecting attentional focus away from the task (Beilock, Carr, Macmahon, & Starks, 2002). Toner, Montero, and Moran (2015) suggest that this process may not be completely automated unconsciously, but that the competitive demands of sporting environments require a dynamic interplay of automatic and conscious processing. Similarly,

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broaden and build theory (Fredrickson, 2001) has been used to explain how associated resilience resources broaden an individual's ability to effectively cope with emotions and sustain during stressful experiences in resilience processes. Rothermund (2011) counter-regulation principle suggests that psychological adaptation is best served by maintaining a steady emotional balance. An implicit emotion regulation involves subconscious automatic processes to offset the perturbation of emotional responses triggered automatically by environmental events (Koole & Rothermund, 2011). Athletes are continually bombarded with emotionally charged stimuli from opposition success to teammate temper tantrums as well as positive college scout interest or attractive interaction partners. Emotional flexibility may be more conducive to resilience (Koole, Schwager, & Rothermund, 2015). The ability to stay positive in the face of adversity may not be driven by a general positivity bias. Instead, it may be part of a broader tendency to respond to negative and positive emotional events with an opposite tendency in affective processing (Tugade & Fredrickson, 2004).

Hill et al. describe a situation where a series of setbacks within a short time can reduce the capacity of resilience so much that a single stressor could cause a person to develop a depressive episode (Van de Leemput et al., 2014). However, on the minimal impact resilience pathway the ability to consistency buffer low magnitude adversity during task involvement will enable the individual to persist unless greater adversity occurs or until the task concludes. The magnitude and situational needs of each adversity is relevant in determining whether this preferred minimal impact pathway to stress buffering can be utilised. Available resources and resilience capacity will contribute to the potential for an adaptive response. This type of resilience regulation is quite different to the process of emergent resilience which tends to occur over longer timeframes and at a different magnitude of adversity.

The regulation of emergent resilience.

The most commonly used model of resilience across both sport and work psychology research is Richardson's (2002) three waves of resiliency enquiry (Chapter 2). Richardson (2002) describes that before any stress-resilience interaction occurs, a stable homeostatic state of resilience is thought to precede any perturbation. Homeostatic resilience is not thought of as a state of rest but of active self-reproduction whereas adaptation or positive change occurs on that state and it will resume with the same major properties but at a higher capacity and flexibility (Van Geert & Steenbeek, 2005). The disruptive and integrative processes post adverse situations are one of the pivotal layers of this theory and both need to be included in a dynamical resilience process and are both reflected in the dual-pathway model (Bryan et al., 2017). Stress disrupts the equilibrium of an individual's cognitive-emotional-environmental system (Lazarus & Folkman, 1984), but is also an essential process to help individuals grow and develop psychologically. Zautra, Arewasikporn and Davis (2010) characterised resilient adaptation by the speed and thoroughness of stress recovery (rebound), the capacity to sustain purpose (minimal impact resilience; maintain regular functioning), and the capacity to attain a form of psychological growth that reveals a greater maturity of the mind (emergent resilience). The adaptation aspect of resilience suggests we should be looking to models of self-regulation in this regard. As an aspect of performance, adaptability has been defined as role flexibility and the proficiency with which individuals self-manage their new learning experiences (see Pulakos, Arad, Donovan, & Plamondon, 2000 for a review). Flexibility is key for minimal impact resilience while self-managing learning may be key to emergent resilience. Thus, the ability to engage in self-regulation or self-management processes are key for adaptation and reintegration of resources.

Reconciling the regulation of minimal impact and emergent resilience.

Although we have demonstrated how minimal impact resilience and emergent resilience represent different timeframes and thus, engender somewhat different processes, they can still be viewed under the same framework from a self-regulation perspective. Differing situational demands may require different facilitative resources and responses from athletes depending on the stressors, be they competition, deadlines or personal. For the minimal impact resilience pathway resources such as coping strategies (Secades et al., 2016), focus (Gould, Dieffenbach, & Moffett, 2002) and optimism (Owens, Kirwan, Lounsbury, Levy, & Gibson, 2013) may be more relevant to maintain homeostatic resilience during competitive tasks. The process of minimal impact resilience involves regulation of emotions and pre-organised action patterns (cf. mental schemas) in order to attend to the adverse situation effectively and successfully. Practitioners should focus on developing this pathway by creating pre-performance routines (Cotterill, 2010) and instilling effective mental imagery practices (Moran, Guillot, MacIntyre, & Collet, 2012) with their athletes. Emergent resilience pathway contains levels of both disruption and reintegration. Hill et al. (2018) have already suggested focusing on periods of critical slowing down that may precede a disruption in resilience, where practitioners can detect early warning signals and develop preventative strategies. Reintegration refers to both the rebound ability (i.e. a return to previous functioning and resilience capacities) and resilience development (i.e. a facilitated learning response to adverse experience). Fletcher and Sarkar (2016) highlight that resilience training can therefore be both proactive (i.e. reintegrating before critical slowing down) and reactive (i.e. to increasing the speed of rebound ability). Sport research points to the development of support (Lu et al., 2016), self-efficacy (Cardoso, 2014) and perspective (Galli & Reel, 2012) as a basis for developing this emergent resilience pathway.

3.6 The *where* of a dynamic approach to resilience

Hobfoll, Stevens and Zalta (2015) proposed that resilience is a property of environments that are (i) rich in personal, social, material and energy resource, (ii) allow access to those resources and (iii) provide safety and protection against resource loss and promote resource growth. From the perspective of COR, these environmental conditions can be considered to provide caravan passageways, which are the environmental conditions that support, foster, enrich and protect the resources of individuals or that detract undermine, or impoverish people's resource reservoirs (Hobfoll, 2012, Hobfoll, Stevans & Zalta, 2015). Thus, possessing resources allows one to build more resources and having more resources places the individual in a higher energy capacity for stress-resilience interaction (Quinn et al., 2012).

Before any stress-resilience interactions, a stable homeostatic state of resilience is thought to precede any perturbation and the capacity of resilience fluctuates as the magnitude of adversity exceeds resilience capacities and capabilities depleting available resources (Richardson, 2002). Figure 3.1 represents a practical example of both when and where resilience may fluctuate in sporting practice.

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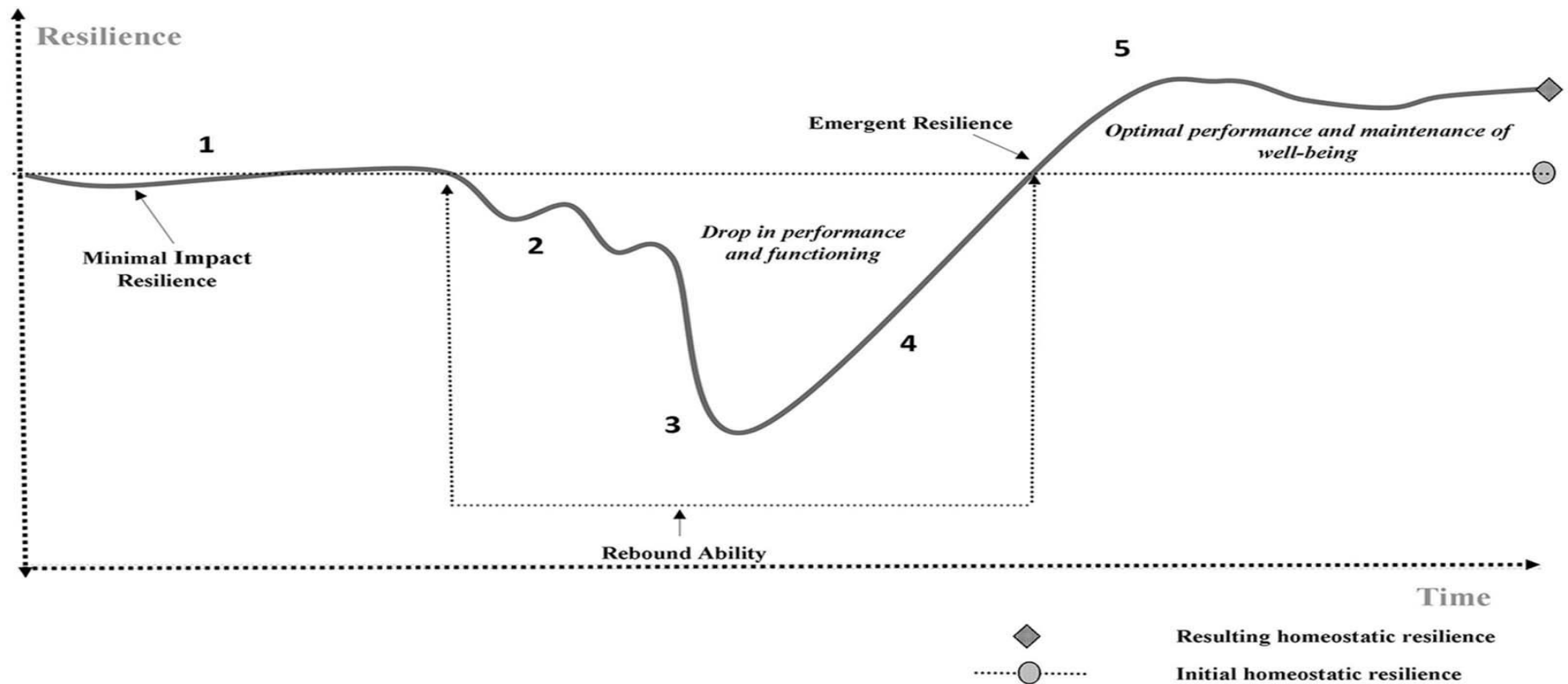


Figure 3.1 Fluctuation of resilience:

Fluctuation of resilience: (1) A player loses the first two matches of tennis tournament. Through the availability of resources and past experience, stress is buffered and functioning is maintained. (2) A series of matches are lost. The magnitude of adversity is greater than the available resources; this causing disruption in resilience and is a critical slowing down point. (3) A continued loss in action performance and effort. A depletion of resources occurs, and a series of cognitive and emotion responses causes further reductions in resilience. (4) The player's support and resources help cognitively reappraise past performances as challenges. Resource reintegration begins, and positive goal-directed behaviours reengage. (5) The player's performance returns and becomes more consistent. Facilitative resources have reintegrated stronger through new learned experiences; the player's resilience capacity increases.

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Whetten (1989) highlights the importance of visual representation during new theory explanation. Figure 3.1 reflects examples offered throughout this commentary and offers the reader a practical view of dynamic resilience. In the fluctuation of resilience we can see a minimal impact perturbation (1) causing no lasting effect on performance and a return to stable homeostatic state. Further on, we then see an encounter of several subsequent stressors with attempts of emotional regulation and reintegration, until a point of critical slowing down (2) and a disruption of resilience. Resilience continues to drop until a point of reappraisal and reintegration begins (4). This rebound ability continues and surpasses initial homeostatic resilience capacities (5) and optimal performance and well-being is resumed. This new resilience capacity is the result of effective reintegration of facilitative resources together with broader perspectives of past historic adverse events.

3.7 Moving forward: The next steps for resilience research as a dynamic, episodic, self-regulating process

I propose and discuss four avenues that are required to fully realise the potential of a dynamic approach to resilience. Firstly, I contend that there is still further work required on the definition and conceptualisation of resilience (the *what*). We need a definition and conceptualisation of resilience that moves away from trait approaches and acknowledges the inherent process and dynamism of resilience. Although definitions of resilience have tended to acknowledge the underlying trait-like protective factors and mental processes (Fletcher & Sarker, 2012, 2013; Hill et al., 2018b), the first step in advancing a dynamic approach to resilience is to define it as such. I have proposed that resilience should be defined as “a dynamic process encompassing the capacity to maintain regular functioning through diverse challenges or to rebound through the use of facilitative resources” (Chapter 2). This definition specifies resilience

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as a dynamic process, but also adopts a broad consideration of reactions to adversity which can include both chronic adaptation to adversity as well as an acute ability to persist in the face of adversity.

Second, I suggest that the process of resilience is more than just dynamic, but also needs to consider episodic performance and self-regulation. The A-CEM-A model highlights the need to consider how self-regulation episodes unfold over time (O'Shea et al., 2017). Applied to dynamic models of resilience, performance episodes would identify timeframes or time periods that wither consume, conserve or develop resilience. These episodes can be momentary, such as the example use by Hill et al. (2018) or can be longer term, such as long term often depending on the magnitude and exposure of adversity (Chapter 2).

Third, and related to the second point, a broader perspective on resources and resource trajectories is required to understand the *how* of the dynamic process. This chapter offers an understanding of the *what* (cf. self-regulation and A-CEM-A model), expanded on the *how* (cf. resource theory) and as detailed the *when* and *where* (cf. dual-pathway model and fluctuation of resilience figures) of a concept of dynamic resilience. Researchers and practitioners can now capture and develop dynamic resilience along a spectrum of maintenance, disruption and reintegration in order to effectively maximise specific individual resilience processes.

Finally, the magnitude and performance situation of the stress-resilience process needs to be considered particularly with regard to what the optimal resilience pathway process looks like and whether associated resources and skill are the same or different. As we have discussed in detail above, it is unlikely that the *when* of resilience is a unitary construct, but rather the temporal nature of resilience dynamics (e.g. in the moment versus longer-term) interacts with the

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magnitude of the stressor and the individuals current resource levels to result in two distinct pathways (minimal impact resilience or emergent resilience).

3.8 Conclusion

In this chapter, we have expanded upon the model of Hill et al. (2018) using Whetten's (1989) criteria of a theoretical contribution. We have shown how recent research investigating dynamic approaches to self-regulation (Vancouver, 2008) and episodic performance models (Beal et al., 2005), together with the A-CEM-A model of self-regulation (O'Shea, Buckley, & Halbesleben, 2017), and conservation of resources theory (Halbesleben et al., 2014; Hobfoll, 1989, 2002) can deepen our understanding of the *what*, *how* and *where* of dynamical resilience. Furthermore, we drew on the work of Chapter 2 to show how the timeframe of this dynamic system may result in somewhat different processes with distinct effects on resilience, and thus, demonstrated that the *when* of dynamic resilience may not be a unitary construct.

CHAPTER 4

THE TRANSFER OF RESILIENCE ACROSS PERFORMANCE DOMAINS

Sports performance provides a context in which both positive (e.g., championships) and adverse (e.g., injury) events occur and to which athletes must respond.

(Shoenfelt, 2016, p. 444)

4.1 Resilience conceptualisation across sport and work

The premise that the goal of sport is to create elite athletes is misplaced. The International Olympic Committee consensus on youth athletic development stated: “The goal is clear: Develop healthy, capable and resilient young athletes, while attaining widespread, inclusive, sustainable and enjoyable participation and success for all levels of individual athletic achievement” (Bergeron et al., 2015, p. 1). However, given the physiological benefits of sport, little attention is given to the abundance of psychological benefits. Overlaps from sporting experience may shape the way in which individuals engage in activities such as leadership, teamwork, and competition in other organisational contexts (Day, Gordon, & Fink, 2012). Therefore, embodied attitudes, cognitions, and emotions that are formed in sport could serve to either develop or disrupt behaviours in work contexts.

Resilience can be exhibited at differing degrees across a multitude of life domains (Gillespie, Chaboyer, & Wallis, 2007), and so the proposition that resilience should be showed as context specific has been argued (Southwick et al., 2014). However, given the variety of adverse circumstance that individuals are exposed to in each context and the dynamic interaction between resources (Hobfoll, 2011), studying specific individual components which predict only specific resilience episodes may also be limiting (Hill et al., 2018b). In contrast, researchers are beginning to borrow research across similar domains of work and sport (Shoenfelt, 2016). Streat (1998) outlines that the descriptions of situations in which successful performers operate, should be welcome additions across many domains of research. Johns (2001) and Johns (2006) establish the importance of contextualisation in research, defining contexts as the surrounding areas associated with the phenomena at play, which aids understanding and helps link a set of relevant

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facts, events or points of view that make possible research and theory form a collective larger whole.

The advantages of studying both sport and work in parallel allows for on-going cross reference of theories and research that may be applicable within each context (Hays, 2012). Furthermore, the transferability between sport and work may go beyond parallels within the literature. The similar cognitive processes of individuals engaging in goal oriented tasks may offer a degree of transferability from one context to another. Mael and Ashforth (2001) speculate that performers must continually search for meaning in work while one is behaviourally, and persistently immersed in it; the environments of work and sport contain similarities where mastery motivation may strengthen the resilience process (Masten, 2001). The contextual overlaps of studying participants in similar environments and the practical transferability of participants experiences across contexts is not verified. The ability of an individual to develop resilience over time involves the development of a multitude of associated resources as previously discussed. These synergistic resources are similarly seen across work and sport which creates the hypotheses of how resilience developed across specific experiences in one domain may be transferred across another.

4.2 Resilience development over a life-span

Previous resilience experiences are noted to be important in future adverse experiences and performance episodes (Sarkar & Fletcher, 2014). By the same token, it is unclear whether resilience independently developed in one domain can be applied to another. The developmental role of sport in early life has already become an important topic within developmental research (Coakley, 2011) and grounded theories for its transferability to later life and work domains has begun to build support (Holt et al., 2017; Kendellen & Camiré, 2019). Considerable qualitative

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research on resilience has provided indications that sports performers can turn the most challenging times around and develop resilience as a result (Sarkar et al., 2015). Early life struggles may be essential, acting as development catalysts in future career adversities (Howells, Sarkar, & Fletcher, 2017). Qualitative research in sport and in high achievers across contexts have shown long-term developments of resilience which incorporate a product of entire past career adversities (Brown, Lafferty, & Triggs, 2015; Fletcher & Sarkar, 2014). Resilience development across both long and short term exposures to adversity have reported similar key resources and processes of resilience such as stress appraisals and social support (see Chapter 2, section 2.3). In addition, retrospective studies with Olympic and World champions revealed a variety of non-linear pathways to expert achievement in sport (Phillips, Davids, Renshaw, & Portus, 2010). Therefore, a consensus has emerged to suggest that excellence in all domains may emerge through dynamic interactions between multiple components or systems across the lifespan where critical life events are significant developmental components (Den Hartigh, Van Yperen, & Van Geert, 2017; John, Gropper, & Thiel, 2019).

An athlete's experience of challenge and support during youth investment years may have a significant impact on the developed cognitive processes and attachment styles later in life; which in turn may have direct impact in their abilities to react to life stress appropriately (Brown, Lafferty, & Triggs, 2015). Equally, work psychology has identified that the development of resilience must begin early and represents a lifelong activity (Britt et al., 2016). Though, most of this past research has relating to future resilience development has tended to focus on similar related experiences in sport or work.

How we perceive difficult challenges in sport, may be cultivated as a result of high pressure competition environments (Hallett & Hoffman, 2014). Research on the promotion of

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specific mindsets in schools has focused on the importance of challenge mindsets. These positive outlooks of ongoing challenge are viewed as something that everyone can take on and overcome with effort, and that these mindset may foster resilience development (Yeager & Dweck, 2012). The occurrence of minor to major adversity places pressure on cognitive demands reducing our ability to be cognitively and emotionally flexible effortful (Baumeister, Gailliot, DeWall, & Oaten, 2006); this effects our energy and how we may entertain positive and negative appraisals of a situation (Zautra, Arewasikporn, & Davis, 2010). Two primary stress appraisals relevant to resilience processes are threat and challenge appraisals. Challenge stress appraisals was seen as a pivotal component of resilience development in Olympic athletes across a life-span (Fletcher & Sarkar, 2012). Threat appraisals involve the potential for future loss and challenge appraisals reflect the possibility of gain or growth from experience (Peacock & Wong, 1990). Perhaps, if educators and coaches can foster appropriate mindsets through sport relating to positive appraisal styles it may be possible to cultivate resilience developments.

4.3 Sport as a vehicle for resilience development

There is growing interest in the use of sport as a context in which to examine fundamental issues in organisations (Day et al., 2012; Hallett & Hoffman, 2014). At its core, behaviour in work contexts involve individual strivings targeted at two main performance goals - getting along versus getting ahead (Hogan, 1996), and sport is an excellent context in which to study these goals. Fletcher and Sarkar (2016) identified the conditions of high challenge and high support as optimally facilitative environment for resilience development. Sport environments offer a multitude of challenges where performers are surrounded with support staff to help facilitate a variety of adversities. Sport is increasingly seen as a vehicle for positive youth development, however transferability of resilience capacities to later life work pursuits is

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unknown. The growing field of sport-based youth development has explored the role of both coaches and social support in fostering athletes' lifelong skills to deal with adversity and challenges they encounter while transitioning into adulthood (Cox, Neil, Oliver, & Hanton, 2016). Research that has focused on the similarities between sport and work has increased in recent times including topics such as coaching methodologies and performance management (Gould & Wright, 2012; Molan, Kelly, Arnold, & Matthews, 2018; Murphy, 2012).

Understanding the overlap of sport and work may serve to better promote sport beyond that of elite athlete development and entertainment. Research is no longer limiting sport to athletic success and is beginning to suggest that sport may play a significant role in youth development. However, we must recognise that resilience may be domain specific. Cartigny, Fletcher, Coupland, and Taylor (2019) developed a grounded theory of dual-career pathways in sport and education where the benefits of well-being and confidence across both domains were brought about by developing a multidimensional identity. For example, athletes who identify as both high achieving athletes and as students may strategically invest their time and resources appropriately in either domain as one career performance at a time may be poorer than the other. Furthermore, the study of critical life events by John et al. (2019) also supported the idea that critical life events impact the dynamic pathway to excellence in different achievement domains from one domain to another where similarly this may also apply for the development of resilience. Studying the effects of sports participating on the development of future career resilience may aid the understanding of the developable pathways in the resilience process but whether these skills and capacities can be transferred across domains is yet unclear.

4.4 Chapter summary

Resilience is fostered through adverse environments in combination with high emotional support (Holt & Dunn, 2004; Masten, 2001). This development is a lifelong process and scientists have been interested in the personal assets and coping strategies that can be developed through sport but which benefit adolescents in all walks of life and future work (Coakley, 2011). Capturing resilience development across a lifespan is difficult, with previous research having spanned over 30 years (Werner, 1997). The emergent resilience pathway is seen as an on-going process that involves a series of disruption followed by reintegration sometimes over a large time scale. Competitive youth sport is likewise seen as a long term developmental pathway involving multiple adversities. These adversities are across a spectrum of magnitudes and exposures, where overall success is the product of repeated performance episodes that require individuals to learn and adapt under pressure. In order to study the developmental benefits of sport on resilience a research design is needed that encompasses differing historic backgrounds of sport and potential relationships with resilience variables. This would allow researchers us to test the hypothesis of long-term resilience development through similar adverse experiences.

CHAPTER 5

SUMMARY OF RESEARCH QUESTIONS AND DEVELOPMENT OF HYPOTHESES

The empirical study of determinants of resilience will inform efforts made at fostering resilience, with the recognition that resilience may be enhanced on numerous levels.

(Southwick et al., 2014, p. 1)

5.1 Introduction

This chapter summarises the main research questions and develops the hypotheses to be tested in this thesis. The previous four chapters summarised the literature, developed a theoretical model of the dynamics of resilience and considered the ways in which previous experiences may influence resilience to similar adverse situations and performance episodes. This chapter will integrate the theoretical models developed in the sports context with advances in longitudinal research in the work context in order to develop the empirical hypotheses to be tested. The chapter will not present any new information on resilience, but will summarise the main research questions and models to be tested in relation to the stability, regulatory processes and long term development of the concept of resilience.

5.2 Examining resilience as a state-like versus trait-like construct

Resilience research is plagued with conceptual inconsistencies, particularly when considered across different contexts, not least because of the diversity of adverse situations across these contexts (Galli & Gonzalez, 2015). In Chapter 2, the systematic review provided a snapshot resilience research in two achievement contexts (sport and work). A conceptual shift away from a trait approach towards a state-like process is beginning to emerge. This shift has created a contrast of opinions within both the sport and work literature (Gonzalez et al., 2014; Britt et al., 2013). The grounded resilience theory in sport (Fletcher & Sarkar, 2012) reflects much of the findings within the work context which can be built upon. This paradigm shift calls for the necessity of conceptual alignment of resilience.

The hypotheses will examine whether there are any fluctuations in resilience over time. The magnitude resilience change over time will then be related to a where the construct sits on the conceptual trait-state continuum. The proportion of longitudinal research in resilience has

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been conducted in work and organisational psychology, with a number of intervention studies reporting significant positive changes in resilience (Robertson, Cooper, Sarkar, & Curran, 2015). Within positive organisational behaviour research, Luthans (2002b) outlines the need for psychological capacities and resources to be effectively measured and effectively managed for successful performance improvement in today's workplace. Peterson and Seligman (2004) note that higher order constructs like resilience need to be differentiated from other constructs in positive psychology by involving state-like or trait-like distinctions. Trait and trait-like concepts represent personality factors, which are stable and difficult to change; whereas state and state-like range from developable malleable constructs and unstable continually changing constructs like momentary affect (Luthans, Avolio, Avey, & Norman, 2007). Hereditary research also suggests resilience may change over time as a function of development and one's interaction with the environment (Kim-Cohen & Turkewitz, 2012).

However, quantifying and analyzing construct stability is complex. Advancements in advanced statistical methodology over the last decade including longitudinal modelling have become increasingly prevalent in the behavioural sciences, with key advantages including increased power, more comprehensive measurement, and the establishment of temporal change over time (Curran & Bauer, 2011). These type of models will be central to the analysis of our research questions. Hill et al. (2018b) confirms that longer timescales and repeated self-reports of various performance indicators could be used to study the temporal process of resilience by establishing time series data. Galli and Pagano (2018) similarly claim that it is necessary to collect measures of resilience and corresponding challenges over time in order to study a dynamical-systems perspective. Hence the following hypotheses are proposed in order to test the stability of resilience in relation to varying adversities:

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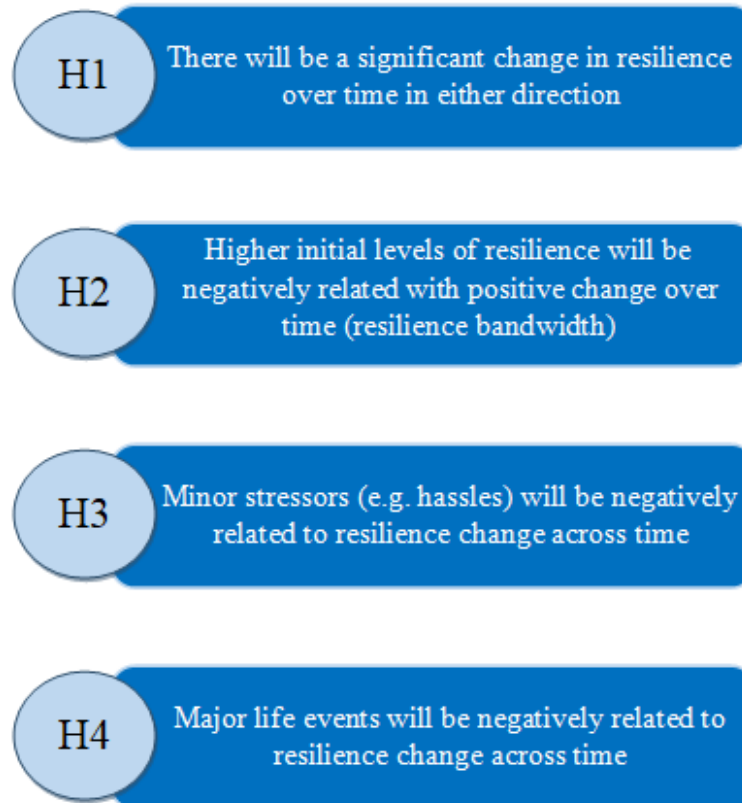


Figure 5.1 Analysis 1 research hypotheses

Our research intends to capture resilience capacities over multiple time points in relation to varying magnitude of events. However, there is a difficulty in choosing appropriate statistical approaches due to increased statistical platforms on offer to clean, model and test complex data. A psychological *process* from a data analytical viewpoint is a process that emerges from a complex system which indicates a variation over time. Time-series data is inherent of time fluctuations and will offer the best approach to capture a processes behavior indicated through enhanced fluctuations (Kelso, Scholz, & Schöner, 1986). Luthans et al. (2007) compares the stability of a construct in lines with reliability of its measurement However, Grover and Furnham (2016) claim self-report data used to predict correlations on other self-report data may

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be misleading, and individual correlation results could be a mechanism of assessment rather than an actual relationship between the variables.

Longitudinal resilience research is prominent within the work and organisational psychology literature. Grant, Curtayne, and Burton (2009), Pidgeon, Ford, and Klaassen (2014) and Waite and Richardson (2004) used a repeated measures (RM) ANOVA to capture change in experimental interventions. Sherlock-Storey, Moss, and Timson (2013) used pairwise comparison t-test in similar organisational interventions. The results of these studies suggested how the time frame of an investigation may be a necessary determinant of positive resilience development due to positive lagged effects. Vanderbilt-Adriance and Shaw (2008) discusses resilience theories in line with high risk children and suggest that beyond initial studies which have shown have shown positive resilience change over longer terms such as ten years and 32 years (Masten et al., 1999; Werner & Smith, 1992), there is also substantial variability in resilience, even over shorter time periods 12-24 months (Anthony & Cohler, 1987). Timeframes of adverse exposure within work and sport are generally medium term with past longitudinal research spanning from 6 weeks to 9 month follow ups (chapter 2). Due to the focus on trajectories to both minor and major ongoing adversities in our hypotheses our investigation will incorporate a multi-wave design encompassing self-reported behaviours over a total of eight weeks where data is collected with equal time lags in order to account for lagged relationships over time. In difference to these studies traditional statistics used by the above authors such as t-test and ANOVA analyses cannot separate important aspects of individual rates of change and more advanced analytical methods must be considered.

5.3 Exploring the process of resilience change

After testing whether resilience may fluctuate over time we also want to know *what* effects this change and *how* this change can be influenced. In order to understand the relationship of positive resilience change we also need to capture an outcome of successful resilience. This research will examine the dynamic aspect of resilience in response to ongoing behaviours at work in order to determine *how* process variables such as cognitive appraisals may add towards the process of maintaining functioning through challenge (cf. minimal impact resilience). When exploring these cognitive processes that may be involved in dynamic resilience our related research hypotheses are:



Figure 5.2 Analysis 2 research hypotheses

5.4 The development of resilience over longer timespans

Resilience development has been associated with the long-term incorporation of entire career adversities and development across the life span (Galli & Vealey, 2008; Sarkar & Fletcher, 2014). Research shows that early life struggles are essential and often act as development catalysts in future career adversity (Howells et al., 2017). Chapter 4 (section, 2.4) outlines qualitative research on resilience which provides evidence that sports performers can turn the most challenging times around and develop resilience over a lifespan as a result (Sarkar et al., 2015). An athlete's experience of challenge and support during youth investment years may have a significant impact on the cognitive process and attachment styles later in life; which in turn may have direct impact in their abilities to react to life stress appropriately (Brown et al., 2015). Equally, work and organisational psychology identifies that the development of resilience must begin early and representative of lifelong challenges (Britt et al., 2016). Specifically, resilience research has pointed towards higher challenge appraisals and fewer threat appraisals associated with successful resilience change over time (Bonanno, Kennedy, Galatzer-Levy, Lude, & Elfström, 2012). Furthermore, the ability to perceive stress as a challenge rather than a threat forms the basis of recent challenge mind-set research (Yeager & Dweck, 2012). The ability to appraise stress as a challenge which you can learn and grow shows positive correlations with workplace successes and development (Hallett & Hoffman, 2014). This research will focus on individuals at work and their resilience processes over time in relation to persistence in goal directed behaviours during stress. Given the broad variety of adversities experienced across both work and sport, it is unclear how a history of overcoming challenging experiences in competitive sport might be applied in the workplace. However, the importance of achievement in sport may not constitute healthy youth development (Coakley, 2011) and participation rather than

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performance may be the key emphasis in sports play (Bergeron et al., 2015). It is the goal of this research to explore if any past association with sport may benefit resilience at work in later life.

Hence, our final research questions to be poised will be:

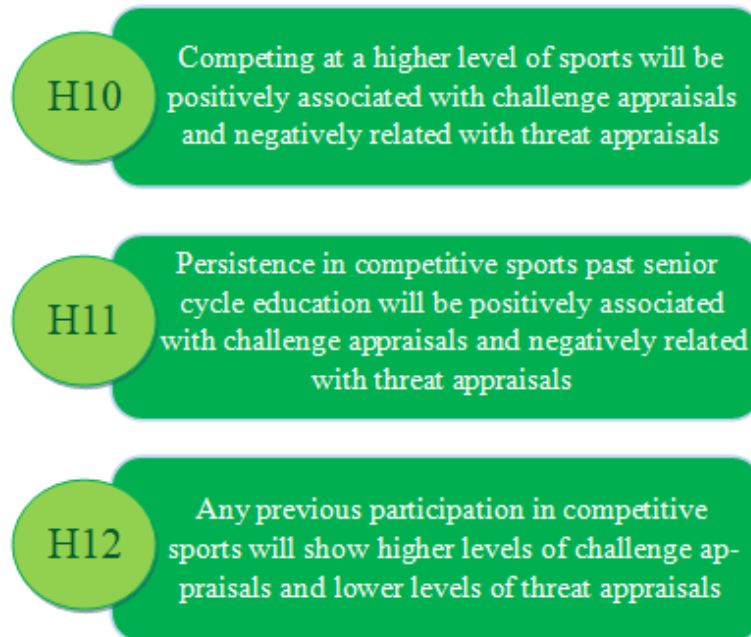


Figure 5.3 Analysis 3 research hypotheses

5.5 Summary of the complete development and theoretical model of the dynamic model of resilience

The hypotheses refer to the stability, regulatory process and development in the different phases of the resilience process. The hypotheses will be tested within the work context and discussed with the outlined theories and associated resilience definitions resulting from the literature review which reflects a strengthened sample across both work and sport. These proposed hypotheses will be tested across three chapters and distinct analyses in order to answer these three pronged processes of dynamic resilience seen across both short and long term adversities through-out both sport and work.

CHAPTER 6

RESEARCH DESIGN AND METHODOLOGY

This issue can only be truly resolved (referring to trait versus state debate of resilience), of course, after researchers have amassed a large body of data on the relative prevalence of resilience across a range of aversive events. I firmly believe that such data, when they become available, will continue to robustly document the natural human ability to thrive under even the most adverse circumstances.

(Bonanno, 2005, p. 266)

6.1 Research Design

This research utilised a longitudinal quantitative methodology to examine the dynamics of resilience over time. If a dynamic state-like concept defines the *how* of dynamic resilience our research design must focus on answering *when* a change in resilience stability occurs (H1 and H2); *what* effects any change in that stability (H3 and H4); *what* cognitive processes are associated with that process of change (H5-9) and finally *where* can that change be influenced over an entire life career (H10-12). The following chapter will discuss the methodological approaches and issues around answering these research questions.

Methodological approach.

The question of what effects resilience includes both external environmental influences as well as internal cognitive processes. One view outlined in a commentary by Kiefer and colleagues (2018) elaborate on the notion of interaction-dominance; this describes that a dynamical system can make use of structurally different components in order to achieve the same functional output. Conservation of resource theory offers parallel explanation of how resources co-occur and interact with one another to decrease vulnerability or increase resilience. In a dynamical system, the same behaviour may result from different interacting underlying processes, therefore analysing all these processes are essential in understanding the behaviour of a dynamical system (Kiefer et al., 2018). Deconstructing the system and studying its components in isolation will likely disrupts the dynamic interactions between the components (Hill, den Hartigh, Meijer, de Jonge, & Van Yperen, 2018a). Therefore, the basis of this research will not further disrupt any process of resilience and utilised a passive approach. The time-series methodology follows recommendations of longitudinal stress research from Frese and Zapf (1994) Zapf and Frese (1996) that: 1. All variables should be measured at all times; 2. A third variable should be

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considered as a potential confounder of the stress-strain relationship; 3. A multi wave design with equal time lags; 4. Assumptions of participant time course should be considered (how long have they been working in their jobs, have they had time to adapt to working conditions?); 5. Linear structural equations approach is recommended to analyze the data; 6. Measurement models should be included and 7. Multiple competing models should be considered. Inclusion of these guidelines served as criteria for this longitudinal study by incorporating all recommendations.

Sample selection.

Resilience research across both work and sport focuses on the ability to sustain performance in the face of mild to moderate adversity. Therefore, utilising a participant sample where our research design could capture data in uniform way that was repeatable across time, organisations and individuals was priority. For example, sport contains an array of similar yet differing adversities and could be seen as a natural laboratory for analysing resilience prior to, during and post high pressure episodic performance. However, these adversities need to be measurable in order to map the trajectory of resilience. The office workplace offered the best sample of investigation for this research with higher potential adult populations and accessibility to online survey instrumentation.

Participants included $N=101$ office workers in medium-sized organisations (54 male and 47 female). The sample comprised 38% managerial and 62% non-managerial staff (Mean age: 32.21; $SD=10.73$) and were recruited through company managers who sent out an email of request for all employees who wished to participate. Eighty-one individuals completed all the questionnaires' across all time-points reflecting on a total of eight weeks and 348 surveys were collected across the four time points to allow for longitudinal analysis (Farrell, 1994) (Time 1

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$N=101$; Time 2 $N=83$; Time 3 $N=83$; Time 4 $N=81$). This represents a response rate of 86.1% (348/404) across all timepoints. The eight week timeframe reflected a shorter scale timeframe than previous longitudinal studies which have already shown resilience change in relation to interventions; 13 weeks (Burton et al., 2010), seven weeks (Liossis et al., 2009) and 16 weeks (Waite & Richardson, 2008). This short time frame was selected in order to observe any on-going trajectory changes in reaction to chronic on-going stress as well as acute major life events in relation to time in order to accurately capture baseline resilience change (Bonanno & Diminich, 2013).

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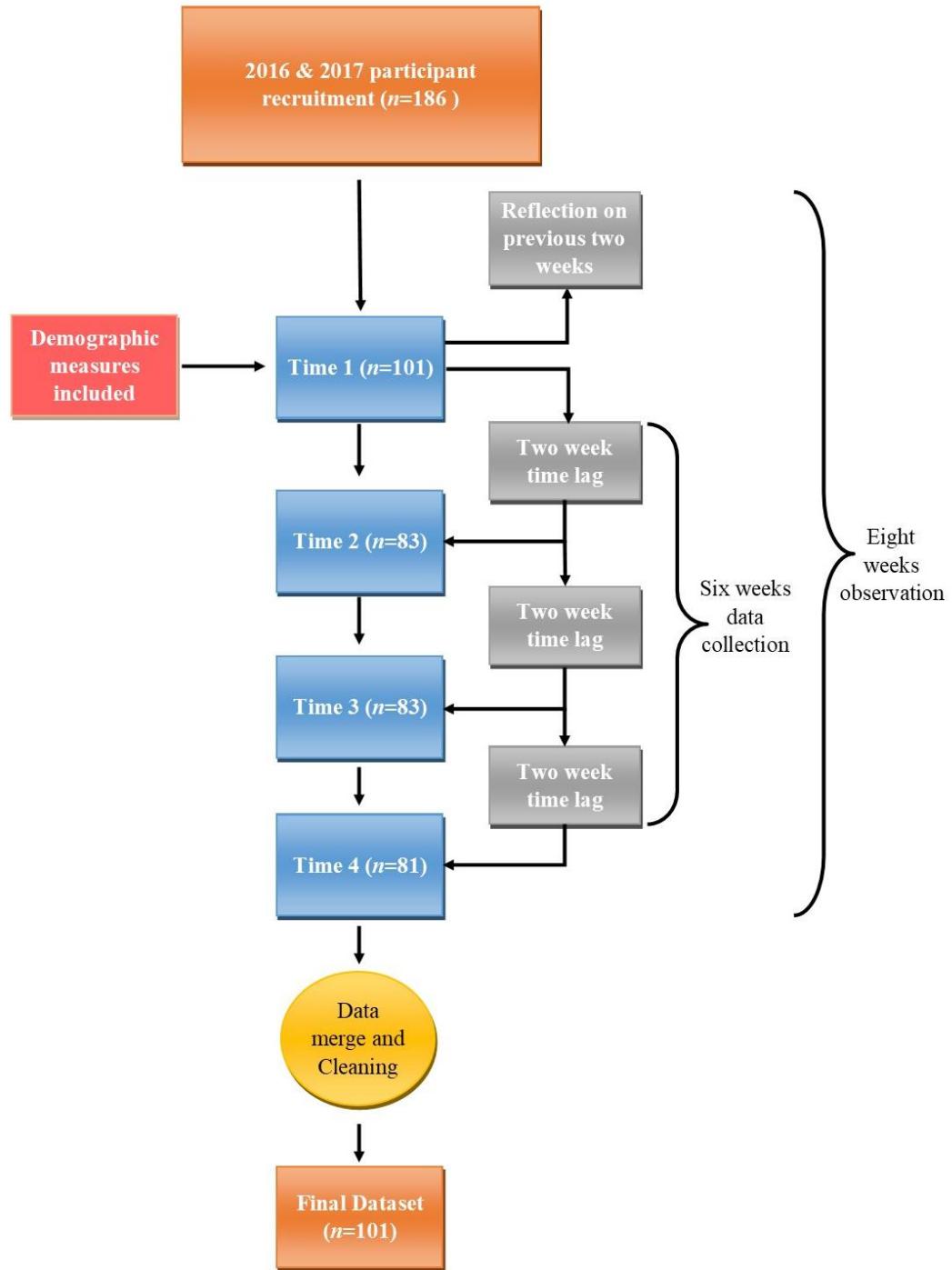


Figure 6.1 Flow diagram of study participants

6.2 Procedure.

Ethics approval was received prior to commencement of the recruitment phase (see Appendix C). The introductory section of the survey instrument comprised the informed consent document (Appendix F) and contained details of the project research and justification, university affiliation, ethics approval process, contact details for any concerns or further information, and research team. It also outlined the process for confidentiality and secure storage of data.

Participants were recruited initially through email invitation to relevant managers across multiple information technology organisations in the south-west of Ireland. Email responses were then followed up with a phone conversation highlighting the details and total time-span of the study. Interested companies then confirmed a list of interested participant emails who were sent invitational emails and information sheets. A total of 101 unique Respondent IDs were generated by the Qualtrics Software over four time points and collected over two separate occasions, Feb 3rd to March 16th 2016 and Feb 8th to March 22nd 2017; a response rate of 54% completed the first survey (from the initial recruitment through the office managers), however 86% of this sample complete all four surveys. This low dropout rate over time may be due to the majority of the population working within the information technology sector, where e-surveys may be more comprehensible and assessable throughout their working day (Jansen & Corley, 2007). Participants were also offered the chance to win a €200 one4all voucher if they successfully complete all four surveys over the [six](#) weeks, however post-paid incentives in web surveys such as vouchers and lotteries have not been found to substantially increase response rates (Fan & Yan, 2010). For the inclusion of data in the final data set as we required a minimum of 10% of the survey data to be completed in order to included (Cohen *et al.*, 1983). The final sample comprised office workers from a total of 11 different Irish companies. The target number

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of completed surveys was 400 because both growth curve modelling and path analyses generally require a medium sized sample ($n=100$ to 200), or at least $n=50$ participants (Iacobucci, 2010). However, due to poor responses on the initial survey the overall survey sample fell shorter ($n = 348$).

All included scales were input to an electronic format using Qualtrics software (Qualtrics Labs, 2011) Questionnaires were sent via Qualtrics Software© (2013; Qualtrics, Provo, UT, USA). Qualtrics is a web-based software tool that is platform independent and allows export of the data into SPSS and R script for further analysis. The entire online survey contained eight validated scientific scales, comprised of a total of 208 questions. The first survey included a further 12 demographic questions which captured sporting background, sex, age, marital status and employment history. At 9a.m. on each week of assessment an automated individualised link was sent to all participant emails. Reminder emails were automatically set up twice more at 12p.m. and 5p.m. through the Qualtrics software. Once a question in the survey was answered, this live link remained open to allow participants complete the entire survey for a period of 24 hours. That individual could reopen the survey using the individualised survey link. Once data was entered into the survey, opening a new record was not possible by the same individual if the attempt was made from the same survey link. For example, a record and participant number was recorded for all participants who may have opened the survey and the incomplete surveys may have reflected reflect respondents who attempted the survey but did not finish it.

Measures.

All measures with the exception of the demographics were assessed at all four timepoints. The Cronbach alpha values for all measures at each timepoint are displayed in Table 6.1.

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Resilience was measured using 25 items from the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003). However, the 10 item scale has been deemed accurate and reliable within the sports context (Gonzalez & Newton, 2013) the 25-item was used as it is more widely used within the work context (cf. table 2.2). Participants were asked to consider their work behaviours over the past two weeks when answering each questions. Items were assessed on a five-point Likert type scale from: *not true at all* (1) to *true nearly all the time* (5). Example items include “I am able to adapt when changes occur”, “I think of myself as a strong person when dealing with life’s challenges and difficulties”. The scale has been validated in both clinical and normal populations and was the most popular measure with the best quality from our systematic literature review. CD-RISC is a brief, self-rated measure of resilience that has demonstrated quantifiable change of resilience through both health status and treatment (Windle, Bennett, & Noyes, 2011)

Stress appraisals were measured using the 24-item Stress Appraisal Measure (SAM) developed by Peacock and Wong (1990) which measures six dimensions of primary and secondary stress appraisals identified as: threat, challenge, centrality, controllable-by-self, controllable-by-others, uncontrollable-by-anyone (uncontrollable). Participants were asked to indicate over the last two weeks at work how you have felt from *Not at all* (1) to *a great extent* (5).

Goal directed behaviour was measured using the “Difficulties in engaging in goal directed behaviour” subscale of the DERS (Difficulties in Emotion Regulation scale; Gratz & Roemer, 2004). Items included “When I was stressed, I had difficulty in concentrating at work”, “When I was stressed, I had difficulty focusing on other things”, “When I was stressed, I had difficulty getting work done”, “When I was stressed, I had difficulty thinking about anything

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else”, “When I was stressed I could still get things done (reversed)”. Responses were made on a 1-5 point anchored scale (1 = almost never ; 5 = almost always).

Hassles were assessed using the revised 53-item version of the Hassles and Uplifts Scale (Kanner, Coyne, Schaefer, & Lazarus, 1981) that reports perceived daily life adversities and uplifts over the previous two weeks. Participants rate each item on how much of a hassle and/or an uplift it was for them over the past two weeks on a 4-point scale ranging from 0 (none or not applicable) to 3 (a great deal). Total hassles scores were obtained by summing across ratings given to all items at each timepoint. Only data on hassles are reported here.

Major life events were measured from a brief categorical response taken from Kanner et al. (1981) full version of the hassles and uplifts scale which asks participants to record any major life events that may have affected the participants scores. Similarly, we included an ordinal measure for major life event (MLE) occurring over the past two weeks. Participants were asked “Has there been a major event in your life that has affected how you answered this?”, immediately poised after the hassles scale. The response was a simple categorical response selection between “Yes”, coded as 1; and “No” coded as 2.

Past sport history was assessed in their first survey with three questions. Participants were asked “Do you have any history of competitive sport”; At what standard did you compete” and “At what age did you retire”. The responses were a multiple choice response including Yes or No; Fun to locally or county to internationally and before final year exams or after final year exams respectively.

Demographic variables were asked in the first survey, including age, gender, marital status, organisational tenure and organisational role.

Scale reliability.

All measures were tested for reliability using Cronbach's Alpha. Reliability is the consistency of a set of measurements and was assessed using Cronbach's α for all continuous data (Cohen, 1992). This test generally measures equivalence, that is the coefficients predict the correlation of the test with a hypothetically equivalent test (Cronbach, 1947). The assumption that a test score has two components, a true score and a variable error which underlines the reliability coefficient. The reliability coefficient is the estimate of the percentage of total variance that is true variance and not due to error (Kuder & Richardson, 1937). Reliability "is the characteristic of a test possessed by virtue of the positive intercorrelations of the items composing it" (Kuder & Richardson, 1937, p. 159). Table 6.1 overviews the Cronbach Alpha values of all validated scales used across each time point. Establishing that each item in the scale is measuring the same, a commonly accepted benchmark indicating that the whole scale is reliable is an alpha of $> .70$ (Spector, 1992).

Table 6.1 *Cronbach alpha for each measure across each timepoint*

Scale	Time 1	Time 2	Time 3	Time 4
Resilience	0.85	0.84	0.80	0.83
Hassles	0.87	0.86	0.88	0.86
Difficulties in engaging in goal-directed behaviour	0.83	0.74	0.79	0.79
Challenge appraisals style	0.84	0.78	0.78	0.84
Controllable-by-self appraisal style	0.88	0.83	0.83	0.83
Controllable-by-others appraisal style	0.82	0.82	0.76	0.74
Uncontrollable appraisal style	0.80	0.77	0.80	0.82

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Centrality appraisal style	0.83	0.82	0.80	0.78
Threat appraisal style	0.90	0.81	0.79	0.81

Analytical Strategy.

The analysis of multi-wave longitudinal data often utilises individual growth models that can detect and describe an individual's change over time (Lenzenweger, Johnson, & Willett, 2004). Structural equation modelling methodologies such as path and growth curve analyses have been widely used to estimate and account for measurement error/bias in academic studies which capture systematic change over time; here forms of growth curve models are often the best analytical choice (McCoach & Kaniskan, 2010). Rogosa, Brandt, and Zimowski (1982) advise that the critical unit of analysis for longitudinal models is in the investigation of stability and change of the individual growth curve or path. First, I conducted an unconditional growth analysis in which to examine the stability versus change in resilience across timepoints. I posited a quadratic individual change trajectory at level 1, such analyses are used for dividing the outcome variation into variance components that describe the net variation in slope and intercept across individuals. Singer and Willett recommend fitting two simple unconditional models before beginning any multilevel model building. These two models to establish: (1) whether there is systematic variation in your outcome that is worth exploring; and (2) where that variation resides (within or between people)" (p. 92). In our first analysis we use both unconditional curve models in order to test hypotheses 1 and 2. Second, we conducted a set of conditional analyses in which we examine systematic interindividual differences in intercept and slope as a function of both hassles and major life events. We use these conditional curve models in order to test hypotheses 3 and 4. To test the meta-cognitive process hypotheses associated with resilience

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through the A-CEMA model in chapter 3 (section, 3.3), and an analytic strategy which can incorporate a range of associated variables and processes is required. A cross lagged path analysis represents a general method for studying relationships among multiple variables. This specifies the key variables in a theory showing a measurement model relating variables to factors and a structural model fit concerned with relationships among the constructs (Todman & Dugard, 2007). Another advantage of structural equation modelling methodologies is its ability to test latent variable models and calculate all of the parameters in a model simultaneously which provides a test of the overall model fit to the data. This makes it possible to both compare competing models and examine the consistency of a model across different groups (Farrell, 1994). Structural equation modelling analyses in R using `sem()` function has also been shown to be robust for non-parametric data. Absolute fit indices will also determine how well a priori model fits the sample data (McDonald & Ho, 2002) and demonstrates which proposed model has the most superior fit. CRAN libraries and the Lavaan packages will be used to test the analyses paths and model fit of our remaining hypotheses 5-12, where specific regression paths and model comparison can offer in-depth information of relevant process relationships. It has recently been pointed out that the longitudinal cross-lagged coefficient provides a reasonable test of a mediation hypothesis, and longitudinal data may be necessary for mediation theory (McArdle, 2009).

Cross-lagged panel data path analysis approach for group differences.

A cross lagged panel analysis can determine the extent to which individual paths are consistent across timepoints. Path Analysis is a multivariate technique specifying relationships between observed (measured) variables (Edwards & Lambert, 2007). The following sequence of hypotheses were developed for analysing group differences as portrayed in hypotheses 9-12.

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This sequence consists of three separate stages: (1) evaluation of all linear regressions to test initial relationships between variables including resilience predicting each variable predicting itself at each timepoint, stress appraisals and engagement in goal directed behaviour at each lagged timepoint and stress appraisals predicting engagement in goal directed behaviour at each timepoint; (2) comparison of structural model fit for all both challenge and threat appraisal models and (3) group comparisons through a an ANOVA chi-squared test between each of the three sporting backgrounds.

Statistical packages.

R Studio™ (Version 0.96.122) was used for non-parametric analysis and longitudinal growth modelling. R is an efficient statistical package where many items inform an unknown number of potential factors . The Lavaan and lmer packages in R-CRAN were used in order to analyse the data and conduct both the longitudinal growth modelling and the cross-lagged panel data analysis. This package allowed us to test the relationships between the dependent and independent variables, and ultimately the theoretical relationships we proposed.

Data cleaning procedure.

The raw data was imported from the Qualtrics survey system and saved as a “.csv” file which could then be imported into the R program. A total of eight survey files comprised of the four separate timepoints taken from both 2016 and 2017 collection periods. These were then merged and coded depending on timepoint of data collection. Participants who had answered no to the consent of the survey were then filtered out along with those without any responses at all. All scales values recorded as strings were then converted into the scale numeric values. Finally, all demographic data was applied across each case from their identification variable. The data was then converted into wide format in order to allow missing data analysis and imputations.

Missing data.

Missing data occur in most studies in the behavioural sciences (Acock, 2005). Several strategies were used to help mitigate missing data, an inherent issue with any longitudinal research, and adhere to the best practices of statistical modelling with missing data. Cohen *et al.* (1983) suggest that missing data of up to 10% is acceptable, and could be retained in the dataset without affecting reliability. Data can be missing at random (MAR) where missing observations differ from observed scores on a certain variable only by chance or not missing at random (NMAR) and can be completely ignored (Schlomer, Bauman, & Card, 2010). Data can also be missing completely at random (MCAR), where missing observations differ from observed scores on certain variables only by chance and the presence versus absence of data on that variable is unrelated to any other variable (Newman, 2014). Schlomer *et al.* (2010) discuss that practices related to missing data must include two processes (a) the extent and nature of missing data and (b) the procedures used to manage the missing data, including the rationale for using the method selected. In order to test homoscedasticity, multivariate normality, and whether data is missing completely at random the package MCAR was used which follows methodology proposed by Jamshidian and Jalal (2010) which is based on testing equality of covariance between groups having identical missing patterns. It is evident from figure 6.2 that dropout rates increase in each timepoint with the most missing data found in results from the fourth timepoint. Figure 6.2 also highlights the patterns of how the data appears missing with 7.5% of the missing data on resilience similarly missed across timepoints 2, 3 and 4.

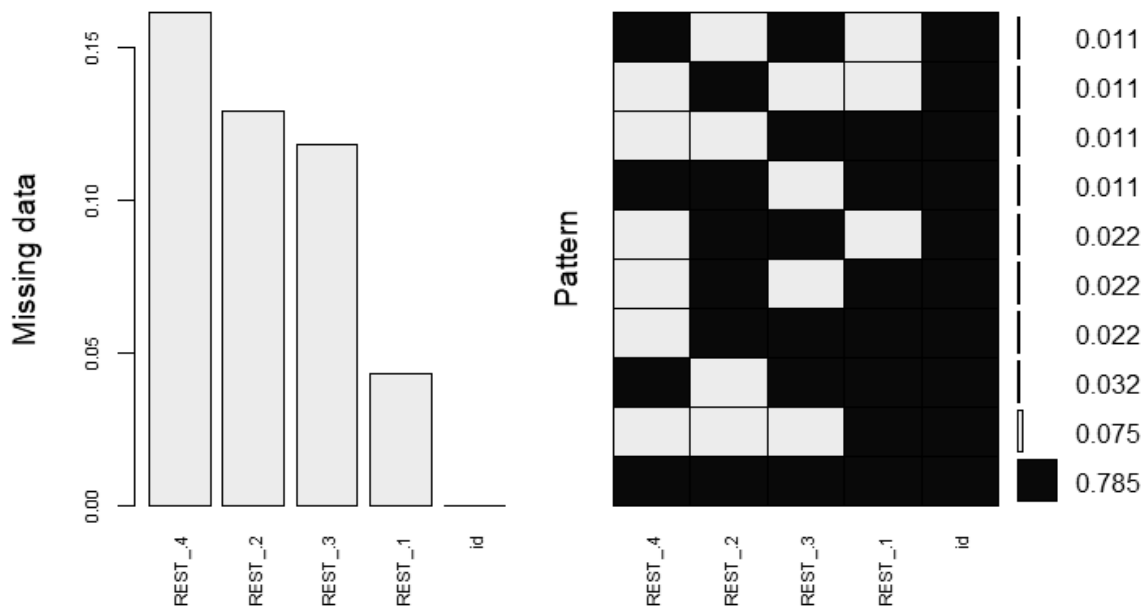


Figure 6.2 Patterns of missing data in Resilience data from 101 cases

Littles' missing completely at random (MCAR) test was used to test for patterns in the data and a large p -value ($p > 0.05$) indicates weak evidence against the null hypothesis that the data is MCAR, no patterns exist in the missing data. In this case resilience data where 10 patterns were found seen in Figure 6.2. and a large p -value ($0.80 > 0.05$). To deal with missing data, the use of the MICE package in R was used to impute missing values, the package creates multiple imputations (replacement values) for multivariate missing data. The method is based on *fully conditional specification*, where each incomplete variable is imputed by a separate model. The MICE algorithm can impute mixes of continuous, binary, unordered categorical and ordered categorical data. In addition, MICE can impute continuous two-level data, and maintain consistency between imputations by means of passive imputation (Van Buuren & Groothuis-Oudshoorn, 2011). The scales and individual items were examined for normality and missing

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values. The data was then imputed, using two options of normality and distribution free, and the test of equality of covariances between groups with identical missing data patterns is performed also with options of assuming normality (Hawkins test) or non-parametrically. Multiple imputation is an additional feature of the program that can be used as a diagnostic tool to help identify cases or variables that contribute to rejection of MCAR, when the MCAR test is rejected (See Jamshidian and Jalal, 2010 for details). Once imputation had been completed then the data analysis could begin.

CHAPTER 7

**LONGITUDINAL GROWTH CURVE ANALYSIS OF RESILIENCE IN THE
WORKPLACE**

Longitudinal models are becoming increasingly prevalent in the behavioral sciences, with key advantages including increased power, more comprehensive measurement, and establishment of temporal precedence.

(Curran & Bauer, 2011, p. 583)

7.1 Review of the main research questions pertaining to stability of resilience.

In order to test the hypothesis of the construct placement of resilience to identify whether there will be a significant change in resilience over time (cf. hypothesis H1) and whether high initial values of resilience will be related with the rate of change over time (cf. hypothesis H2) a longitudinal design was necessary in order to capture resilience over four time points, this data allowed me to map individual paths for each participant and individual models of change. Investigation of the relationship between the dynamic nature of resilience and both minor stressors (cf. hypothesis H3) and/or major life events (cf. hypothesis H4) will be tested over time using growth trajectories. Hassles representing a measure of minor adversity and major life events represented a measure of major adversity.

7.2 Preliminary analysis

Histogram plots were created using the “Hist()” function from the ggPlot2 library for both resilience and hassles scales where a skewed distribution was evident from both figure 7.1 and 7.2. before any analysis can take place a Shapiro-Wilk normality test was run on the R console from the “dyplr” package and library. This test is based on the correlation between the data and the corresponding normal scores (Royston, 1982). This showed a significant p -value ($p < 0.01$) for both resilience and hassles values that was recorded over the four timepoints. As we cannot assume the normality of the data further non-parametric methods will be used for analysis.

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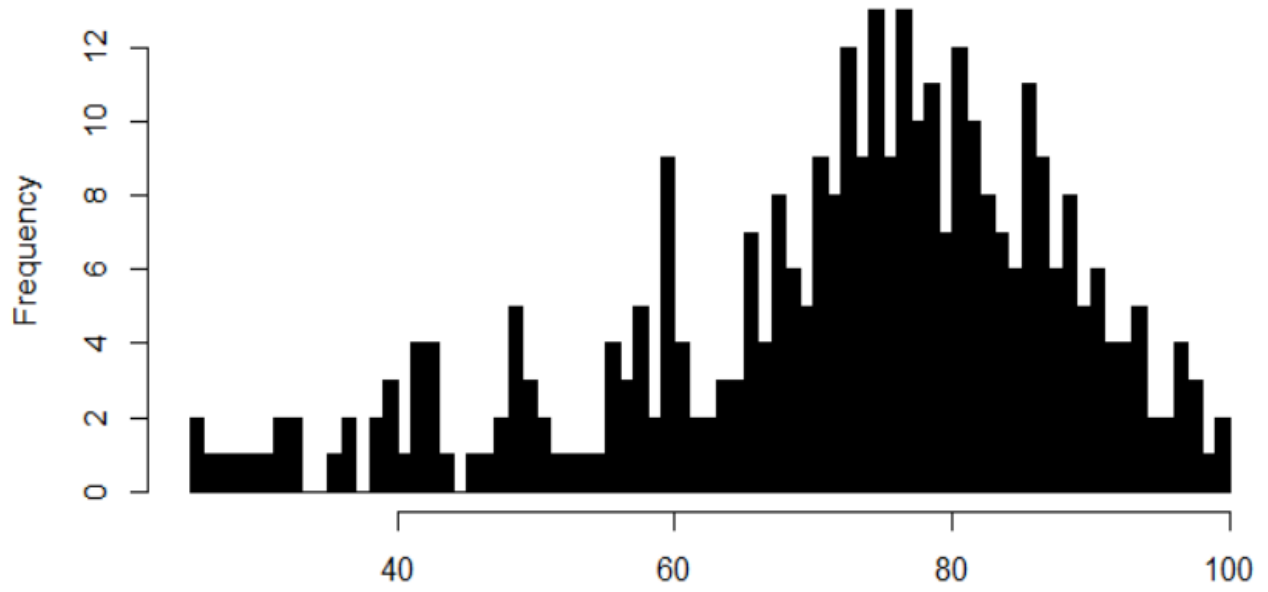


Figure 7.1 Histogram plot of resilience measure

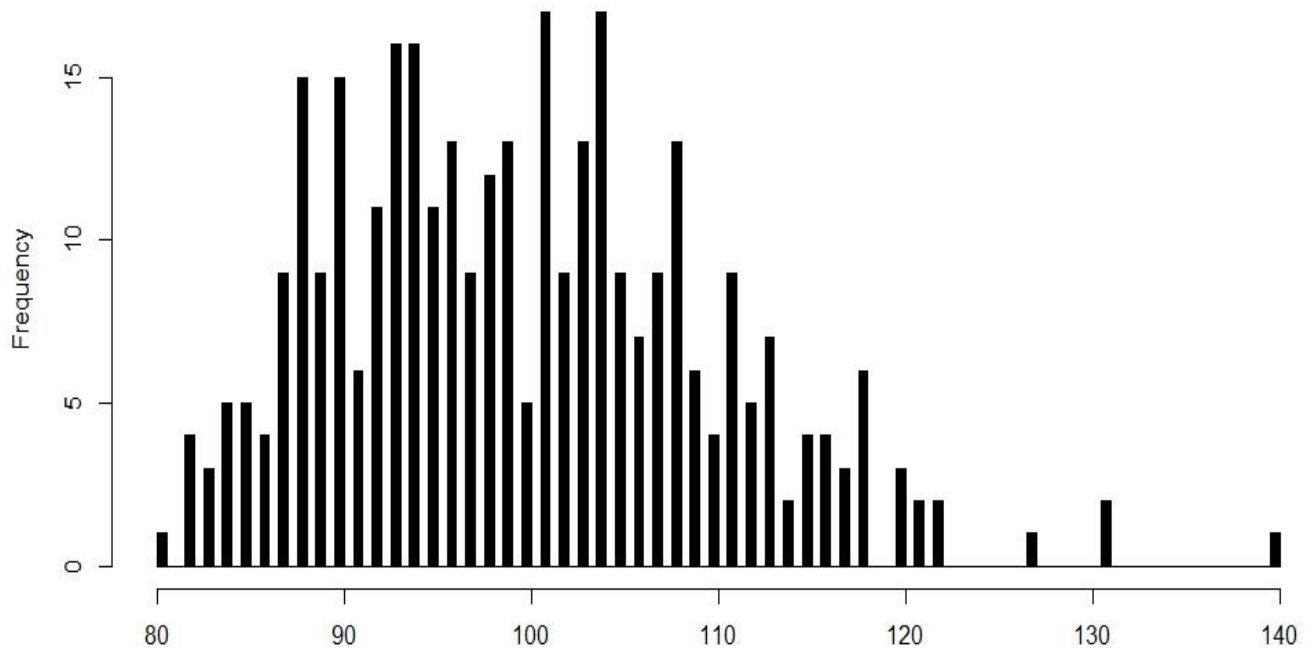


Figure 7.2 Histogram plot of hassles measure

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An empirical growth plot in R was generated from the same “ggPlot()” function from the ggPlot2 library to view the individual participant paths to inform possible intraindividual variation for resilience. Figure 7.3 presents unique growth trajectories in a subset of 93 individuals over four time points. In this collection of individual growth trajectories are of find focus for our initial hypotheses where growth, initial resilience capacity and the rate of change over time can be analysed. This figure shows differing levels and rates of change. For example, some individuals start high and decrease over time, some start low and increase over time, and others remain fairly stable across time points.

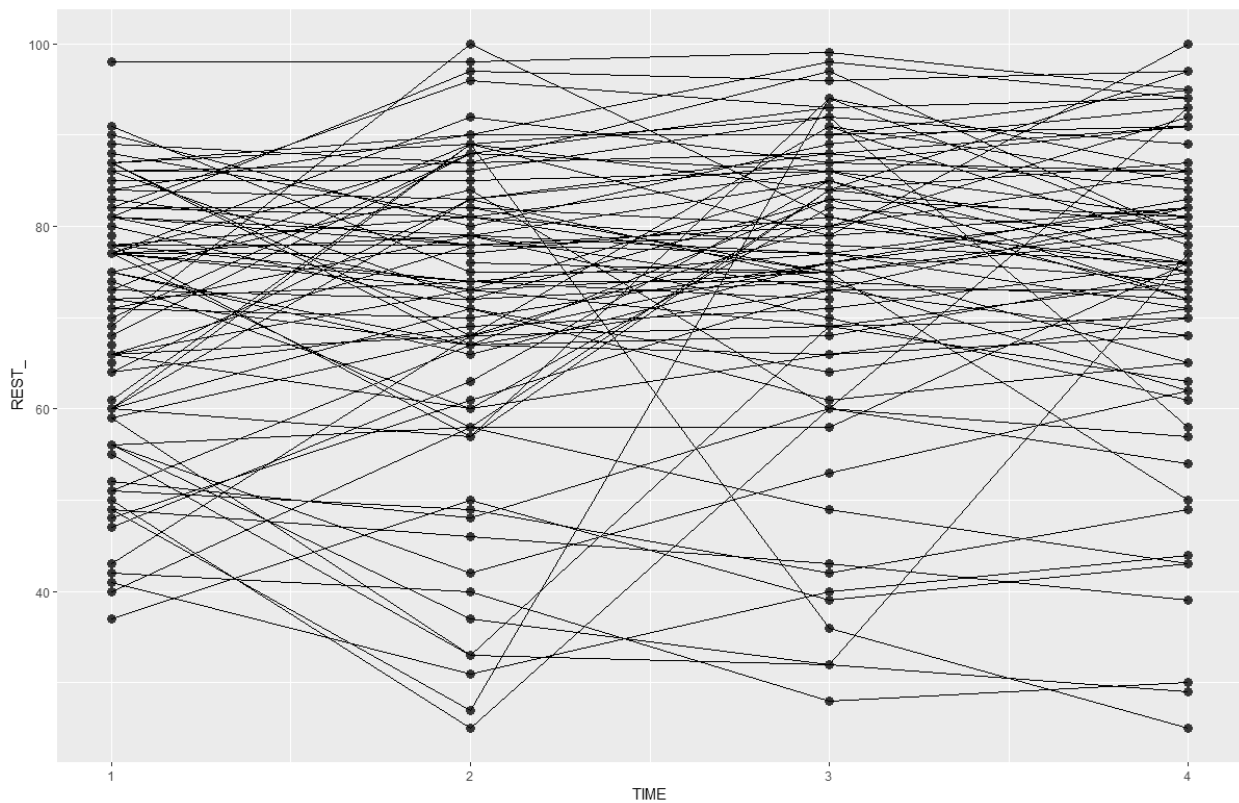


Figure 7.3 Individual resilience quadratic growth curve trajectories

To test whether there will be a significant change in within-individual resilience from one time point to another (H1) two initial analyses were carried out which focus on the analysis of

variance between each time-point measure of resilience. First, the `iccbare()` function (Wolak, Fairbairn, & Paulsen, 2012) to estimate the intraclass correlation coefficient (ICC). Results from a one-way ANOVA suggested an ICC of $r=0.61$ which rates as good between 0.60 and 0.74 (Cicchetti, 1994) or moderate between 0.50 and 0.75 (Koo & Li, 2016) and would be observed as a relatively malleable construct. Secondly, due to the skewed distribution of our data the Kruskal-Wallis test was used (McKight & Najab, 2010), we can decide whether the population distributions are identical without assuming them to follow the normal distribution. The resulting Kruskal-Wallis showed a $Chi-squared = 8.297, df = 3, p < 0.05$ where we can conclude that resilience measurements across all timepoints for the same participants are nonidentical; further suggesting the state-like nature of resilience. Therefore, confirming hypothesis H1 that there will be significant change from one time point to another. Repeated measures polynomial analysis of variance (ANOVA) models are seen as special cases of latent growth curve models (LGM), where the factor means or medians (corresponding to group level information) are of main interest (Meredith & Tisak, 1990). However, in order to identify the rate of change is growth curve models can further interpret change through the slope and intercept of each participants individual trajectory.

7.3 Assessing growth curves of resilience

In order to test the hypotheses the slopes and intercepts of resilience were examined. A quadratic growth curve was found as best fit from the four timepoints of data collecting and figure 7.3. Unconditional latent growth curve analysis allowed us to examine the role of time as a predictor of initial resilience capacities and growth over time. Analysis began with an unconditional growth model which a path diagram can be seen in Figure 7.4

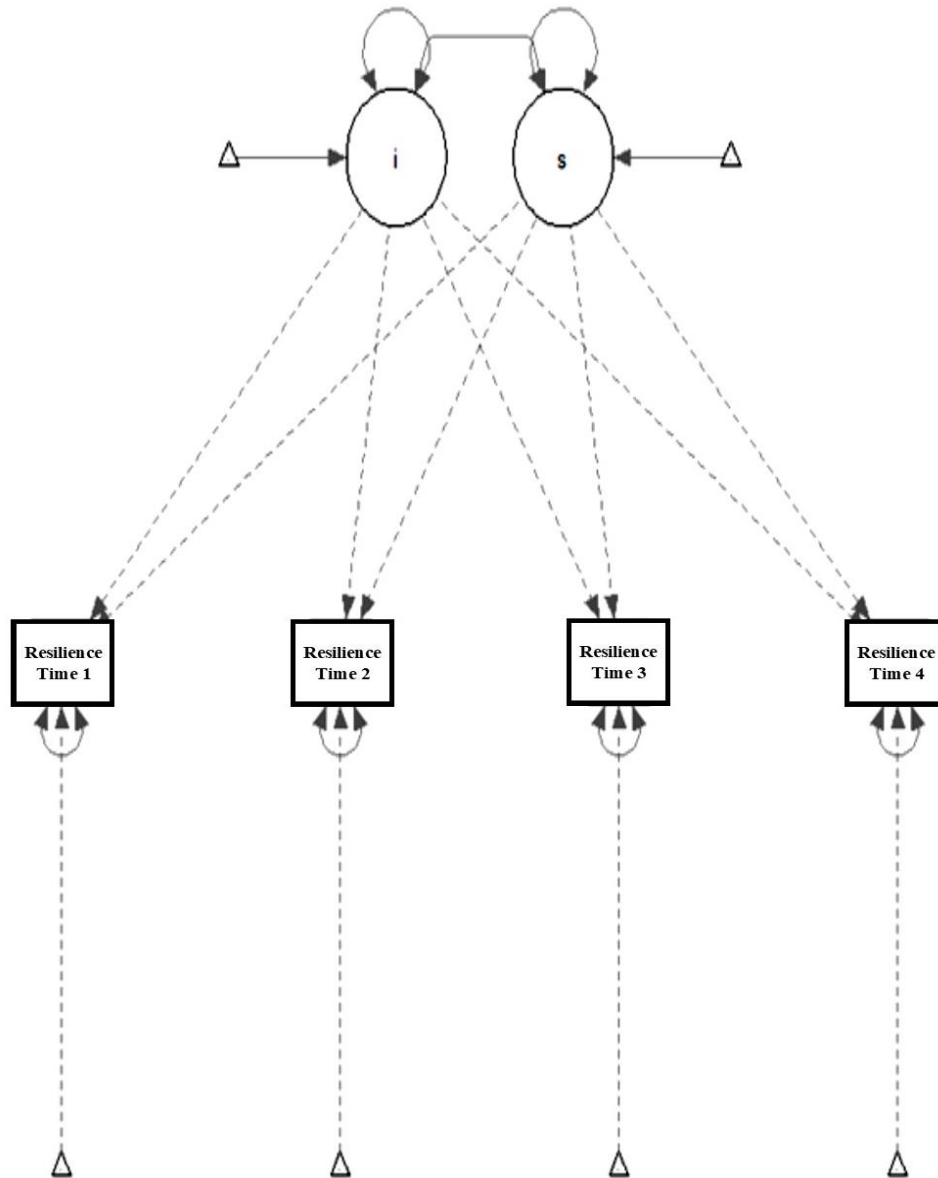


Figure 7.4 Path model of the unconditional growth curve model

The first step is to define the model, in this case, parameter estimates are fixed for time to be one to ensure the model is identified. Then setting each of the slope parameter estimates to their respective time point with one change. Since we cannot estimate the slope of time point one, it is set that to zero and use n-1 time points, in this case four to identify the slopes. Variances for the time points, intercept, slope, and covariance between the slope and variance are freely estimated.

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Then, using the growth function in lavaan the data was analysed as a longitudinal growth model.

Table 7.1. shows an overview of the slopes and intercepts results for the unconditional model.

Initial model fit showed Chi-squared statistic 3.97 (df=5, $p>0.05$), a SRMR of 0.03 (good indicator of good fit should fall below 0.08 (Hu & Bentler, 1999)) and a CFI of 1.0 (a value of $CFI \geq 0.95$ is presently recognised as indicative of good fit (Hu & Bentler, 1999)) (see Appendix G).

Table 7.1

Unconditional LGC model

	Estimate (SE)	z-value	$P(> z)$
<i>Covariances:</i>			
Corr. of Intercept with Slope	-22.9 (11.9)	-1.9	0.05
<i>Intercepts (within-participants):</i>			
Initial resilience mean	70.3 (1.7)	41.1	0.00
Resilience rate of change	1.3 (0.6)	2.2	0.03
<i>Variances (between-participants):</i>			
Initial resilience mean	201 (40.7)	4.9	0.00
Resilience rate of change	22.1 (5.8)	3.9	0.00

The results of the intercepts show that 70.3 is the mean of the starting value at time one and 1.3 is the average change in over time. We can see that the slope is statistically significantly different from zero ($p<0.05$) meaning that there is a significant change in resilience over time. This supports our first hypothesis (H1) that there is a significant positive change in resilience over

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time. This significant within individual change over time suggests that resilience does indeed change over relatively short periods of time and supports a view of resilience as a state rather than a trait.

The first section of Table 7.1 explores the covariance between the intercept and the slope and Figure 7.5 demonstrates the relationship between the starting values and change over time.

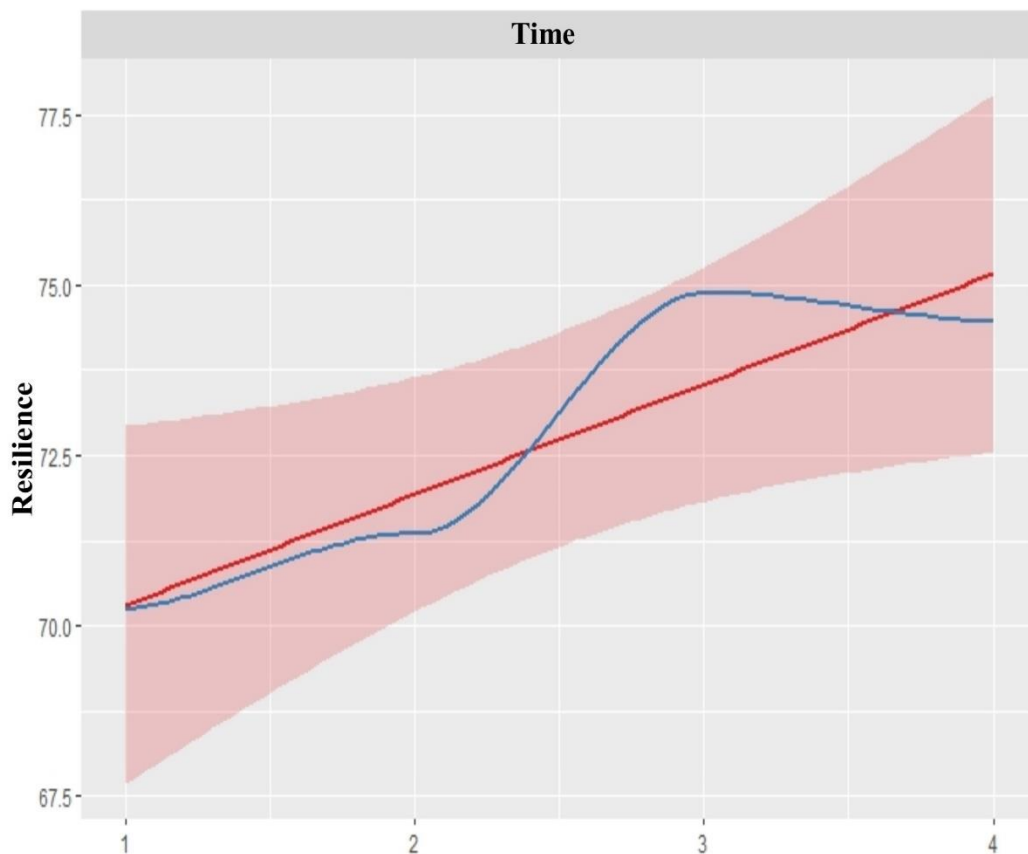


Figure 7.5 Unconditional growth curve model of resilience over time

The slope is positive and the covariance is negative so we can say that with larger slopes the starting values will be lower. This then offer some support to our next hypothesis that higher initial capacities of resilience (i.e. intercepts) will leads to smaller slopes or changes over time

(H2). However, as $p=0.05$ and Figure 7.5 does not show a pattern of fanning in or out we can't confirm and accept our hypothesis H2.

7.4 Predicting resilience growth with adversity

In order to examine both minor (H3) and major (H4) magnitudes of adversity that may influence the rate of change of resilience over time we created two conditional growth curve analyses. Firstly, resilience co-varying with hassles over four time points (model 1) was analysed. Secondly, resilience co-varying with major life events over four time points (model 2) was analysed. Tables 7.2 and 7.3 shows initial correlation matrices across each timepoint with resilience.

Table 7.2
Conditional growth model 1 correlation table

	<i>REST_</i> <i>_.1</i>	<i>DHAST_</i> <i>.1</i>	<i>REST_</i> <i>2</i>	<i>DHAST_</i> <i>.2</i>	<i>REST_</i> <i>3</i>	<i>DHAST_</i> <i>.3</i>	<i>REST_</i> <i>4</i>	<i>DHAST_</i> <i>.4</i>
<i>REST_</i> <i>.1</i>								
<i>DHAST_</i> <i>.1</i>	0.342*							
<i>REST_</i> <i>.2</i>	0.694*	0.307						
<i>DHAST_</i> <i>.2</i>	0.159	0.483*	0.023					
<i>REST_</i> <i>.3</i>	0.634*	0.105	0.626*	-0.005				
<i>DHAST_</i> <i>.3</i>	0.305*	0.506*	0.046	0.688***	0.105			
<i>REST_</i> <i>.4</i>	0.535*	0.108	0.548*	0.077	0.795*	0.138		
<i>DHAST_</i> <i>.4</i>	0.167	0.442*	-0.060	0.778*	0.080	0.810*	0.119	

*= $p<0.01$; *REST_*. = Resilience; *DHAST_*. = Hassles.
Computed correlation used pearson-method with pairwise-deletion.

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Table 7.3 *Conditional growth model 2 correlation table*

	<i>REST_.1</i>	<i>MLE.1</i>	<i>REST_.2</i>	<i>MLE.2</i>	<i>REST_.3</i>	<i>MLE.3</i>	<i>REST_.4</i>	<i>MLE.4</i>
<i>REST_.1</i>								
<i>MLE.1</i>	-0.070							
<i>REST_.2</i>	0.694*	0.008						
<i>MLE.2</i>	-0.200	0.480*	-0.128					
<i>REST_.3</i>	0.634*	-0.063	0.626*	-0.041				
<i>MLE.3</i>	0.014	0.346*	0.091	0.335**	0.015			
<i>REST_.4</i>	0.535*	-0.107	0.548*	-0.098	0.795*	0.143		
<i>MLE.4</i>	-0.007	0.235*	-0.091	0.459*	0.167	0.254*	0.303*	

*= $p < 0.01$; *REST_.* = Resilience; *MLE.* = Major life event.
 Computed correlation used pearson-method with pairwise-deletion.

The correlation tables show strong significant correlations of resilience across timepoints and weak but significant correlations across major life events. There are some moderate positive correlations of resilience and hassles over timepoints 1, 2 and 3 however there is only one significant positive correlation between resilience and major life events at timepoint 4 and in addition, caution should be exercised in interpreting findings from correlation matrices.

Figure 7.6 contain a path diagram of the relationships between adversity and resilience in the growth curve analyses. In order to account for subsequent influences of previous adversity we must also regresses resilience with each preceding timepoint of adversity.

LONGITUDINAL GROWTH CURVE ANALYSIS OF RESILIENCE IN THE WORKPLACE

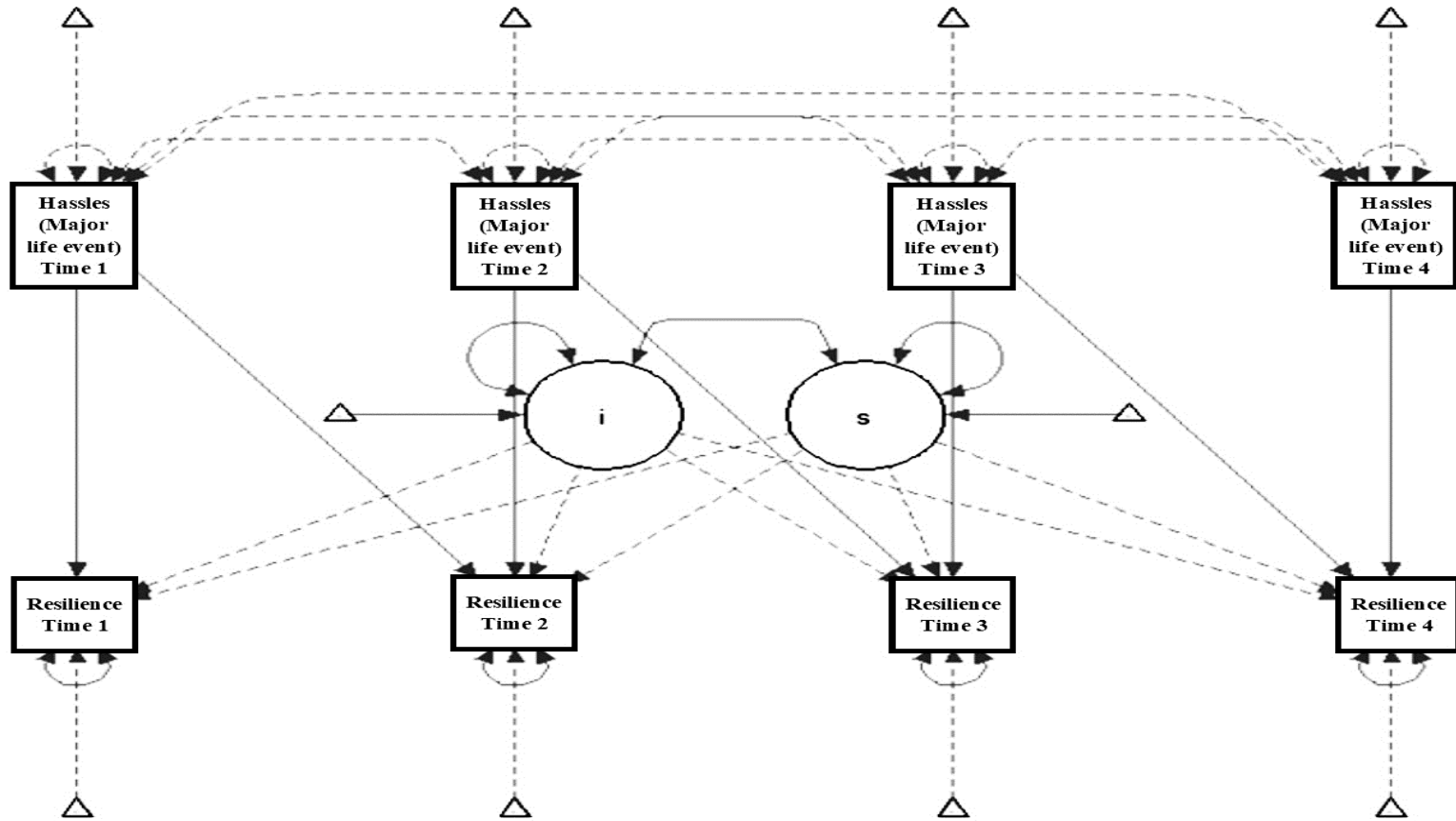


Figure 7.6 Conditional growth curve model with adversity as a time varying co-variate across four time points

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Having assumed that common-factor loadings are invariant over time we tested a broad hypothesis of resilience equilibrium by asking if there is equality (i.e., stationarity) of the common adversity predictors in each model across each time point (McArdle, 2009). Table 7.4 shows the results of both latent growth curve models. The fit indices for both models reflect good model fit both model 1 and 2, without either model showing substantially greater fit than the other.

Table 7.4

Conditional growth curve model of resilience with hassle (model 1) and major life events (model 2)

Fit Indices:	Test statistic	p-value	
Chi-squared (df) (Model 1)	22.4 (14)	0.07	
Chi-squared (df) (Model 2)	22.0 (14)	0.08	
SRMR (Model 1)		0.048	
SRMR (Model 2)		0.087	
CFI (Model 1)		0.95	
CFI (Model 2)		0.96	
	Estimate (SE)	z-value	P(> z)
<i>Covariances:</i>			
Intercept with Slope (Model 1)	-15.39(10.8)	-1.4	0.15
Intercept with Slope (Model 2)	-24.9(11.1)	-2.24	0.03

Intercepts (within-participants):

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Initial resilience mean (Model 1)	29.3(14.6)	2.0	0.04
Resilience rate of change (Model 1)	10.1(6.5)	1.6	0.12
Initial resilience mean (Model 2)	69.4 (5.3)	13.1	0.00
Resilience rate of change (Model 2)	-9.2(3.72)	-2.5	0.01

Variances (between-participants):

Initial resilience mean (Model 1)	170.1(36.1)	4.7	0.00
Resilience rate of change (Model 1)	19.98(5.5)	3.6	0.00
Initial resilience mean (Model 2)	207.3(40.9)	5.07	0.00
Resilience rate of change (Model 2)	22.34(5.3)	4.2	0.00

Model 1* = Resilience change predicted by hassles; Model 2* = Resilience change predicted by major life events

The results of the intercepts shows lower initial resilience capacities for hassles model ($t = 29.3$, $SE = 14.6$, $p > 0.05$) than major life events model ($t = 69.4$, $SE = 5.3$, $p > 0.01$). The within-individual mean slope (rate-of-change) then shows a positive change for hassles (model 1: ($t = 10.1$, $SE = 6.5$, $p > 0.05$)) and a negative change for major life events (model 2: ($t = -9.2$, $SE = 3.72$, $p < 0.05$)). However, this is only significant for model 2 which confirms that those participants who experiences a significant life event had greater change in resilience scores over time which confirms evidence for H4 that major life events are negatively correlated with resilience.

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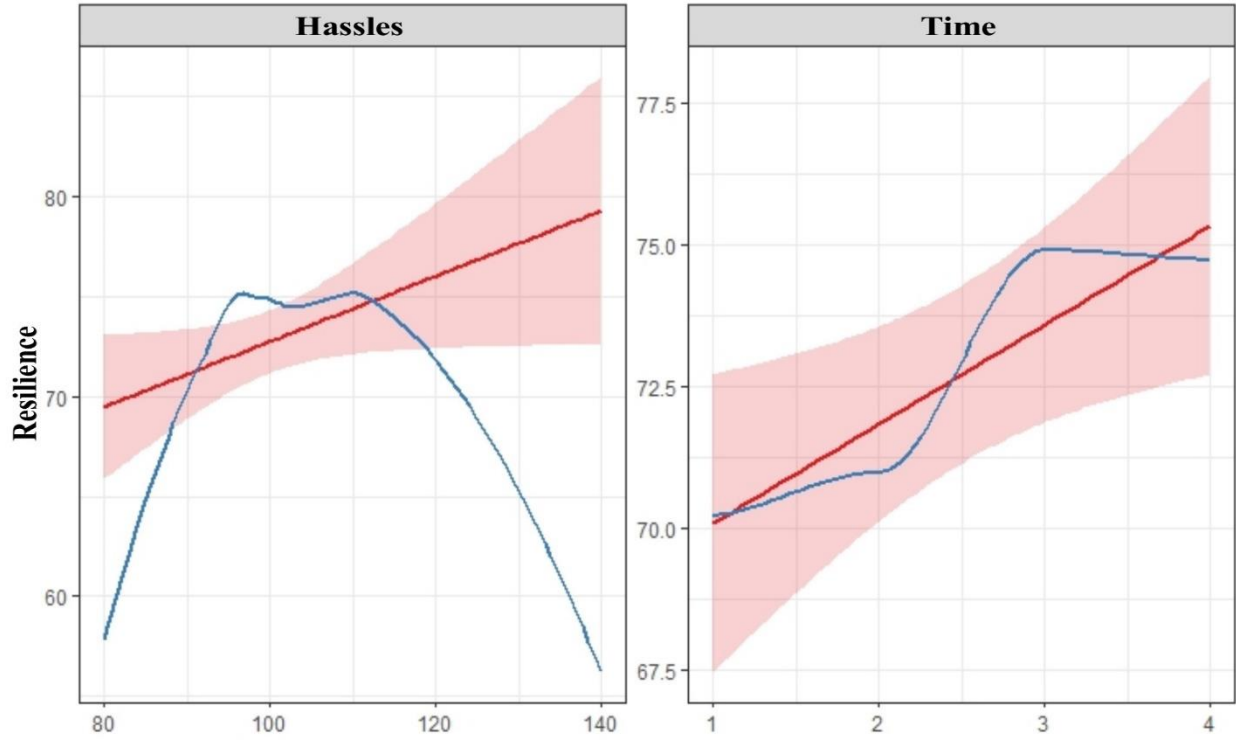


Figure 7.7 Conditional growth curve model of resilience with hassles

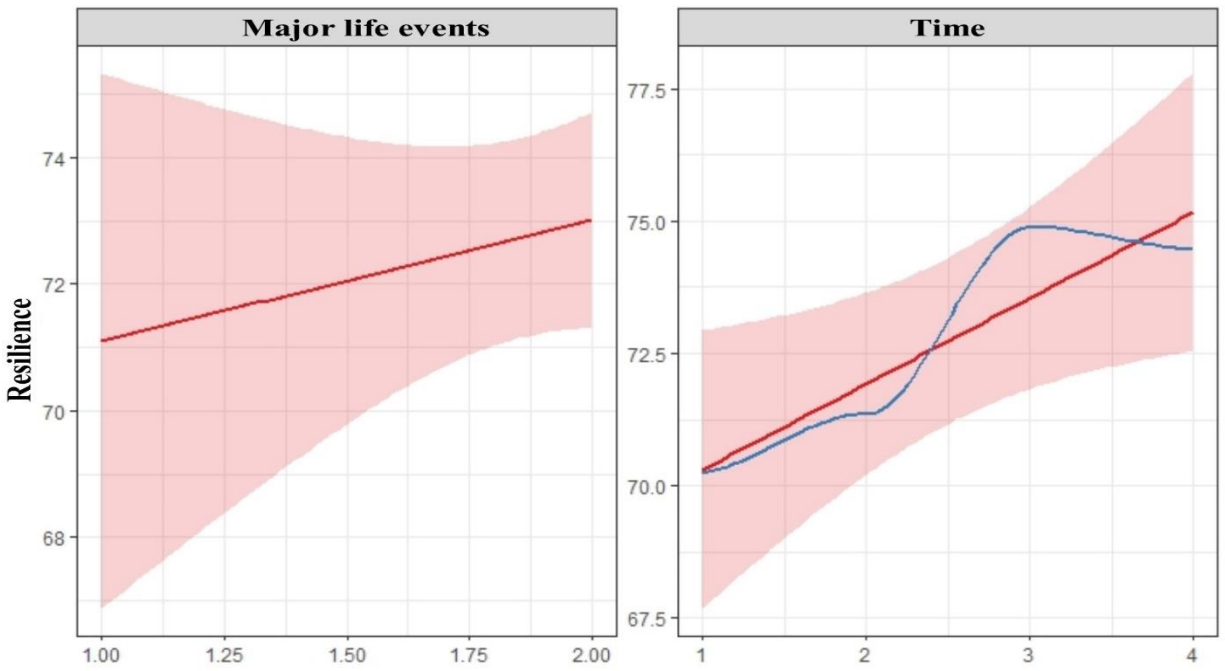


Figure 7.8 Conditional growth curve model of resilience with major life events

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Analysis of covariance of both models show similarly negative covariance in the correlation of the slope and intercept as seen in the unconditional model. However, only model 2 shows significant p-value ($t=24.9$, $SE= 11.1$, $z=-2.24$, $p<0.05$) which suggests that those individuals who experienced a major life event will have significantly more varied initial resilience capacities. Inspection of the graphs in figure 7.7 and 7.8 we can see differences in resilience change over time as a function of both hassles and major life events. The graph in Figure 7.7 are showing a pattern of fanning out, where initial resilience capacities are less varied during low amount of perceived hassles and more varied as hassles grow past a score of 120. This supports hypothesis H3 that higher hassles will be associated with greater positive changes in resilience however the this was not reflected in a significant analysis. The reverse is seen in figure 7.8 for model 2 however. Those who experienced a major life event (score of 1) resulted in significantly larger slopes ($t= -9.2$, $SE= 3.72$, $p<0.05$) and more resilience change.

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Table 7.5
Regression coefficients of Model 1 and 2

REGRESSIONAL PATH	Sample (SE) (β)	z-values	p-value
<i>Resilience regressed on hassles</i>			
Time 1 ~ Time 1	0.41 (0.15)	2.83	0.01
Time 2 ~ Time 2	-0.27 (0.15)	-1.84	0.07
Time 3 ~ Time 3	0.26 (0.18)	1.47	0.14
Time 4 ~ Time 4	0.05 (0.20)	0.26	0.80
Time 2 ~ Time 1	0.58 (0.17)	0.17	0.00
Time 3 ~ Time 2	-0.02 (0.15)	-0.12	0.91
Time 4 ~ Time 3	0.09 (0.23)	0.39	0.70
<i>Resilience regressed on major life events</i>			
Time 1 ~ Time 1	0.56 (2.96)	0.19	0.85
Time 2 ~ Time 2	1.18 (3.53)	0.34	0.74
Time 3 ~ Time 3	-0.29 (4.09)	-0.07	0.94
Time 4 ~ Time 4	13.23 (4.35)	3.04	0.002
Time 2 ~ Time 1	4.68 (3.96)	1.18	0.24
Time 3 ~ Time 2	12.40 (3.43)	3.61	0.00
Time 4 ~ Time 3	3.37 (4.32)	0.78	0.44

Table 7.5 outlines the regression coefficients of each model. Each model shows a significant influence of adversity scores on resilience capacity both cross sectionally and at least one time lagged effect. However, for each unit change in hassles resilience scores increased, showing that hassles do not seem to create immediate or lagged negative effects on resilience capacity. In contrast to this the presence of no major life effect (coded as a higher score of 2) was a significantly higher predictor of greater resilience both at that time point and in future time points.

7.5 Chapter Discussion

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In summary, results suggest that resilience changes over time and that individuals with a lower starting resilience values may have a larger bandwidth of resilience or higher rates of change as suggested by Fletcher and Sarkar (2016); whereas, those with high initial resilience experience less change over time. In addition, the fitting of conditional growth curve analyses show that presence of larger amount of perceived hassles or a major life event is associated with greater variation in resilience growth trajectories. The presence of a major life event was indicated by significant change in resilience over time. This overlaps with research on critical life events by John et al. (2019) that critical life events differ from the wide spectrum of life experiences as they exceed the common horizon of daily life hassles and are accompanied by emotions that disrupt the balance of between an individual and their psychological resources. Major life events may impede us in many ways including negatively impacting on our daily plans and potentially leading us to question our belief systems (Leist, Ferring & Filipp, 2010).

The results of this first analysis answers the major discrepancy between studies that arose from the literature review; is resilience a trait or a state construct? The findings suggests that not only is resilience a state or state-like concept but it is changeable over a two week period during major life events.

CHAPTER 8

**CROSS LAGGED PATH ANALYSIS OF RESILIENCE, STRESS APPRAISALS AND
THE REGULATION OF GOAL DIRECTED BEHAVIOURS AT WORK**

Sports are like life, simplified. The rules are enforced instantly and on the spot. Winners are clearly declared. In the stadium there's delightful relief from the real-world trial of sifting enemies from allies: if they're wearing your team's uniforms, they're good guys.

(Abbott, 2011, p. C1)

8.1 Review of the main research questions pertaining to regulation of resilience

In order to investigate *what* influences resilience change over time two stress appraisal styles are examined and to degree to which resilience predicts positive challenge appraisals at each time point (cf. hypothesis H6) or negative threat appraisal styles (cf. hypothesis H7) will be explored. Moreover, the extent to which resilience would directly predict persistence in goal directed behavior at work at each timepoint (cf. hypothesis H5) or whether it was predicted by challenge appraisal styles (cf. hypothesis H8) or threat appraisal styles (cf. hypothesis H9) indirectly is of interest.

All these hypotheses are concerning the associated processes of resilience that might explain some of the predictive relationships of change over time. This analysis focuses on the role of stress appraisal style in the iterative process of resilience and the engagement of goal directed behavior at work during stress. In particular challenge and threat stress appraisal styles which have both been associated with the promotion of resilience processes (Bonanno et al., 2012).

8.2 Preliminary analysis

In order to explore the initial associations between all included variables both overtime and in relation to each other a correlation matrix was generated as seen in table 8.1. The correlation matrix shows a only five significant relationships with stress appraisals styles. Positive relationships with resilience and controllable-by-others stress appraisal style across one [time](#) lag. Negative relationships between resilience at time 1 and controllable-by-self stress appraisal style at all other timepoints was also seen which suggests that as resilience increases

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

the participants perceived ability to control the situation by themselves at work decreased.

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

Table 8.1 Analysis 2 correlation table

	REST_1	REGGBT	SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACENT_1	SATH_1	REST_2	REGGBT	SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACENT_2	SATH_2	REST_3	REGGBT	SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACENT_3	SATH_3	REST_4	REGGBT	SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACENT_4	SATH_4		
REST_1																																		
REGGBT_1	0.204																																	
SACHT_1	-0.091	-0.135																																
SACST_1	-0.248*	-0.224	0.640***																															
SACOT_1	-0.197	-0.067	0.468***	0.475***																														
SAUNT_1	0.12	0.360***	-0.097	-0.247**	-0.229																													
SACENT_1	0.019	0.109	0.197	0.187	-0.086	0.356**																												
SATH_1	0.218	0.441***	-0.088	-0.248*	-0.325**	0.587***	0.515***																											
REST_2	0.694***	0.178	-0.093	-0.064	-0.105	-0.025	-0.1	-0.029																										
REGGBT_2	0.261*	0.731***	-0.250*	-0.188	-0.081	0.205	0.002	0.322**	0.216																									
SACHT_2	-0.165	-0.223	0.700***	0.580***	0.346**	-0.223	0.213	-0.247*	-0.178	-0.350**																								
SACST_2	-0.323**	-0.228	0.439**	0.692***	0.257*	-0.208	0.209	-0.314*	-0.151	-0.333**	0.742***																							
SACOT_2	-0.167	-0.184	0.318**	0.438**	0.637***	-0.479***	-0.123	-0.374*	-0.049	-0.234*	0.471**	0.446**																						
SAUNT_2	0.148	0.298**	-0.108	-0.260*	-0.357**	0.519***	0.085	0.421**	0.012	0.346**	-0.189	-0.268*	-0.377**																					
SACENT_2	-0.08	0.175	0.165	0.205	-0.079	0.176	0.691***	0.400**	-0.146	0.164	0.244*	0.231*	-0.009	0.358**																				
SATH_2	0.096	0.374**	0.017	-0.062	-0.353**	0.444**	0.400**	0.551**	0.033	0.427**	-0.094	-0.102	-0.340**	0.753***	0.663***																			
REST_3	0.634***	-0.013	-0.052	-0.088	-0.054	-0.125	-0.076	0.026	0.626***	0.105	-0.148	-0.143	0.059	0.032	-0.118	-0.052																		
REGGBT_3	0.268*	0.651***	-0.103	-0.222	-0.083	0.365**	0.101	0.469**	0.113	0.635***	-0.283*	-0.304*	-0.235*	0.398***	0.2	0.460***	0.13																	
SACHT_3	-0.23	-0.205	0.471**	0.512***	0.216	-0.157	0.106	-0.133	-0.219	-0.301**	0.610***	0.602***	0.419***	-0.207	0.11	-0.068	-0.138	-0.261*																
SACST_3	-0.348**	-0.139	0.349**	0.650***	0.295*	-0.216	0.102	-0.247*	-0.177	-0.209	0.557***	0.768***	0.470***	-0.193	0.193	-0.034	-0.154	-0.277**	0.772***															
SACOT_3	-0.119	-0.261*	0.108	0.261*	0.538**	-0.371**	-0.201	-0.355**	-0.019	-0.22	0.276*	0.337**	0.730***	-0.417**	-0.133	-0.395**	0.17	-0.258*	0.553**	0.535**														
SAUNT_3	0.178	0.224	-0.213	-0.233*	-0.317**	0.499***	0.034	0.253*	0.116	0.253*	-0.269*	-0.291*	-0.375**	0.592***	0.093	0.375**	0.084	0.490***	-0.257*	-0.341**	-0.319**													
SACENT_3	-0.054	0.042	0.041	0.192	-0.155	0.034	0.580***	0.292*	-0.043	0.015	0.148	0.223	-0.031	0.107	0.616***	0.302**	-0.068	0.04	0.191	0.257*	-0.03	0.129												
SATH_3	0.13	0.413***	-0.188	-0.133	-0.361**	0.427***	0.233*	0.528**	0.068	0.370**	-0.278*	-0.219	-0.420**	0.569***	0.315*	0.602***	0.038	0.545***	-0.184	-0.197	-0.442***	0.679***	0.340**											
REST_4	0.535***	0.003	-0.002	-0.012	0.074	-0.098	-0.029	-0.08	0.548***	0.074	-0.053	0.018	0.149	-0.063	-0.094	-0.073	0.795***	0.101	-0.064	-0.078	0.234*	-0.04	-0.027	-0.117										
REGGBT_4	0.17	0.707***	-0.258*	-0.21	-0.156	0.259*	0.023	0.339**	0.115	0.727***	-0.324*	-0.253*	-0.255*	0.268*	0.102	0.392**	0.028	0.672***	-0.289*	-0.231*	-0.288*	0.294*	0.063	0.471**	-0.019									
SACHT_4	-0.147	-0.195	0.462**	0.383**	0.419**	-0.172	-0.033	-0.269*	-0.267*	-0.274*	0.626**	0.503**	0.456**	-0.215	0.066	-0.156	-0.037	-0.169	0.622**	0.480**	0.488**	-0.356**	-0.018	-0.300**	0.123	-0.250*								
SACST_4	-0.244*	-0.165	0.308**	0.469**	0.380**	-0.240*	0.006	-0.303**	-0.188	-0.18	0.504**	0.621**	0.449**	-0.266*	0.055	-0.128	-0.024	-0.173	0.537**	0.628**	0.504**	-0.399**	0.032	-0.264*	0.104	-0.184	0.828***							
SACOT_4	-0.166	-0.11	0.195	0.235*	0.641**	-0.290*	-0.202	-0.318**	-0.131	-0.082	0.326**	0.276*	0.674**	-0.283*	-0.09	-0.265*	0.062	-0.143	0.386**	0.412**	0.784**	-0.342**	-0.196	-0.393**	0.191	-0.179	0.586**	0.591**						
SAUNT_4	0.227	0.264*	-0.057	-0.263*	-0.266*	0.634**	0.231*	0.512**	-0.004	0.285*	-0.168	-0.248*	-0.407**	0.575**	0.192	0.448**	0.054	0.538**	-0.166	-0.276*	-0.312**	0.748**	0.189	0.593**	0	0.278*	-0.135	-0.209	-0.21					
SACENT_4	-0.011	0.135	0.104	0.108	0.06	0.23	0.487***	0.292*	-0.105	0.186	0.189	0.221	-0.001	0.209	0.553***	0.365**	0.027	0.265*	0.141	0.127	0.059	0.127	0.559***	0.256*	0.09	0.162	0.358**	0.378**	0.188	0.445***				
SATH_4	0.175	0.448***	-0.079	-0.23	-0.203	0.542***	0.393***	0.556**	0.009	0.446**	-0.133	-0.237*	-0.398**	0.582**	0.402**	0.616**	0.019	0.601**	-0.270*	-0.287*	-0.404**	0.539**	0.223	0.673**	-0.072	0.469**	-0.064	-0.086	-0.183	0.733***	0.608**			

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATH = Threat; SACENT = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACH = Challenge); Computed correlation used pearson-method with listwise-deletion

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Difficulties in sustaining goal directed behaviour during stress showed many significant relationships with a variety of stress appraisal style both cross sectionally and over time. A significant negative relationship describes that as challenge stress appraisals styles were larger the difficulty in sustaining goal directed behaviours at each timepoint and at future timepoints were proportionally reduced. In contrary, threat stress appraisal style showed the significant positive correlations suggesting as threat stress appraisal style increased so did the difficulty in engaging goal direct effort during stress.

8.3 Cross lagged panel model

A crossed lagged model analysis was run using the `sem()` function from the `lavaan` package in Rstudio. Path diagram of the model with all paths can be seen in figure 8.1. Each variable was regressed on itself at each timepoint and lagged across each other predictor variable in both directions at each time lag. The same model of was run with resilience regressed on difficulties in sustaining goal directed behaviour and stress appraisal style a total of six times replacing Table 8.2 represents all of the regression results from this analysis and table 8.3 contains the results of the model fit indices.

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

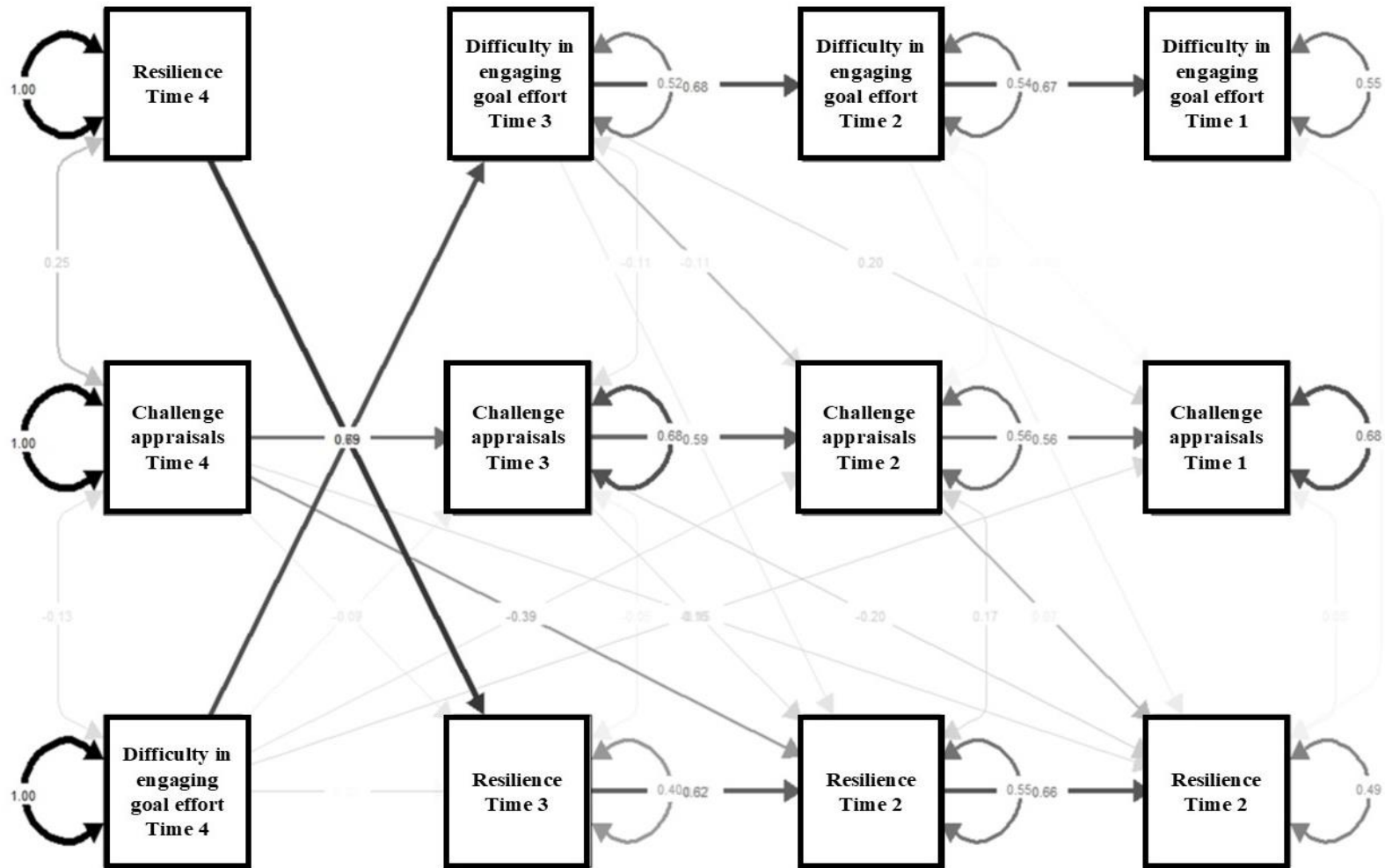


Figure 8.1 Path analysis for challenge appraisals style

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

Table 8.2

Path analysis regression results for each model path

Regression Path	Challenge (β)	Controllable-by-self (β)	Controllable-by-others (β)	Uncontrollable Stress (β)	Centrality (β)	Threat (β)
<i>Resilience regressed on Resilience</i>						
Time 4 ~ Time 3	0.7791*	0.7814*	0.7542*	0.7791*	0.7767*	0.7687*
Time 3 ~ Time 2	0.5925*	0.5913*	0.5723*	0.5968*	0.5941*	0.5728*
Time 2 ~ Time 1	0.7735*	0.8225*	0.7793*	0.7943*	0.7746*	0.7934*
<i>Resilience regressed on Stress appraisals style</i>						
Time 4 ~ Time 3	0.1953	0.3032	0.4537	-0.7171	0.0975	-1.012*
Time 3 ~ Time 2	-0.0813	-0.2038	0.2655	0.2885	-0.0016	0.0688
Time 2 ~ Time 1	-0.3588	0.9692	0.1661	-0.8654	-0.4451	-0.921*
<i>Stress appraisals style regressed on Resilience</i>						
Time 4 ~ Time 3	0.0010	0.0127	-0.0141	0.0012	0.0130	-0.0026
Time 3 ~ Time 2	-0.0173	-0.0115	0.0015	0.0170	0.0150	0.0057
Time 2 ~ Time 1	-0.0161	-0.0260	-0.0092	0.0096	-0.0182	-0.0112
<i>Resilience regressed on Difficulties engaging in goals</i>						
Time 4 ~ Time 3	0.0250	0.0685	0.1013	0.3540	-0.0192	0.5826
Time 3 ~ Time 2	-0.0889	-0.1078	-0.1660	-0.1627	-0.0645	-0.2565
Time 2 ~ Time 1	0.0408	0.2156	0.0457	0.2567	0.0938	0.3303

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Difficulties engaging in goals *regressed on* Resilience

Time 4 ~ Time 3	-0.0150	-0.0130	-0.0074	-0.0114	-0.0116	-0.0109
Time 3 ~ Time 2	-0.0060	-0.0060	-0.0045	-0.0032	-0.0020	-0.0021
Time 2 ~ Time 1	0.0236	0.0247	0.0224	0.0266	0.0255	0.0258

Difficulties engaging in goals *regressed on* Difficulties engaging in goals

Time 4 ~ Time 3	0.7992*	0.8147*	0.8016*	0.8496*	0.8339*	0.7412*
Time 3 ~ Time 2	0.5853*	0.5837*	0.5898*	0.5491*	0.5912*	0.5342*
Time 2 ~ Time 1	0.5757*	0.5849*	0.5864*	0.6009*	0.5878*	0.5903*

Stress Appraisals Style *regressed on* Stress Appraisals Style

Time 4 ~ Time 3	0.6853*	0.6631*	0.7763*	0.6341*	0.6204*	0.4899*
Time 3 ~ Time 2	0.5086*	0.6803*	0.6662*	0.4617*	0.5515*	0.4615*
Time 2 ~ Time 1	0.5542*	0.5869*	0.5598*	0.4767*	0.6699*	0.5152*

Difficulties engaging in goals *regressed on* Stress Appraisals Style

Time 4 ~ Time 3	-0.1754	-0.0711	-0.1019	-0.0304	0.0014	0.1521
Time 3 ~ Time 2	-0.0642	-0.0976	-0.0688	0.1626*	0.0597	0.1474*
Time 2 ~ Time 1	-0.1127	-0.0198	-0.0591	-0.0645	-0.0047	-0.0082

Stress Appraisals Style *regressed on* Difficulties engaging in goals

Time 4 ~ Time 3	0.0007	0.0016	0.0657	0.1747*	0.2497*	0.3191*
Time 3 ~ Time 2	-0.0866	-0.0537	-0.0986	0.0917	-0.1130	0.1580

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

Time 2 ~ Time 1	-0.1228	-0.0217	-0.1012	0.0820	0.0873	0.1162
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*= $p < 0.05$

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

Table 8.3

Stress Appraisal Model summary

	<i>df</i>	<i>Chi Squared</i>	<i>RMSEA</i>	<i>SRMR</i>	<i>CFI</i>
Controllable-by-self	31	95.200	0.151	0.095	0.888
Threat	31	112.757	0.170	0.117	0.864
Centrality	31	87.049	0.141	0.093	0.897
Uncontrollable	31	120.590	0.178	0.114	0.850
Controllable-by-others	31	93.570	0.149	0.091	0.896
Challenge	31	95.208	0.151	0.099	0.885

Examining the results from table 8.3 we can compare model fit for all six dimensions of primary and secondary appraisal style: threat, challenge, centrality, controllable-by-self, controllable-by-others and uncontrollable-by-anyone. Initial model fit CFI shows similarly moderate model fit across all appraisal styles with uncontrollable and threat appraisals showing the weakest model fit across RMSEA, SRMR and CFI.

The hypothesis that resilience would negatively predict difficulties in engaging goal directed behaviour (H5) was rejected within each appraisal style model and the direct effect of resilience in sustaining goal directed effort during stress (cf. minimal impact resilience) was not directly observed. Further, path analysis investigations then investigated hypotheses with the influences of both threat and challenge appraisals in the resilience process. Threat stress appraisals type was seen as the most prominent predictor of resilience across multiple lagged time points of two and six weeks (T3-T4, $\beta = 1.01, p < 0.01$; T1-T2, $\beta = 0.92, p < 0.01$) allowing

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us to accept hypotheses H7 and H9 as a high negative prediction of resilience and as a high positive predictor of difficulties in engaging goal directed behaviours during stress. However, challenge appraisal style had no significant paths predicted by resilience predicting difficulties in engaging goal directed behaviours during stress. We can then reject hypothesis H6 and H8 that challenge stress appraisal style is associated at each timepoint with the influence of resilience or engagement of goal directed behaviours at work.

8.4 Chapter Discussion

Viewing stressful situations as a threat (situational demands exceed available resilience resources) has been linked to negative health outcomes such as depression (Blascovich, 2008). Those individuals who tend to be ‘threat responders’ rather than ‘challenge responders’ in high pressure domains need to develop coping skills to reduce this tendency for a threat appraisal style (Moore, Freeman, Hase, Solomon-Moore, & Arnold, 2019) which is associated in our results with lower resilience and abilities to persist in goal directed effort at work.

In conclusion we support the hypothesis H7 and H9 that stress appraisal styles are negatively associated with change in both resilience and the ability to engage in goal directed behaviours during stress with higher levels predicted by lower resilience capacities and predicting higher difficulties in persisting in goal directed behaviour at work. We can assume that appraisal styles type may be an important aspect of the resilience process and promotion of reduced threat appraisals may facilitate stronger resilience outcomes of maintaining goal directed effort during periods of high stress i.e. minimal impact resilience. Contrary to the literature challenge appraisals did not produce a significant influence on this resilience process over time and only displayed a weak model fit. However, recent research is beginning to suggest that appraisal style may be on a dynamic continuum where individuals could be (1) challenged, (2)

CROSS LAGGED PATH ANALYSIS OF RESILIENCE

threatened, (3) challenged and threatened, or (4) neither challenged or threatened by a particular stimulus. From this viewpoint, it could be argued that the appraisal of some situations as both challenging and threatening could be advantageous. Rather than dismissing threats as an undesirable state that we wish to avoid, reconceptualising threat as having some advantages in some situations may develop flexibility to individuals experiencing threat on this continuum and to those practitioners working alongside individuals to can help enhance well-being and functioning (Uphill, Rossato, Swain, & O'Driscoll, 2019). Therefore, minimal impact resilience pathways such as persisting in goal directed behaviours in work may be associated with the flexibility of reducing threat states more than the ability to appraise situations as a challenge.

CHAPTER 9

**TESTING THE EFFECTS OF YOUTH SPORT EXPERIENCE AS A PREDICTOR FOR
LATER LIFE WORKPLACE RESILIENCE**

Development is a lifelong process with experiences from childhood potentially having an impact on health and well-being throughout in midlife and beyond.

(Infurna, Rivers, Reich, & Zautra, 2015, p. 2)

9. 1 Review of the main research question pertaining to the influence of past sporting experience.

In this chapter I examined a series of six cross lagged panel analyses by groups in regards to their specific sporting backgrounds. These demographic groups were created to better understand how youth sport may best promote resilience development for later life. To test how resilience may be developed over longer periods of adversity (cf. emergent resilience) our hypotheses (H10-12) utilised a cross lagged panel analysis focused on the predicting the effects of resilience on stress appraisal styles (specifically challenge and threat stress appraisals) and difficulties in engaging goal directed effort at work. The hypotheses aimed to address whether the exposure, timeframe or magnitude of challenging events effected longer term resilience development. The influence of past participation of sporting activities will be predicted through multiple model comparisons on specific categorical variables taking from the demographic data. Specific path analysis evaluations and model fit indices allowed us to explore our proposed hypothesis of whether sporting history will have any significant differing effects from one group to another on resilience processes later in life. Sub-sets of data explored three avenues of sporting influence: 1. Participation in competitive sports versus no exposure; 2. The persistence in competitive sport versus earlier disengagement; and 3. Participating in high level competitive sport versus lower levels.

9. 2 Results

Using the a repeatable cross lagged panel model design as seen in figure 8.1, both challenge and threat appraisals were fitting into the model for each of the sub-setted groups. Preliminary results showed that $N=59$ individuals reported to have a history of competitive sport

TESTING THE EFFECTS OF YOUTH SPORT EXPERIENCE

where $N=32$ did not. When asked at what standard they competed at results showed $N=24$ did not progress past local county levels where $N=67$ competed beyond county level including up to international levels. Finally, sporting persistence was reported as $N=48$ participants reporting to have concluded their sporting endeavours before their final senior cycle exams while $N=43$ persisted through into life tertiary education.

9.3 Cross lagged panel model analysis

This analysis used a cross-lagged path analysis using the `sem()` function of the `lavaan` package in Rstudio. The results offered a multitude of regression analyses and model fit indices which could then be used to directly compare each grouped data set. An ANOVA chi-squared test was used to compare the two models to see if a significant difference occurred. The test resulted in $P < 0.001$ showing statistically significant differences and confirming hypothesis H11 that those participants who persisted in sport past for models of both threat and challenge appraisals rather than those who disengaged earlier. However, neither a history of competitive sports or a high sporting level of sports did not show significant model differences in relations to the competing models across either threat or challenge appraisal styles. Figure 9.1 displays the two competing paths models with regression paths of sporting persistence and earlier. The model comparison analysis in table 9.1 shows each stress appraisal measure fit for participants within each group. Results suggest that participants who had past sporting histories of persisting in sport and competing at a high level sport showed better Comparative Fit Index (CFI). The CFI (Bentler, 1990) is a revised form of the NFI which takes into account sample size that performs well even when sample size is small (Tabachnick, 2014). In Table 9.1 model individuals who persisted in sport longer contained a CFI of 0.92 and 0.89 which signifies acceptable model fit (Hu & Bentler, 1999) in comparison to those who had earlier disengagement with a CFI of 0.83

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and 0.81 which was 8.5% worse for both challenge and threat models subsequently. Similarly, these groups showed similar improved model fits across *RMSEA* and *SRMR* fit indices whereas the other model comparisons of competing in competitive sport and competing at a high level of sport did not. These results offer some evidence of the importance of persisting in competitive sport rather than reaching a certain attainment level.

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Table 9.1

Model fit indices of all sports history groups

Sports history group	df		Chi-Squared		<i>p</i> value		RMSEA		SRMR		CFI	
	Chall-enge	Threat	Chall-enge	Threat	Chall-enge	Threat	Chall-enge	Threat	Chall-enge	Threat	Chall-enge	Threat
Early disengagement (<i>N</i> =48)	30.00	30.00	54.00	85.23	0.01	0.00	0.16	0.20	0.12	0.14	0.83	0.81
Sport Persistence (<i>N</i> =43)	30.00	30.00	68.88	64.97	0.00	0.00	0.13	0.16	0.11	0.14	0.92	0.89
No participation of Competitive Sport (<i>N</i> =59)	30.00	30.00	78.38	86.03	0.00	0.00	0.17	0.18	0.12	0.14	0.88	0.87
Participated in Competitive Sport (<i>N</i> =29)	30.00	30.00	63.21	87.57	0.00	0.00	0.19	0.24	0.13	0.17	0.83	0.74
High level of Sport Competition (<i>N</i> =67)	30.00	30.00	52.27	59.84	0.01	0.00	0.18	0.20	0.22	0.19	0.90	0.86
Lower level of Sport Competition (<i>N</i> =24)	30.00	30.00	79.84	96.62	0.00	0.00	0.16	0.18	0.09	0.13	0.87	0.84

DEVELOPING HYPOTHESES OF THE CONCEPT OF RESILIENCE

Group 1

versus

Group 2

1. High level sporting competition ($N=67$)
2. Persistence in sport through to adulthood ($N=43$)
3. Participation in competition sports ($N=59$)

1. Lower level sporting competition ($N=24$)
2. Early disengagement from sports ($N=48$)
3. No participating in competitive sports ($N=32$)

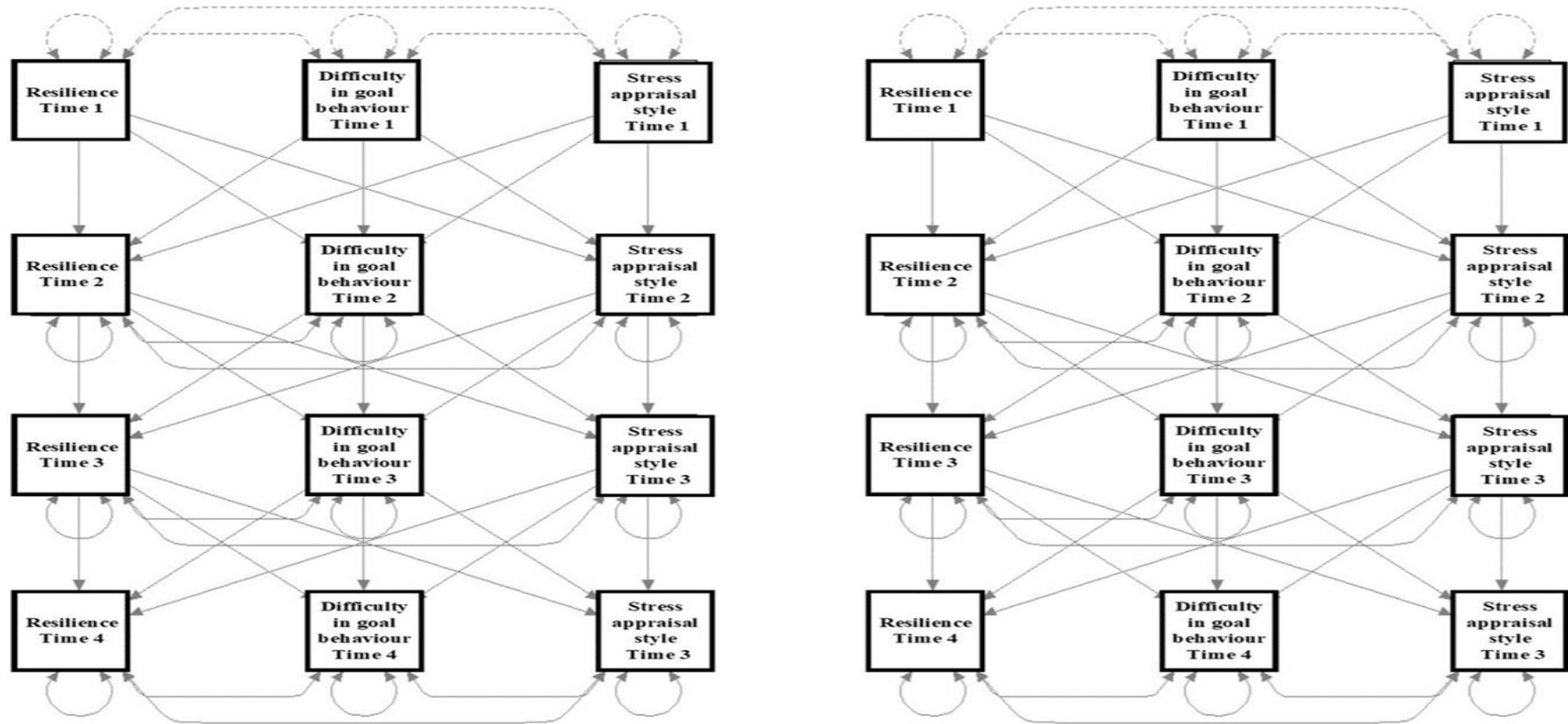


Figure 9.1 SEM path diagram model comparison of resilience, challenge appraisals and regulation of goal-directed behaviour during stress between two sport persistence groups

DEVELOPING HYPOTHESES OF THE CONCEPT OF RESILIENCE

Table 9.1

Regression results for challenge appraisals model for each sub-setted path analysis group

Reg. Path	Sample (β)	Early disengagement (N=48)	Sport Persist. (N=43)	No part. of Comp. Sport (N=32)	Participated in Comp. Sport (N=59)	High level of Sport Comp. (N=67)	Lower level of Sport Comp. (N=24)
<i>Resilience regressed on Resilience</i>							
Time 4 ~ Time 3	0.7784*	0.4620*	0.9167*	0.9003*	0.4357*	0.9639*	0.7351*
Time 3 ~ Time 2	0.5887*	0.3990*	0.6792*	0.5366*	0.6003*	0.6072*	0.5668*
Time 2 ~ Time 1	0.7747*	0.7830*	0.7683*	0.7402*	0.8444*	0.6386*	0.827*
<i>Resilience regressed on Challenge Stress Appraisal Style</i>							
Time 4 ~ Time 3	0.1707	0.6677	-0.1888	-0.3213	1.2270	-0.4760	0.4454
Time 3 ~ Time 2	-0.1080	0.2631	0.08336	-0.1144	-0.09923	-0.2886	0.0397
Time 2 ~ Time 1	-0.3388	-0.4113	-0.268	-0.2666	-0.5581	0.0350	-0.4256
<i>Challenge Stress Appraisal Style regressed on Resilience</i>							
Time 4 ~ Time 3	0.0096	0.0339	0.0042	0.00178	0.03971	-0.0654*	0.0277
Time 3 ~ Time 2	-0.0166	-0.0231	-0.0111	-0.0018	-0.0512*	-0.0749*	-0.0061
Time 2 ~ Time 1	-0.0154	0.0015	-0.0197	-0.0196	0.0136	-0.0206	-0.0076
<i>Resilience regressed on Difficulties engaging in goals</i>							
Time 4 ~ Time 3	-0.0060	-0.0962	-0.0552	0.0916	-0.2559	-0.2042	0.0184
Time 3 ~ Time 2	-0.0975	-0.4667	0.2818	0.3104	-0.7021	0.4458	-0.2448
Time 2 ~ Time 1	0.0675	-0.1567	0.4286	0.2041	-0.1986	0.9757	-0.2193

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Difficulties engaging in goals *regressed on* Resilience

Time 4 ~ Time 3	-0.0148	-0.0159	-0.0277	-0.0161	-0.0193	-0.0015	-0.0283
Time 3 ~ Time 2	-0.0050	0.0191	-0.0279	-0.0233	0.0256	-0.0655	0.0066
Time 2 ~ Time 1	0.0241	0.0240	0.0224	0.0171	0.0478	0.0188	0.0306

Difficulties engaging in goals *regressed on* Difficulties engaging in goals

Time 4 ~ Time 3	0.7929*	0.8252*	0.7421*	0.8*	0.7687*	0.5172*	0.8256*
Time 3 ~ Time 2	0.5807*	0.4935*	0.7091*	0.6622*	0.4251*	0.5529*	0.5938*
Time 2 ~ Time 1	0.576*	0.5638*	0.591*	0.5922*	0.5326*	0.6738*	0.5534*

Challenge Stress Appraisal Style *regressed on* Challenge Stress Appraisal Style

Time 4 ~ Time 3	0.6862*	0.6544*	0.7100*	0.6932*	0.6669*	0.6355*	0.6537*
Time 3 ~ Time 2	0.5112*	0.4194*	0.6354*	0.6318*	0.3273*	0.2775	0.5472*
Time 2 ~ Time 1	0.5479*	0.5151*	0.5441*	0.5978	0.3849*	0.6756*	0.5075*

Difficulties engaging in goals *regressed on* Challenge Stress Appraisal Style

Time 4 ~ Time 3	-0.1806	-0.0082	-0.3203*	-0.1534	-0.2507	-0.4913*	-0.0776
Time 3 ~ Time 2	-0.0595	-0.1410	0.0195	0.0170	-0.2269	-0.0615	-0.0737
Time 2 ~ Time 1	-0.1115	-0.1169	-0.1032	-0.1225	-0.1385	-0.0702	-0.1248

Challenge Stress Appraisal Style *regressed on* Difficulties engaging in goals

Time 4 ~ Time 3	0.0035	-0.0803	0.1263	0.1410	-0.2527	-0.0058	0.0061
Time 3 ~ Time 2	-0.0885	-0.1013	-0.0906	-0.0732	-0.1793	-0.2624	-0.0385
Time 2 ~ Time 1	-0.1174	-0.1038	-0.1411	-0.0657	-0.2451*	-0.0880	-0.1145

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Table 9.2

Regression results for threat appraisals model for each sub-setted path analysis group

Regression Path	Sample (β) (N=91)	Early disengagement (N=48)	Sport Persistence (N=43)	No participation of Comp. Sport (N=32)	Participated in Comp. Sport (N=59)	High level of Sport Comp. (N=67)	Lower level of Sport Comp. (N=24)
<i>Resilience regressed on Resilience</i>							
Time 4 ~ Time 3	0.7736*	0.4822*	0.9138*	0.9058*	0.4486*	1.007*	0.7145*
Time 3 ~ Time 2	0.5835*	0.3709*	0.6809*	0.5331*	0.6035*	0.6059*	0.5539*
Time 2 ~ Time 1	0.8077*	0.7677*	0.8198*	0.8061*	0.8022*	0.6382*	0.8584*
<i>Resilience regressed on Threat Stress Appraisal Style</i>							
Time 4 ~ Time 3	-1.021*	-1.019*	-0.6921	-0.4247	-1.406*	0.1933	-1.433
Time 3 ~ Time 2	-0.1654	-0.3741	-0.3903	-0.1588	-0.04554	0.5682	-0.4546
Time 2 ~ Time 1	-0.9179*	-1.019*	-0.7269	-1.284*	-0.5135	-0.6618	-0.9593
<i>Threat Stress Appraisal Style regressed on Resilience</i>							
Time 4 ~ Time 3	-0.0024	-0.0418	0.0314	0.0152	-0.0310	0.0335	-0.0125
Time 3 ~ Time 2	0.0072	0.0408	-0.0126	-0.0227	0.0860*	-0.0038	0.0036
Time 2 ~ Time 1	-0.0097	-0.0291	0.0265	0.0087	-0.0340	-0.0133	-0.0111
<i>Resilience regressed on Difficulties engaging in goals</i>							
Time 4 ~ Time 3	0.5826	0.4747	0.3574	0.3686	0.4799	-0.1329	0.827*

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Time 3 ~ Time 2	0.0273	-0.4242	0.6167	0.4439	-0.654	0.3798	-0.0120
Time 2 ~ Time 1	0.3957	0.3314	0.563	0.5277	0.1564	1.001	0.1852

Difficulties engaging in goals regressed on Resilience

Time 4 ~ Time 3	-0.0109	-0.0157	-0.014	-0.0072	-0.0113	0.0295	-0.0269
Time 3 ~ Time 2	-0.0003	0.0512*	-0.0307	-0.0257	0.0675*	-0.0591	0.0113
Time 2 ~ Time 1	0.0259	0.0208	0.0199	0.0212	0.0400	0.0254	0.0306

Difficulties engaging in goals regressed on Difficulties engaging in goals

Time 4 ~ Time 3	0.7372*	0.8395*	0.5919*	0.6229*	0.9078*	0.6166*	0.7853*
Time 3 ~ Time 2	0.5267*	0.4087*	0.6429*	0.5846*	0.4374*	0.5185*	0.5439*
Time 2 ~ Time 1	0.5857*	0.605*	0.5824*	0.5955*	0.559*	0.6767*	0.5629*

Threat Stress Appraisal Style regressed on Threat Stress Appraisal Style

Time 4 ~ Time 3	0.4896*	0.4208*	0.6403*	0.5605*	0.4525*	0.5332*	0.4559*
Time 3 ~ Time 2	0.4619*	0.6737*	0.4025*	0.5000*	0.717*	0.6287*	0.398*
Time 2 ~ Time 1	0.5087*	0.5208*	0.506*	0.5263*	0.5567*	0.6204*	0.478*

Difficulties engaging in goals regressed on Threat Stress Appraisal Style

Time 4 ~ Time 3	0.1483	-0.0201	0.3873*	0.3564*	-0.102	0.181	0.0843
Time 3 ~ Time 2	0.1527*	0.3908*	0.0784	0.1380	0.4049*	0.1687	0.1419
Time 2 ~ Time 1	-0.0036	-0.0785	0.1148	0.0238	-0.0204	0.1258	-0.0139

Threat Stress Appraisal Style regressed on Difficulties engaging in goals

Time 4 ~ Time 3	0.3203*	0.4131*	0.1713	0.3319*	0.2346	0.3408*	0.3225*
Time 3 ~ Time 2	0.1559	0.0653	0.2116	0.1258	0.1947	0.2816*	0.1364

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Time 2 ~ Time 1	0.1179	0.0013	0.3817*	0.2698*	-0.1932	0.1484	0.107
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Figure 9.1 portrays a path diagram of the comparison models for each sports history groups. Table 9.2 and 9.3 then represents all multiple regression analyses for each model group. We can see a greater amount of significant paths in relations to the influence of threat appraisals over challenge. Threat appraisals predicted both lower resilience especially in those participants who did not persist in sport through their senior cycle exams. Difficulties engaging in goal directed behavior at work subsequently predicted higher threat appraisals for all group expect those who participated in competitive rather than recreational sport.

In regards to the influence of challenge appraisals throughout each group, weak significant influences were found on the predictive ability of resilience on challenge appraisal style in those who competed in sport but more consistently in those who competed at a high level. Challenge appraisals influenced the ability to engage more in goal directed effort at work during stress in those who persisted longer in sport and within those who competed at a higher level.

9.4 Chapter Discussion

The ability of resilience to maintain goal directed effort at work (cf. minimal impact resilience) is a key component of resilience definition. This process is influenced by both challenge and threat stress appraisal styles. Hypothesis H10 and H12 are inconclusive due to the lack of a significant difference from the ANOVA chi-squared test, however there is some evidence that challenge appraisals predict the abilities to engage in goal directed behaviours for both those who competed to a high level of sport and persisted longer in competitive sports. Higher threat appraisal styles predict difficulties in engaging goal directed behaviors across all groups and similarly, difficulties in goal directed behaviours is seen to predict threat appraisals. This highlighted the importance of threat appraisal styles in the resilience

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process regardless of sporting backgrounds. At the same time, persistence in sport throughout senior cycle exams was seen to be more effective in developing later life resilience rather than those who disengaged from sport. This development was primarily evident through three paths of analysis: 1. improved stability of resilience capacity over time; 2. the use of challenge appraisals to engage in goal directed behaviour during stress and 3. The absence of threat appraisals to predict future resilience levels. Perhaps this reflects recent findings of Cartigney et al. (2019); that in order to manage both endeavours of sport and education a number of management strategies to reappraise challenging circumstance as such, through the use of effective communication and social skills. This may be how these significant pathways have been developed in our model and that this dual career time of sport and education develops resilience processes that apply to work in later life. Furthermore, Allen, Rhind, and Koshy (2015) outlined that the transfer of life skills from sports needs athletes to perceive the positive benefits and need for life skill applications prior to formulating intentions to apply their life skill. Therefore, not only should persistence in sport be recommended during final exams but also the transferrable benefits of resilience development in managing the dual-career challenges.

CHAPTER 10

**GENERAL DISCUSSION: ADVANCING THEORY AND RESEARCH IN
ACHIEVEMENT CONTEXT RESILIENCE**

*We have to keep clarifying that we cannot label a person
as resilient; it is a process.*

(Werner, 2012, p. 20)

10.1 Overview

A central objective of the research programme was to advance resilience theory and research in the achievement context. This research aimed to address the previous issues within the context of sport and work where definitional dilemmas and atheoretical research abounded. This examination began with the parallel analysis of resilience studies across both work and sport settings. A systematic literature with thematic analyses focused on five proximal areas important to understanding resilience: 1. definitions of resilience; 2. construct placement; 3. theoretical orientation; 4. adversity and 5. associated resources. An array of parallel theoretical approaches to understanding resilience was evident throughout the extant work and sport psychology literature which supported a state-like form of resilience encompassing psychological resource theories (Fredrickson, 2001; Hobfoll, 2001) and the reciprocal regulation of action, cognition, emotion, and motivation (O'Shea, Buckley, & Halbesleben, 2017). Resilience was shown to be relevant during both minor and moderate adversities over both short and medium time frames. This dual-pathway model of resilience in response to a variety of stressors coincides with definitions of resilience which encompass both a capacity to maintain regular functioning or to rebound through facilitative resources after adversity. This built on the previous grounded models developed within sports (Fletcher & Sarkar, 2012, 2016) which had been similarly reflected in the work domain, however no models had been developed (Shoenfelt, 2016). This orientated the research methodology and offers researchers across multiple contents basis of how resilience is conceptualised currently in the literature as a state-like concept subject to potential change.

Further investigation into the theory of how a dynamical process of resilience may function over time is still required. Specifically, examination into the temporal dimensions of each dimension of change helped me explain the possible regulation of action and cognition

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at each proposed curve of resilience change: The minimal impact resilience pathway during pressurised performance episodes; *the critical slowing down* point before resilience disruption and emergent resilience pathway of reintegration; and broadening of associated resources and cognitions. This theoretical contribution advances dynamical concepts of resilience and structures the avenues of further resilience investigation into specific resilience episodes.

Finally, integration of a longitudinal study facilitated the confirmation of the hypothesis proposed from the previous literature review and the complex aspects of resilience disruption, maintenance and reintegration were elucidated.

10.2 Resilience as a state-like concept

Previous studies across sport and work had defined resilience inconsistently as either a trait or trait-like which was innate of each individual or state or state-like that was malleable to development and fluctuations over time (cf. figure 2.2). In order to test the construct placement of resilience, three separate analyses were conducted: 1. a non-parametric method for testing whether samples originate from the same distribution (Kruskal-Wallis test) showed that at least one timepoint of resilience scores significantly differed from one or more of the other timepoints; 2. a non-parametric linear mixed model showed the test–retest reliability of resilience was $r=0.63$ over time which suggests questionable stability; and 3. latent growth curve model analysis showed statistically significant variation in resilience across time in the elevation and rate of change of the individual resilience growth trajectories. Individual growth trajectories were influenced by participants initial resilience capacity at time one, where individuals with higher initial capacities reflected greater resilience stability over time (i.e. less change over time) (H2). Evidence emerged from the unconditional growth curve model that individual resilience does change over time (H1) and over relatively short

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timeframes (8 weeks in over study). These findings offer substantial evidence that resilience construct is optimally conceptualised as a state-like concept.

Higher resilience capacity therefore not only contributes towards stress-resilience interactions but may also influence stress-resilience fluctuations and developments. For example, those with higher resilience are not only less likely to suffer performance and well-being disruptions during adverse events (minimal impact resilience) but also they are less likely to suffer resilience disruptions at future timepoints. Evidence could be interpreted here for the proposed conservation of resources theories to explain the upward fluctuations of change over time where participant trajectories took the form of an upward spiral when individuals use current resources to acquire new resources as seen in the positive significant slope in our results (Halbesleben et al., 2014; Hobfoll, 1988). Moreover, Fletcher and Sarkar (2012; 2013) refer to the protective and promotive factors that individuals can use to proactively build resilience in response to adverse events. Protective factors refer to resources denoting a ‘shielding effect’ and promotive factors refer to resources denoting a ‘steeling’ or strengthening effect after resilience-stress interactions. These resources are a combination of more stationary resources (i.e. optimism) and more malleable skills (i.e. coping skills) were an individual’s “resilience bandwidth” as an indication of his or her natural developmental trajectory compared to his or her point of highest potential. This is importing for the resilience literature as resilience development may need to be multifaceted where resilience training can be proactive (i.e. reintegrating before critical slowing down) to maintained stability of current capacities and reactive (i.e. to increasing the speed of rebound ability) to optimise the upward spiral of positive resources on-going adverse experiences.

10.3 Adversity as a predictor of resilience change.

The relevance of adversity in relation to the magnitude and length of exposure was identified in the review (See Chapter 2.3) as necessary component of interaction to constant

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dynamic resilience reactions to varying environmental demands. In previous reviews of resilience in the workplace both Britt et al. (2016) and Luthans, Vogelgesang, and Lester (2006) noted 'significant adversity' a necessary consideration of resilience. However, in the modern workplace what constitutes a significant adversity and how it may be quantified remains unclear (Estrada, Severt, & Jiménez-Rodríguez, 2016). Biron, Ivers, Brun, and Cooper (2006) posited that adversity can be categorised through two levels; 1. exposure from short term to long term and 2. magnitude from minor to major adversity. In the review of resilience research across both work and sport contexts a combination of short to long term adversity, where the magnitude of adversity did not exceed minor to moderate was reported.

From our results in Chapter 7 two magnitudes of adversity minor (hassles) and major (major life events) were found and created two conditional growth curve analysis's with resilience co-varying with hassles and major life events. Results conveyed that hassles did not create any immediate or lagged effect on resilience capacity. Whereas, the presence of a major life event creates a significant negative change immediately and over time. Further growth curve analysis observed that those participants with lower resilience had subsequently more resilience disruption overtime during both minor and major adversity. This provides further evidence to the dual pathway model of resilience (figure 2.4) where great resilience disruption (categorised here as a large variation in resilience capacities in relation to higher levels of hassles or a significant life event) was seen for major adversity in relation to minor adversity (see figures 7.7 and 7.8). Hill et al. (2018a) suggested the process of resilience is likely to change dependent on the type of adversity experienced and personal experience of previous adversities thus, making it difficult to test across a full sample of differing individuals. Furthermore, research on the difference between on-going life stressors and major life events show that hassles are associated with adaptational outcomes and a learned stress-reaction process often occurs similar to minimal impact resilience pathways (Kanner et

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al., 1981). Perhaps, due to the absence of unexpected challenges in this study, results did not reflect any significant change from hassles across individuals. Individuals may have had pre-determined resilience pathways for buffering expected daily adversities and future studies should involve an intervention of implemented challenges to map resilience disruption and reintegration over time. Results offer empirical evidence beyond that of the current state of the resilience literature, that individual resilience capacities change as a function of time and various magnitudes of adversity. Evidence has converged to support the contention that resilience is as a state-like concept subject to change. Further analysis on resilience change is needed to determine the specific processes underlying successful resilience outcomes to a variety of challenges across both sport and work contexts.

10.4 Predicting the influencers of dynamic resilience processes

The core aspect of resilience from a state-like (dynamic) perspective is understanding what regulates individuals perceptions about themselves their environment and their progress towards their goals. Self-regulation was not only cited as a key associated resource of resilience in the review but also in self-regulation associated theories (A-CEMA model, Chapter 3). It is thought that this self-regulation is dependent on meta-cognitive processes which orient individuals and their environment. Hill et al. (2018) suggest that knowledge about the temporal dimension of resilience can assist researchers and practitioners to develop strategies to counter regulate incidents that would otherwise have a negative effect on resilience, well-being and performance. Path analyses were used to incorporate individual stress appraisal styles with resilience capacities and difficulties in engaging self-regulatory resilience outcomes (goal-directed behaviour at work during stress, cf. minimal impact resilience). Results confirmed strong associations between stress appraisal style and the regulation of goal directed behaviour, in particular challenge and threat appraisals. Secondary appraisal level styles associated with control such uncontrollable stress appraisal style which

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also demonstrated some small path predictions with both resilience and engagement in goal directed behaviours at work during stress (Table 8.1). As adversities are often classified by their uncontrollable nature so it is logical that a perception of lack of control could significantly influence an individual's stress responses and resilience resources in relation to an effective resilience outcome (Nicholls, Holt, Polman, & Bloomfield, 2006). Stress appraisals have also been shown to be of importance in the adaptive and reintegration process of adversity (Armeli et al., 2001). Brown et al. (2015) denote that in successful athletes a lack of control may influence the reappraisal of an event which would in turn regulate the impact of such circumstances and ultimately an athletes ability to adapt. Evidence was seen in Table 8.1 with uncontrollable appraisals predicting difficulty in engaging goal directed behaviour and difficult in engaging goal directed behaviour predicting uncontrollable appraisals. Alike to the hypotheses that challenge appraisals will be associated with resilience change (H6) and difficulties in engaging with goal directed behaviours during stress (H8) the analyses reflected that challenge appraisals may only facilitate resilience processes in participants with a past history of persisting in sport or competing to a high level. In favour of the results Bonanno, Kennedy, Galatzer-Levy, Lude, and Elfström (2012) correspondingly found that patients with spinal cord injury and minimal-impact resilience trajectories were more likely to have challenge appraisals than threat appraisals and that appraisal style may be a robust predictor of long-term outcomes of adverse events. Similarly, the facilitative use of challenge appraisal style may only be utilised in the resilience process if previous experiences of similar adversities exist. From the results, evidence that any future approaches to the study of resilience should investigate cognitive processes in order to facilitate positive resilience change.

10.5 The development of resilience through past experience.

Exploring the long-term trajectories of resilience development requires may require both qualitative and quantitative studies in order to explore in details specific process interactions. Emergent resilience reflects both the disruption and reintegration of resilience and a key component of Richardson et al. (1990) resiliency model. Any athlete such as the tennis example (see Chapter 3) is in constant reaction to adversity during each competition and ongoing training practices. Over time and through appropriate cognitions a facilitative learned adaptation and reintegration will occur. Results suggest that this *steeling* process of resilience development was only relevant to the work context in the participant group who may have developed this process through the persistence of competitive sport. Those group who had similar experience on a higher level of competitive nor the group who had exposure to competitive sports reflected a significant improvement in the path analysis model.

There is longstanding interest in using sport as a context in which to explore central issues in organisations, such as competition and rivalry, leadership and organisational performance, compensation and incentives, team and individual performance over time, streak performance and choking, passionate pursuit of life and work activities, and transitions within and away from a lifelong calling (Day et al., 2012). The ability of developing challenge appraisals in particular arose from the findings, where competitive sport may expose participants to high pressure challenging episodes of stress in their youth which they may not have been presented with within solely educational settings. The analysis takes into account a broad perspective on resilience development to help augment how it may be developed across the life span and transferable across similar contexts.

Qualitative studies in sport have point towards how resilience interactions during both competitive and organisational stressors influences resilience against personal stressors (Brown, Butt, & Sarkar, 2019). Howells et al. (2017) concluded their qualitative research

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recommending the investigation of cognitive appraisal and emotion regulation in understanding the automatic and controlled nature of growth with is mirrored in these results. This analysis begins to bridge the quantitative gap on how this dynamic resilience process may be relevant and understood during longer term developments through the lens of stress appraisal type.

Integrating conservation of resources with a dynamical perspective goes beyond identifying the relevant resources, but explains how they can be enhanced or depleted during both short timeframe or perhaps over large time spans. The first principle from COR theory that resource loss is more salient than resource gain and the implementation of stress appraisal styles in past experiences of resource loss and gain may contribute to better self-regulatory process of resilience change.

Emergent resilience can be seen as attaining a form of psychological growth that reveals a greater maturity of the mind. Fletcher and Sarkar (2016) have described a resilience bandwidth of how resilience capacities fluctuate in relation to their developable resource potential. Where, permanent change represents a long-term trends in both initial capacities and reduced slopes of change. Resilience development should focus on opportune experiences to develop resilience for both expected and unexpected challenges. Where, specific environments and challenges may differ but associated resilience resources continue to broaden and build through similar disruptive and reintegrative processes of dynamic resilience.

Sources of support such as coaches and parents should focus on persistence in sport rather than striving to attain higher levels of competition, where the goal is to promote resilience in the workplace later in life. Increased attention towards sport engagement during both positive and negative experiences may be necessary to allow individuals to persist in sport longer and develop resilience processes through the practice of reducing threat

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appraisals and appraising stress as more of a challenge. The availability of social support coupled with the interaction of associated resilience resources are fundamental in resilience maintenance, reintegration and development. The balance between support and challenge are significant in the direction and duration of stress-resilience interactions (Fletcher & Sarkar, 2016). Pierce, Gould, and Camiré (2017) defines how an individual further develops or learns and internalises a resource in sport and then experiences a personal change through the application of this resource in one or more life domains beyond the context where it was originally learned. This process (i.e., sport to life) involves three interrelated stages: (a) life skills learning in sport, (b) life skills transfer, and (c) life skills application in at least one life domain beyond sport. However, the transferability of resilience across contexts needs further research where theories of identity development may play a key role to understanding how accrued skills and resources can be applied to similar experiences.

10.6 Practical Implications

In addition to building on the theoretical models developed in sport, the longitudinal research in the workplace has reflected numerous aspects of a this conceptualised state-like construct. Figure 3.1 fluctuation of resilience describes *when* resilience change can occur and researchers, coaches and managers alike can develop interventions and training in order to prepare for these predictable and probable events. Researchers and practitioners can help manage adverse events through measurable athlete or employee resilience capacities and on-going developments of psychological skills associated with both on-going and major life challenges.

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Similarly, evidence in the use of cognitive processes in order to facilitate resilience recovery and adaption should be applied. The facilitative use of challenge appraisal style may be applicable if previous experiences exist from similar adversities. However, the reduction of threat appraisal style can be recommended for all individual resilience processes.

Allen, Rhind, and Koshy (2015) have discussed how the transfer of life skills from sport to life is unlikely if opportunities for individuals to apply their skills in other contexts don't exist. Here, we found that those individuals who had the opportunity to persist in their sport throughout the challenges of final exams developed an ability to appraise adversity more of a challenge and persist during work stress. The added influence of immediate support such as coaches and academic advisors may play a crucial role in developing dual-career resilience. Aiding individuals to manage and identify as both high achieving athletes and individuals outside of the playing field will create the best opportunity for developing resilience that is transferrable across different situations and domains (Cartigny et al., 2019).

10.7 Strengths and Limitations

The original strengths of the research pertain to the clarification of resilience knowledge across work and sport domains. The precise applications of the *what, how, where* and *when* of resilience in both contexts were theorised and tested in relation to varying magnitudes of adversity. This research also began to explained the multiple pathways of resilience development at work through the use of cognitive appraisal skills and long-term developments through sport.

In considering the limitations that should be taken into account. Firstly, all of the measures used were completed by self-report which increased the risk of common method bias in the results. The lack of a specific measure to assess adversity on a scale from minor to major meant that we have to create an interpretive comparison of similar models rather than

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being able to generate a singular curve representing adversity over time in relation to resilience change. Resilience measurement itself was also limiting, although the items within the CD-25 scale (Connor & Davidson, 2003) capture a temporal aspect of resilience and is prominent within both the sport and work literature; it is ultimately based on the memoirs from Ernest Shackleton (1874-1922) while he was under-going what could be categorised as major life adversity (lead on of the first failing missions to the Antarctic). The development of a state-like measure of resilience which captured the outlined dynamic processes of resilience still needs to be identified.

Secondly, due to the repetitive nature of longitudinal design, the reordering of questions in the survey may have allowed some aspects of this bias to be limited (Podasakoff, Mackenzie, Lee, & Podsakoff, 2003). Additionally, the sample size over the four timepoints did not meet the target generally require for a medium sized sample ($n=100$ to 200) (Iacobucci, 2010). The time scale of the research design is also limiting as currently literatures on the relative timeframes of resilience processes is not documented. From the review we represented adversity exposure on three scales: short, medium and long term. This study only investigated relatively short term exposure (8 weeks). The timeframe used for this study may have been too short for any permanent change in resilience capacity to be developed. However, the study of individual performance episodes would be significantly shorter exposure and in contrast longer term developmental studies such as 32 year follow up measures (Werner & Smith, 1992) would be seen as significantly longer term exposures. The recognition of lasting resilience development may involve longer term observations, which act to sufficiently detect permanently higher fluctuations in new capacities over time. The involvement of life-long learning perspective may contribute to the understanding of *what*, *how*, *when* and *where* permanent resilience development can occur. Currently, strength based positive youth development (PYD) focuses on promoting strengths and views youth as

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having resources to be developed rather than problems to be fixed (Lerner, Almerigi, Theokas, & Lerner, 2005). The argument for resilience in this body of work offers a similar perspective of youth developing resilience resources across contexts and situations rather than a limited capacity isolated from one context to the next. It is recommend that future researchers measure adversity by documenting the frequency, exposure, and magnitude enhancing the ability of researchers to make causal inferences regarding the specific process phenomena.

10.8 Future research directions

Since we were interested in fluctuation of resilience over time, the focus of our study was restricted to individuals experiencing stress through their regular daily activities at work over an eight week period. Future studies could extend this timeframe to a competitive season, perhaps using a longer timeframe which incorporates an expected adverse period for all participants. This way resilience capacities can be tracked along with possible influencing factors to measurable levels of adversity. This future research should focus on how stress-resilience interactions can be optimised through planned intervention before, during and after high challenge environments

It is also important to note that our definition of resilience involves the pathway of minimal impact resilience which has been tested within sport (Meggs et al., 2016; Seligman et al., 1990) but still needs to be tested within the work context perhaps during a planned 'performance' episode.

The role of environment can have a major influence on the resilience (Fletcher & Sarkar, 2016). Following the associated resource theories presented in Chapters 2 and 3 the exploration of resource passageways and trajectories that emphasise environmental

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conditions effecting resilience fluctuation for either better or worse should be a fruitful avenue for both sport and work contexts.

Finally, the present research focused on the association of previous experiences in sport influencing future workplace resilience. Future research should identify those flexible skills and resources that may be transferrable from context to another and how those skills can be adapted and developed to optimise identity of skills to various adversities.

10.9 Concluding Reflections

It was found that resilience can be define, understood and quantified as a dynamic concept. A process that can maintain regular functioning through predictive appraisal styles and develop through on-going disruptive and reintegration experiences. This confirms that resilience should be understood in terms of the process of associated factors which interact with stress to produce a positive outcome. This advances the current literature by confirming the hypotheses that resilience may change over time and can be developed similar to dynamic resource theories which should be utilise by researchers moving forward. Previously, it was unknown what magnitude of adversity was necessary for resilience to be relevant. I have established that resilience is relevant in relation to both minor and major adversity in the workplace and future research can begin to investigate a variety of specific challenging episodes in order to develop interventions to increase resilience.

References

- Abbott, H. (2011). Fans' Notes, Rapturous and Otherwise. In (pp. C1). New York, N.Y.: New York Times Company.
- Abbott, J. A., Klein, B., Hamilton, C., & Rosenthal, A. J. (2009). The impact of online resilience training for sales managers on wellbeing and performance. *Sensoria: A Journal of Mind, Brain & Culture*, 5(1), 89-95.
- Acock, A. C. (2005). Working with missing values. *Journal of Marriage and family*, 67(4), 1012-1028. doi.org/10.1111/j.1741-3737.2005.00191.x
- Allen, G., Rhind, D., & Koshy, V. (2015). Enablers and barriers for male students transferring life skills from the sports hall into the classroom. *Qualitative Research in Sport, Exercise and Health*, 7(1), 53-67. doi:10.1080/2159676X.2014.893898
- Andersen, M. B. (2011). *Who's mental? Who's tough and who's both? Mutton constructs dressed up as lamb*. In D. F. Gucciardi & S. Gordon (Eds.) *Mental toughness in sport: Developments in research and theory*. Routledge Research in Sport and Exercise Science (pp. 69-88). Abington, UK: Routledge.
- Anthony, E. J. E., & Cohler, B. J. E. (1987). *The Invulnerable Child*: New York: Guilford.
- Armeli, S., Gunthert, K. C., & Cohen, L. H. (2001). Stressor appraisals, coping, and post-event outcomes: The dimensionality and antecedents of stress-related growth. *Journal of Social and Clinical Psychology*, 20(3), 366-395. doi.org/10.1521/jscp.20.3.366.22304
- Arora, R., & Rangnekar, S. (2014). Workplace mentoring and career resilience: An empirical test. *The Psychologist Manager Journal*, 17(3), 205-220. doi:10.1037/mgr0000021
- Ayala, J. C., & Manzano, G. (2010). Established business owners' success: Influencing factors. *Journal of Developmental Entrepreneurship*, 15(3), 263-286. doi:10.1142/S1084946710001555

- Ayala, J. C., & Manzano, G. (2014). The resilience of the entrepreneur. Influence on the success of the business. A longitudinal analysis. *Journal of Economic Psychology*, *42*, 126-135. doi: 10.1016/j.joep.2014.02.004
- Bandura, A. (1986). *Social Foundation of Thought and Action: A Social-Cognitive View*. Englewood Cliffs, New Jersey: Prentice-Hall.
- Baron, R., & Henry, R. (2010). How Entrepreneurs Acquire the capacity to excell: Insights from research on expert Performance. *Strategic Entrepreneurship Journal*, *4*, 49-65. doi:10.1002/sej
- Bartone, P. (2007). Test-retest reliability of the Dispositional Resilience Scale-15, a brief hardiness scale. *Psychological Reports*, *101*(3), 943-944. doi:10.2466/pr0.101.3.943-944
- Baumeister, R. F., & Vohs, K. D. (2007). Self-Regulation, Ego Depletion, and Motivation. *Social and Personality Psychology Compass*, *1*(1), 115-128. doi:10.1111/j.1751-9004.2007.00001.x
- Baumeister, R. F., Gailliot, M., DeWall, C. N., & Oaten, M. (2006). Self-Regulation and Personality: How Interventions Increase Regulatory Success, and How Depletion Moderates the Effects of Traits on Behavior. *Journal of personality*, *74*(6), 1773-1802. doi: 10.1111/j.1467-6494.2006.00428.x
- Beal, D., Weiss, H. M., Barros, E., & Macdermid, S. M. (2005). An episodic process model of affective influences on performance. *Journal of Applied Psychology* *90*(1), 1054-1068. doi:10.1037/0021-9010.90.6.1054
- Belem, I. C., Caruzzo, N. M., Nascimento Junior, J., Vieira, J. L. L., & Vieira, L. F. (2014). Impact of coping strategies on resilience of elite beach volleyball athletes. *Revista Brasileira de Cineantropometria e Desempenho Humano*, *16*(4), 447. doi: 10.5007/1980-0037.2014v16n4p447

- Bentler, P. (1990). Comparative fit indexes in structural models. *Psychological bulletin*, 107(Mar 90), 238-246.
- Bergeron, M. F., Mountjoy, M., Armstrong, N., Chia, M., Côté, J., Emery, C. A., Engebretsen, L. (2015). International Olympic Committee consensus statement on youth athletic development. *British journal of sports medicine*, 49(13), 843. doi:10.1136/bjsports-2015-094962
- Biron, C., Ivers, H., Brun, J.-P., & Cooper, C. (2006). Risk assessment of occupational stress: Extensions of the Clarke and Cooper approach. *Health, Risk and Society*, 8(4), 417-429. doi:10.1080/13698570601008222
- Blascovich, J. (2008). "Challenge, threat, and health," in Handbook of Motivation Science, eds J. Y. Shah and W. L. Gardner (New York, NY: Guildford Press), 481–493.
- Block, J., & Kremen, A. M. (1996). IQ and ego-resiliency: Conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology*, 70(2), 349-361. doi: 10.1037/0022-3514.70.2.349
- Bonanno, G. A. (2004). Loss, trauma, and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? *American psychologist*, 59(1), 20. doi:10.1037/0003-066X.59.1.20
- Bonanno, G. A. (2005). Clarifying and Extending the Construct of Adult Resilience. *American Psychologist*, 60(3), 265-267. doi: 10.1037/0003-066X.60.3.265b
- Bonanno, G. A., & Diminich, E. D. (2013). Annual Research Review: Positive adjustment to adversity—trajectories of minimal–impact resilience and emergent resilience. *Journal of Child Psychology and Psychiatry*, 54(4), 378-401. doi: 10.1111/jcpp.12021
- Bonanno, G. A., Kennedy, P., Galatzer-Levy, I. R., Lude, P., & Elfström, M. L. (2012). Trajectories of resilience, depression, and anxiety following spinal cord injury. *Rehabilitation psychology*, 57(3), 236. doi: 10.1037/a0029256

- Boyatzis, R. E. (1998). *Transforming qualitative information: Thematic analysis and code development*. London: Sage.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. doi:10.1191/1478088706qp063oa
- Britt, T. W., Shen, W., Sinclair, R. R., Grossman, M. R., & Klieger, D. M. (2016). How much do we really know about employee resilience? *Industrial and Organizational Psychology*, 9(2), 378-404. doi: 10.1017/iop.2015.107
- Brown, H. E., Lafferty, M. E., & Triggs, C. (2015). In the face of adversity: Resiliency in winter sport athletes. *Science & Sports*, 30(5), 105-117.
- Brown, H., Lafferty, M. E., & Triggs, C. (2015). In the face of adversity: Resiliency in winter sport athletes. *Science & Sports*, 30(5), 105-117.
- Burke, J., & Attridge, M. (2011). Pathways to career and leadership success: Part 1- A psychosocial profile of \$100k professionals. *Journal of Workplace Behavioral Health*, 26(3), 175-206. doi: 10.1080/15555240.2011.589718
- Burton, N. W., Pakenham, K. I., & Brown, W. J. (2010). Feasibility and effectiveness of psychosocial resilience training: a pilot study of the READY program. *Psychology, Health & Medicine*, 15(3), 266-277. doi:10.1080/13548501003758710
- Cardoso, F., Sacomori, C. . (2014). Resilience of athletes with physical disabilities: a Cross sectional Study. *Revista de Psicología del Deporte*, 23(1), 15-22.
- Cartigny, E., Fletcher, D., Coupland, C., & Taylor, G. (2019). Mind the Gap: A Grounded Theory of Dual Career Pathways in Sport. *Journal of Applied Sport Psychology*. doi:10.1080/10413200.2019.1654559
- Cervone, D., & Little, B. R. (2019). Personality architecture and dynamics: The new agenda and what's new about it. *Personality and Individual Differences*, 136, 12-23. doi:10.1016/j.paid.2017.07.001

- Chen, G., Gully, S. M., Whiteman, J.-A., & Kilcullen, R. N. (2000). Examination of relationships among trait-like individual differences, state-like individual differences, and learning performance. *Journal of Applied Psychology, 85*(6), 835-847. doi:10.1037/0021-9010.85.6.835
- Cicchetti, D. V. (1994). Guidelines, criteria, and rules of thumb for evaluating normed and standardized assessment instruments in psychology. *Psychological assessment, 6*(4), 284. doi:http://dx.doi.org/10.1037/1040-3590.6.4.284
- Clarke, S. G., & Cooper, C. L. (2000). The risk management of occupational stress. *Health, Risk & Society, 2*(2), 173-187.
- Clauss, E., Hoppe, A., O'Shea, D., Morales, M. G. G., Steidle, A., & Michel, A. (2018). Promoting Personal Resources and Reducing Exhaustion Through Positive Work Reflection Among Caregivers. *Journal of Occupational Health Psychology, 23*(1), 127-140. doi:10.1037/ocp0000063
- Coakley, J. (2011). Youth Sports: What Counts as "Positive Development?". *Journal of Sport and Social Issues, 35*(3), 306-324. doi:10.1177/0193723511417311
- Cohen, J. (1992). Statistical Power Analysis. *Current Directions in Psychological Science, 1*(3), 98-101.
- Connor, K. M., & Davidson, J. R. (2003). Development of a new resilience scale: The Connor-Davidson resilience scale (CD-RISC). *Depression and Anxiety, 18*(2), 76-82. doi:10.1002/da.10113
- Cronbach, L. (1947). Test "reliability": Its meaning and determination. *Psychometrika, 12*(1), 1-16. doi:10.1007/BF02289289
- Curran, P. J., & Bauer, D. J. (2011). The Disaggregation of Within-Person and Between-Person Effects in Longitudinal Models of Change. *Annual review of psychology, 62*(1), 583-619. doi:10.1146/annurev.psych.093008.100356

- Day, D. V., Gordon, S., & Fink, C. (2012). The Sporting Life: Exploring Organizations through the Lens of Sport. *The Academy of Management Annals*, 6(1), 397-433. doi:10.1080/19416520.2012.678697
- Debusscher, J., Hofmans, J., & De Fruyt, F. (2016). Do personality states predict momentary task performance? The moderating role of personality variability. *JOURNAL OF OCCUPATIONAL AND ORGANIZATIONAL PSYCHOLOGY*, 89(2). doi:10.1111/joop.12126
- Decroos, S., Lines, R. L., Morgan, P. B., Fletcher, D., Sarkar, M., Fransen, K., Vande Broek, G. (2017). Development and validation of the Characteristics of Resilience in Sports Teams Inventory. *Sport, Exercise, and Performance Psychology*, 6(2), 158. doi:10.1037%2Fspy0000089
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86(3), 499-512. doi:101037/0021-9010 86 3 499
- Den Hartigh, R. J. R., Cox, R. F. A., & Van Geert, P. L. C. (2017). Complex versus Complicated Models of Cognition. In L. Magnani & T. Bertolotti (Eds.), *Springer Handbook of Model-Based Science* (pp. 657-669). Cham: Springer International Publishing.
- Easterbrook, J. A. (1959). The effect of emotion on cue utilization and the organization of behavior. *Psychological Review*, 66(3), 183-201. doi.org/10.1037/h0055708
- Edmondson, A. C., & McManus, S. E. (2007). Methodological fit in management field research. *Academy of management review*, 32(4), 1246-1264. doi: 10.5465/amr.2007.26586086.

- Edwards, J. R., & Lambert, L. S. (2007). Methods for Integrating Moderation and Mediation: A General Analytical Framework Using Moderated Path Analysis. *Psychological Methods, 12*(1), 1-22. doi:10.1037/1082-989X.12.1.1
- Egeland, B. R., Carlson, E., & Sroufe, L. A. (1993). Resilience as process. *Development and Psychopathology, 5*(4), 517-528.
- Estrada, A. X., Severt, J. B., & Jiménez-Rodríguez, M. (2016). Elaborating on the Conceptual Underpinnings of Resilience. *Industrial and Organizational Psychology, 9*(02), 497-502. doi:10.1017/iop.2016.46
- Fan, W., & Yan, Z. (2010). Factors affecting response rates of the web survey: A systematic review. *Computers in human behavior, 26*(2), 132-139.
doi:10.1016/j.chb.2009.10.015
- Feldman, M. S. (2004). Resources in Emerging Structures and Processes of Change. *Organization Science, 15*(3), 295-309. doi:10.1287/orsc.1040.0073
- Feldman, M. S., & Worline, M. C. (2011). Resourcefulness: Resources, resourcing, and ampliative cycles in organizations. In K. S. Cameron & G. M. Spreitzer (Eds.), *Oxford handbook of positive organizational scholarship* (pp. 629-641). Oxford: Oxford University Press.
- Fergus, S., & Zimmerman, M. A. (2005). Adolescent resilience: A framework for understanding healthy development in the face of risk. *Annual Review of Public Health, 26*, 399-419. doi:10.1146/annurev.publhealth.26.021304.144357
- Fleeson, W., & Jayawickreme, E. (2015). Whole Trait Theory. *Journal of Research in Personality, 56*, 82-92. doi:https://doi.org/10.1016/j.jrp.2014.10.009
- Fleming, J., & Ledogar, R. J. (2008). Resilience, an evolving concept: A review of literature relevant to Aboriginal research. *Pimatisiwin, 6*(2), 7-23.

- Fletcher, D., & Sarkar, M. (2012). A grounded theory of psychological resilience in Olympic champions. *Psychology of Sport and Exercise, 13*(5), 669-678.
doi:<http://dx.doi.org/10.1016/j.psychsport.2012.04.007>
- Fletcher, D., & Sarkar, M. (2013). Psychological resilience: A review and critique of definitions, concepts, and theory. *European Psychologist, 18*(1), 12-23.
- Fletcher, D., & Sarkar, M. (2016). Mental fortitude training: An evidence-based approach to developing psychological resilience for sustained success. *Journal of Sport Psychology in Action, 7*(3), 135-157. doi:10.1080/21520704.2016.1255496
- Fletcher, D., & Wagstaff, C. R. D. (2009). Organizational psychology in elite sport: Its emergence, application and future. *Psychology of Sport and Exercise, 10*(4), 427-434.
doi: <http://dx.doi.org/10.1016/j.psychsport.2009.03.009>
- Folkman, S., & Moskowitz, J. T. (2000). Positive affect and the other side of coping. *The American psychologist, 55*(6), 647. doi:10.1037/0003-066X.55.6.647
- Foo, M. D., Uy, M. A., & Baron, R. A. (2009). How do feelings influence effort? An empirical study of entrepreneurs' affect and venture effort. *Journal of Applied Psychology, 94*(4), 1086-1094. doi:10.1037/a0015599
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and- build theory of positive emotions. *American Psychologist, 56*(3), 218-226. doi:10.1037/0003-066X.56.3.218
- Frese, M., & Zapf, D. (1994). Action as the core of work psychology: A German approach. In H. C. Triandis, M. D. Dunnette, & L. M. Hough (Eds.), *Handbook of Industrial and Organizational Psychology* (2nd ed., Vol. 4, pp. 271-340). Palo Alto, CA: Consulting Psychologists Press.

- Galli, N., & Gonzalez, S. P. (2014). Psychological resilience in sport: A review of the literature and implications for research and practice. *International Journal of Sport and Exercise Psychology*, 1-15. doi:10.1080/1612197x.2014.946947
- Galli, N., & Reel, J. J. (2012). 'It was Hard, But it was Good': A qualitative exploration of stress-related growth in Division I intercollegiate athletes. *Qualitative Research in Sport, Exercise and Health*, 4(3), 297-319. doi: 10.1080/2159676x.2012.693524
- Galli, N., & Vealey. (2008). "Bouncing Back" From Adversity: Athletes' Experiences of Resilience. *The Sport Psychologist*, 316-335. doi:10.1123/tsp.22.3.316
- Gillespie, B. M., Chaboyer, W., & Wallis, M. (2007). Development of a theoretically derived model of resilience through concept analysis. *Contemporary Nurse*, 25(1-2), 124-135. doi:10.5172/conu.2007.25.1-2.124
- Gillispie, S. K., Britt, T. W., Burnette, C. M., & McFadden, A. C. (2016). Employee mental health treatment seeking: Perceptions of responsibility and resilience. *Journal of Workplace Behavioral Health*, 31(1), 1-18. doi: 10.1080/15555240.2015.1100519
- Gledhill, A., Harwood, C., & Forsdyke, D. (2017). Psychosocial factors associated with talent development in football: A systematic review. *Psychology of Sport and Exercise*, 31, 93-112.
- Gonzalez, S., & Newton, M. (2013). Measuring resilient qualities in sport: A confirmatory factor analysis (CFA) and structural equation model (SEM) of the 10-item Connor Davidson Resilience Scale. *Journal of sport & exercise psychology*, 35, S87-S88. doi:10.1016/j.psychsport.2015.10.005
- Gonzalez, S. P., Moore, E. W. G., Newton, M., & Galli, N. A. (2016). Validity and reliability of the Connor-Davidson Resilience Scale (CD-RISC) in competitive sport. *Psychology of Sport and Exercise*, 23, 31-39. doi: <http://dx.doi.org/10.1016/j.psychsport.2015.10.005>

- Gould, D., Dieffenbach, K., & Moffett, A. (2002). Psychological characteristics and their development in olympic Champions. *Journal of Applied Sport Psychology, 14*(3), 172-204. doi: 10.1080/10413200290103482
- Grant, A. M., Curtayne, L., & Burton, G. (2009). Executive coaching enhances goal attainment, resilience and workplace well-being: A randomised controlled study. *The Journal of Positive Psychology, 4*(5), 396-407. doi:10.1080/17439760902992456
- Greenhalgh, T., & Peacock, R. (2005). Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. *British Medical Journal, 331*(7524), 1064-1065. doi: 10.1136/bmj.38636.593461.68
- Grover, S., & Furnham, A. (2016). Coaching as a developmental intervention in organisations: A systematic review of its effectiveness and the mechanisms underlying it. *PloS one, 11*(7), 129-137. doi:10.1371/journal.pone.0159137
- Gucciardi, D. F., Jackson, B., Coulter, T. J., & Mallett, C. J. (2011). The Connor-Davidson Resilience Scale (CD-RISC): Dimensionality and age-related measurement invariance with Australian cricketers. *Psychology of Sport and Exercise, 12*(4), 423-433. doi: 10.1016/j.psychsport.2011.02.005
- Gucciardi, D., Jackson, B., Hodge, K., Anthony, D., & Brooke, L. (2015). Implicit Theories of Mental Toughness: Relations With Cognitive, Motivational, and Behavioral Correlates. *Sport Exercise And Performance Psychology, 4*(2), 100-112. doi:10.1037/spy0000024
- Halbesleben, J. R. B., Neveu, J. P., Paustian-Underdahl, S. C., & Westman, M. (2014). Getting to the "COR": Understanding the Role of Resources in Conservation of Resources Theory. *Journal of Management, 40*(5), 1334-1364. doi:10.1177/0149206314527130

- Hallett, M. G., & Hoffman, B. (2014). Performing under pressure: Cultivating the peak performance mindset for workplace excellence. *Consulting Psychology Journal*, 66(3), 212-230. doi:10.1037/cpb0000009
- Hays, K. F. (2012). The psychology of performance in sport and other domains. *The Oxford handbook of sport and performance psychology*, 24.
- Hill, Y., den Hartigh, R. J. R., Meijer, R. R., de Jonge, P., & Van Yperen, N. W. (2018a). Resilience in Sports From a Dynamical Perspective. *Sport, Exercise and Performance Psychology*, 7(4), 333-341. doi:10.1037/spy0000118
- Hill, Y., den Hartigh, R. J. R., Meijer, R. R., de Jonge, P., & Van Yperen, N. W. (2018b). The temporal process of resilience. *Sport, Exercise, and Performance Psychology*, 7(4), 363-370. doi:10.1037/spy0000143
- Hinkin, T. R. (1995). A review of scale development practices in the study of organizations. *Journal of Management*, 21(5), 967-988.
- Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44(3), 513-524. doi:10.1037/0003-066X.44.3.513
- Hobfoll, S. E. (2001). The influence of culture, community, and the nested-self in the stress process: advancing conservation of resources theory. *Applied Psychology*, 50(3), 337-421. doi: 10.1111/1464-0597.00062
- Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, 6(4), 307-324. doi:10.1037//1089-2680.6.4.307
- Hobfoll, S. E. (2011). Conservation of resource caravans and engaged settings. *Journal of Occupational & Organizational Psychology*, 84(1), 116-122. doi:10.1111/j.2044-8325.2010.02016.x

- Hogan, R. (1996). A socioanalytic perspective on the five-factor model. In *The five-factor model of personality: Theoretical perspectives*. (pp. 163-179). New York, NY, US: Guilford Press.
- Holt, N. L., & Dunn, J. G. H. (2004). Toward a grounded theory of the psychosocial competencies and environmental conditions associated with soccer success. *Journal of Applied Sport Psychology, 16*(3), 199-219. doi: 10.1080/10413200490437949
- Holt, N. L., Neely, K. C., Slater, L. G., Camiré, M., Côté, J., Fraser-Thomas, J., Tamminen, K. A. (2017). A grounded theory of positive youth development through sport based on results from a qualitative meta-study. *International Review of Sport and Exercise Psychology, 10*(1), 1-49. doi:10.1080/1750984X.2016.1180704
- Hosseini, S. A., & Besharat, M. A. (2010). Relation of resilience whit sport achievement and mental health in a sample of athletes. *Procedia - Social and Behavioral Sciences, 5*(0), 633-638. doi: <http://dx.doi.org/10.1016/j.sbspro.2010.07.156>
- Howells, K., Sarkar, M., & Fletcher, D. (2017). Can athletes benefit from difficulty? A systematic review of growth following adversity in competitive sport. In *Progress in brain research* (Vol. 234, pp. 117-159): Elsevier.
- Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal, 6*(1), 1-55.
doi:<https://doi.org/10.1080/10705519909540118>
- Iacobucci, D. (2010). Structural equations modeling: Fit indices, sample size, and advanced topics. *Journal of Consumer Psychology, 20*(1), 90-98. doi: 10.1016/j.jcps.2009.09.003

- Infurna, F. J., Rivers, C. T., Reich, J., & Zautra, A. J. (2015). Childhood trauma and personal mastery: Their influence on emotional reactivity to everyday events in a community sample of middle-aged adults. *PloS one*, *10*(4), e0121840.
- Jansen, J., & Corley, K. (2007). E-survey methodology. In *Handbook of research on electronic surveys and measurements* (pp. 1-8): IGI Global.
- Jamshidian, M., & Jalal, S. (2010). Tests of homoscedasticity, normality, and missing completely at random for incomplete multivariate data. *Psychometrika*, *75*(4), 649-674. doi: 10.1007/s11336-010-9175-3
- John, J. M., Gropper, H., & Thiel, A. (2019). The role of critical life events in the talent development pathways of athletes and musicians: A systematic review. *Psychology of Sport & Exercise*, *45*. doi:10.1016/j.psychsport.2019.101565
- Johns, G. (2001). In praise of context. *Journal of Organizational Behavior*, *22*(1), 31-42.
- Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of management review*, *31*(2), 386-408. doi: 10.2307/20159208
- Jones, G. (2002). Performance excellence: A personal perspective on the link between sport and business. *Journal of Applied Sport Psychology*, *14*(4), 268-281.
doi:10.1080/10413200290103554
- Jones, J., & Jetten, J. (2011). Recovering from strain and enduring pain multiple group memberships promote resilience in the face of physical challenges. *Social Psychological and Personality Science*, *2*(3), 239-244.
doi:10.1177/1948550610386806
- Kanner, A., Coyne, J., Schaefer, C., & Lazarus, R. (1981). Comparison of two modes of stress measurement: Daily hassles and uplifts versus major life events. *Journal of Behavioral Medicine*, *4*(1), 1-39. doi:10.1007/BF00844845

- Karam, E. G., Friedman, M. J., Hill, E. D., Kessler, R. C., McLaughlin, K. A., Petukhova, M., . . . Koenen, K. C. (2014). Cumulative traumas ad risk thresholds: 12-month PTSD in the world mental heath surveys. *Depression and Anxiety, 31*(2), 130-142. doi:10.1002/da.22169
- Kelso, J. A. S. (1995). *Dynamic patterns: The selforganization of brain and behavior*. Cambridge, MA: MIT Press.
- Kelso, J., Scholz, J. P., & Schöner, G. (1986). Nonequilibrium phase transitions in coordinated biological motion: critical fluctuations. *Physics Letters A, 118*(6), 279-284. doi:10.1016/0375-9601(86)90359-2
- Kendellen, K., & Camiré, M. (2019). Applying in life the skills learned in sport: A grounded theory. *Psychology of Sport & Exercise, 40*, 23-32. doi:10.1016/j.psychsport.2018.09.002
- Kiefer, A. W., Silva, P. L., Harrison, H. S., & Araújo, D. (2018). Antifragility in sport: Leveraging adversity to enhance performance. *Sport, Exercise, and Performance Psychology, 7*(4), 342-350. doi:10.1037/spy0000130
- Killien, M. G., Habermann, B., & Jarrett, M. (2001). Influence of employment characteristics on postpartum mothers' health. *Women & health, 33*(1-2), 63-81. doi:10.1300/J013v33n01_05
- Killien, M., & Jarrett, M. (1993). Returning to work: Impact on postpartum mothers' health.
- Kim-Cohen, J., & Turkewitz, R. (2012). Resilience and measured gene–environment interactions. *Development and Psychopathology, 24*(4), 1297-1306. doi:10.1017/S0954579412000715
- King, D. D., Newman, A., & Luthans, F. (2016). Not if, but when we need resilience in the workplace: Workplace resilience. *Journal of Organizational Behavior, 37*(5), 782-786. doi: 10.1002/job.2063

- King, G., & Rothstein, M. G. (2010). Resilience and Leadership: The self-management of failure. *Self-management and Leadership Development*, 361.
- Koo, T. K., & Li, M. Y. (2016). A Guideline of Selecting and Reporting Intraclass Correlation Coefficients for Reliability Research. *Journal of Chiropractic Medicine*, 15(2), 155-163. doi:10.1016/j.jcm.2016.02.012
- Kuder, G., & Richardson, M. (1937). The theory of the estimation of test reliability. *Psychometrika*, 2(3), 151-160. doi:10.1007/BF02288391
- Lane, A. M., Beedie, C. J., Jones, M. V., Uphill, M., & Devonport, T. J. (2012). The BASES Expert Statement on emotion regulation in sport. *Journal of Sports Sciences*, 30(11), 1189-1195. doi:10.1080/02640414.2012.693621
- Leipold, B., & Greve, W. (2009). Resilience: A conceptual bridge between coping and development. *European Psychologist*, 14(1), 40-50. doi: 10.1177/0002764291034004003
- Leist, A. K., Ferring, D., & Filipp, S.H. (2010). Remembering positive and negative life events: Associations with future time perspective and functions of autobiographical memory. *GeroPsych: The Journal of Gerontopsychology and Geriatric Psychiatry*, 23(3), 137-147. DOI: 10.1024/1662-9647/a000017
- Lenzenweger, M. F., Johnson, M. D., & Willett, J. B. (2004). Individual Growth Curve Analysis Illuminates Stability and Change in Personality Disorder Features: The Longitudinal Study of Personality Disorders. *Archives of General Psychiatry*, 61(10), 1015-1024. doi:10.1001/archpsyc.61.10.1015
- Lepore, S. J., & Revenson, T. A. (2006). Resilience and posttraumatic growth: Recovery, resistance, and reconfiguration. *Handbook of Posttraumatic Growth: Research and Practice* (pp.22-46). Mahwah, New Jersey: Lawrence Erlbaum Associates Publishers.

- Lerner, R. M., Almerigi, J. B., Theokas, C., & Lerner, J. V. (2005). Positive Youth Development A View of the Issues. *The Journal of Early Adolescence*, 25(1), 10-16. doi:10.1177/0272431604273211
- Liossis, P. L., Shochet, I. M., Millear, P. M., & Biggs, H. (2009). The Promoting Adult Resilience (PAR) Program: The effectiveness of the second, shorter pilot of a workplace prevention program. *Behaviour Change*, 26(2), 97-112. doi:10.1375/behc.26.2.97
- Loh, J. M. I., & Dahesihsari, R. (2013). Resilience and economic empowerment: a qualitative investigation of entrepreneurial Indonesian women. *Journal of Enterprising Culture*, 21(1), 107-121. doi: 10.1142/s0218495813500052
- London, M., & Noe, R. A. (1997). London's career motivation theory: An update on measurement and research. *Journal of Career Assessment*, 5(1), 61-80. doi:10.1177/106907279700500105
- Lu, F. J. H., Lee, W. P., Chang, Y.-K., Chou, C.-C., Hsu, Y.-W., Lin, J.-H., & Gill, D. L. (2016). Interaction of athletes' resilience and coaches' social support on the stress-burnout relationship: A conjunctive moderation perspective. *Psychology of Sport and Exercise*, 22, 202-209. doi: <http://dx.doi.org/10.1016/j.psychsport.2015.08.005>
- Luthans, F. (2002). The need for and meaning of positive organizational behavior. *Journal of Organizational Behavior*, 23(6), 695-706. doi:10.1002/job.165
- Luthans, F., Avey, J. B., Avolio, B. J., & Peterson, S. J. (2010). The development and resulting performance impact of positive psychological capital. *Human Resource Development Quarterly*, 21(1), 41-67. doi:10.1002/hrdq.20034
- Luthans, F., Avolio, B. J., Avey, J. B., & Norman, S. M. (2007). Positive psychological capital: Measurement and relationship with performance and satisfaction. *Personnel Psychology*, 60(3), 541-572. doi:10.1111/j.1744-6570.2007.00083.x

- Luthans, F., Vogelgesang, G. R., & Lester, P. B. (2006). Developing the psychological capital of resiliency. *Human Resource Development Review*, 5(1), 25-44.
doi:10.1177/1534484305285335
- Luthar, S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Dev*, 71. doi: 10.1111/1467-8624.00164
- Machida, M., Irwin, B., & Feltz, D. (2013). Resilience in Competitive Athletes With Spinal Cord Injury The Role of Sport Participation. *Qualitative health research*, 23(8), 1054-1065. doi:10.1177/1049732313493673
- MacIntyre, T. E., Igou, E. R., Campbell, M. J., Moran, A. P., & Matthews, J. (2014). Metacognition and action: a new pathway to understanding social and cognitive aspects of expertise in sport. Advance online publication.
<http://dx.doi.org/10.3389/fpsyg.2014.01155>
- MacIntyre TE, Walkin AM, Beckmann J, Calogiuri G, Gritzka S, Oliver G, Donnelly AA and Warrington G (2019) An Exploratory Study of Extreme Sport Athletes' Nature Interactions: From Well-Being to Pro-environmental Behavior. *Front. Psychol.* 10:1233. doi: 10.3389/fpsyg.2019.01233
- Mael, F. A., & Ashforth, B. E. (2001). Identification in work, war, sports, and religion: Contrasting the benefits and risks. *Journal for the Theory of Social Behaviour*, 31(2), 197-222. doi: 10.1111/1468-5914.00154
- Maher, P., O'Shea, D., & Igou, E. I. (2017). Applying social cognitive approaches on meaning regulation to the understanding of meaning in the workplace. In K. O'Doherty & D.J. Hodgetts (Eds.) *Handbook of Applied Social Psychology*. London: Sage.

- Mancini, A. D., & Bonanno, G. A. (2009). Predictors and parameters of resilience to loss: Toward an individual differences model. *Journal of Personality, 77*(6), 1805-1832. doi:10.1111/j.1467-6494.2009.00601.x
- Manzano-Garcia, G., & Ayala Calvo, J. C. (2013). Psychometric properties of Connor-Davidson Resilience Scale in a Spanish sample of entrepreneurs. *Psicothema, 25*(2), 245-251. doi:10.7334/psicothema2012.183
- Martin-Krumm, C. P., Sarrazin, P. G., Peterson, C., & Famose, J.-P. (2003). Explanatory style and resilience after sports failure. *Personality and Individual Differences, 35*(7), 1685-1695. doi: [http://dx.doi.org/10.1016/S0191-8869\(02\)00390-2](http://dx.doi.org/10.1016/S0191-8869(02)00390-2)
- Masten, A. S. (1994). Life events and adjustment in adolescents: The significance of event independence, desirability, and chronicity. *Journal of Research on Adolescence, 4*(1), 71-97. doi: 10.1207/s15327795jra0401_5
- Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American Psychologist, 56*(3), 227-238. doi:10.1037/0003-066X.56.3.227
- Masten, A. S. (2014). *Ordinary Magic: Resilience in Development*. New York: Guilford Press.
- Masten, A. S., Hubbard, J. J., Gest, S. D., Tellegen, A., Garmezy, N., & Ramirez, M. (1999). Competence in the context of adversity: Pathways to resilience and maladaptation from childhood to late adolescence. *Development and Psychopathology, 11*(1), 143-169. doi:10.1017/S0954579499001996
- McArdle, J. J. (2009). Latent Variable Modeling of Differences and Changes with Longitudinal Data. *Annual Review of Psychology, 60*(1), 577-605. doi:10.1146/annurev.psych.60.110707.163612
- McCoach, D. B., & Kaniskan, B. (2010). Using time-varying covariates in multilevel growth models. *Frontiers in psychology, 1*, 17. doi:10.3389/fpsyg.2010.00017

- McKight, P. E., & Najab, J. (2010). Kruskal-wallis test. *The corsini encyclopedia of psychology*, 1-1. doi: 10.1002/9780470479216.corpsy0491
- McLarnon, M. J. W., & Rothstein, M. G. (2013). Development and initial validation of the workplace resilience inventory. *Journal of Personnel Psychology*, 12(2), 63-73. doi: 10.1027/1866-5888/a000084
- Meggs, J., Golby, J., Mallett, C., Gucciardi, D., & Polman, R. C. (2016). The cortisol awakening response and resilience in elite swimmers. *International Journal of Sports Medicine*, 37(2), 169-174. doi: 10.1055/s-0035-1559773
- Meredith, L. S., Sherbourne, C. D., Gaillot, S. J., Hansell, L., Ritschard, H. V., Parker, A. M., & Wrenn, G. (2011). *Promoting psychological resilience in the US military*. Santa Monica, California: RAND Corporation.
- Meredith, W., & Tisak, J. (1990). Latent Curve Analysis. *Psychometrika*, 55(1), 107-122. doi:10.1007/BF02294746
- Millear, P., Liossis, P., Shochet, I. M., Biggs, H., & Donald, M. (2008). Being on PAR: outcomes of a pilot trial to improve mental health and wellbeing in the workplace with the Promoting Adult Resilience (PAR) Program. *Behaviour Change*, 25(4), 215-228. doi:10.1375/behc.25.4.215
- Mills, A., Butt, J., Maynard, I., & Harwood, C. (2012). Identifying factors perceived to influence the development of elite youth football academy players. *Journal of Sports Science*, 30(15), 1593-1604. doi: 10.1080/02640414.2012.710753
- Moore, L. J., Freeman, P., Hase, A., Solomon-Moore, E., & Arnold, R. (2019). How Consistent Are Challenge and Threat Evaluations? A Generalizability Analysis. *Frontiers in Psychology*, 10(1778). doi:10.3389/fpsyg.2019.01778
- Mulligan, K., Fear, N., Jones, N., Wessely, S., & Greenberg, N. (2011). Psycho-educational interventions designed to prevent deployment-related psychological ill-health in

- Armed Forces personnel: A review. *Psychological Medicine*, 41(4), 673-686. doi: 10.1017/S003329171000125X
- Mummary, W. K., Schofield, G., & Perry, C. (2004). Bouncing back: the role of coping style, social support and self-concept in resilience of sport performance. *Athletic Insight*, 6(3), 1-15.
- Newman, D. A. (2014). Missing Data: Five Practical Guidelines. *Organizational Research Methods*, 17(4), 372-411. doi:10.1177/1094428114548590
- Nezhad, M. A. S., & Besharat, M. A. (2010). Relations of resilience and hardiness with sport achievement and mental health in a sample of athletes. *Procedia - Social and Behavioral Sciences*, 5(0), 757-763. doi: 10.1016/j.sbspro.2010.07.180
- Nicholls, A. R., Holt, N. L., Polman, R. C. J., & Bloomfield, J. (2006). Stressors, coping, and coping effectiveness among professional rugby union players. *Sport Psychologist*, 20(3), 314-329. doi:10.1123/tsp.20.3.314
- Nielsen, K., & Randall, R. (2009). Managers' Active Support when Implementing Teams: The Impact on Employee Well-Being. *Applied Psychology-Health and Well Being*, 1(3), 374-390. doi:10.1111/j.1758-0854.2009.01016.x
- Nielsen, K., Randall, R., Yarker, J., & Brenner, S. O. (2008). The effects of transformational leadership on followers' perceived work characteristics and psychological well-being: A longitudinal study. *Work and Stress*, 22(1), 16-32. doi:10.1080/02678370801979430
- Nowack, K. M. (1989). Coping style, cognitive hardiness, and health status. *Journal of Behavioural Medicine*, 12(2), 145-158. doi:10.1007/BF00846548
- O'Shea, D., Buckley, F., & Halbesleben, J. (2017). Self-regulation in entrepreneurs: Integrating action, cognition, motivation, and emotions. *Organizational Psychology Review*, 7(3), 250-278. doi:10.1177/2041386617705434

- Pangallo, A., Zibarras, L., Lewis, R., & Flaxman, P. (2015). Resilience through the lens of interactionism: A systematic review. *Psychological Assessment*, 27(1), 1-20. doi: 10.1037/pas0000024
- Panter-Brick, C., & Eggerman, M. (2012). Understanding culture, resilience, and mental health: The production of hope. *The Social Ecology of Resilience* (pp. 369-386). New York: Springer.
- Paul, M., Khanna, N., & Sandhu, J. S. (2012). Psycho-motor analysis of athletes under overtraining stress. *Serbian Journal of Sports Sciences*, 6(3), 95-101.
- Peacock, E. J., & Wong, P. T. (1990). The stress appraisal measure (SAM): A multidimensional approach to cognitive appraisal. *Stress Medicine*, 6(3), 227-236. doi: 10.1002/smi.2460060308
- Peterson, C., & Seligman, M. E. P. (2004). *Character strengths and virtues: A handbook and classification*: Oxford University Press.
- Phillips, E., Davids, K., Renshaw, I., & Portus, M. (2010b). Expert performance in sport and the dynamics of talent development. *Sports Medicine*, 40, 271–283. <https://doi.org/10.2165/11319430-000000000-00000>.
- Pidgeon, A. M., Ford, L., & Klaassen, F. (2014). Evaluating the effectiveness of enhancing resilience in human service professionals using a retreat-based Mindfulness with Metta Training Program: A randomised control trial. *Psychology, Health & Medicine*, 19(3), 355-364. doi:10.1080/13548506.2013.806815
- Pierce, S., Gould, D., & Camiré, M. (2017). Definition and model of life skills transfer. In (Vol. 10, pp. 186-211): Routledge.
- Pluye, P., & Hong, Q. N. (2014). Combining the power of stories and the power of numbers: mixed methods research and mixed studies reviews. *Annual Review of Public Health*, 35, 29-45. doi:10.1146/annurev-publhealth-032013-182440

- Pluye, P., Gagnon, M.-P., Griffiths, F., & Johnson-Lafleur, J. (2009). A scoring system for appraising mixed methods research, and concomitantly appraising qualitative, quantitative and mixed methods primary studies in Mixed Studies Reviews. *International Journal of Nursing Studies*, 46(4), 529-546.
doi:10.1016/j.ijnurstu.2009.01.009
- Podasakoff, P., Mackenzie, S., Lee, J.-Y., & Podsakoff, N. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903. doi:10.1037/0021-9010.88.5.879
- Pogrebtsova, E., Craig, J., Chris, A., O'Shea, D., & González-Morales, M. G. (2017). Exploring daily affective changes in university students with a mindful positive reappraisal intervention: A daily diary randomized controlled trial. *Stress and Health*, n/a--n/a. doi:10.1002/smi.2759
- Quinn, R. W., Spreitzer, G. M., & Lam, C. F. (2012). Building a Sustainable Model of Human Energy in Organizations: Exploring the Critical Role of Resources. *The Academy of Management Annals*, 6(1), 337-396. doi:10.1080/19416520.2012.676762
- Richardson, G. E. (2002). The metatheory of resilience and resiliency. *Journal of Clinical Psychology*, 58(3), 307-321. doi:10.1002/jclp.10020
- Robertson, I. T., Cooper, C. L., Sarkar, M., & Curran, T. (2015). Resilience training in the workplace from 2003 to 2014: A systematic review. *Journal of occupational and organizational psychology*, 88(3), 533-562. doi:10.1111/joop.12120
- Roche, M., Haar, J. M., & Luthans, F. (2014). The role of mindfulness and psychological capital on the well-being of leaders. *Journal of Occupational Health Psychology*, 19(4), 476-489. doi: 10.1037/a0037183

- Rogosa, D., Brandt, D., & Zimowski, M. (1982). A growth curve approach to the measurement of change. *Psychological bulletin*, 92(3), 726. doi:10.1037/0033-2909.92.3.726
- Rothstein, M. G., McLarnon, M. J. W., & King, G. (2016). The role of self-regulation in workplace resiliency. *Industrial and Organizational Psychology*, 9(2), 416-421. doi: 10.1017/iop.2016.32
- Royston, J. P. (1982). An Extension of Shapiro and Wilk's W Test for Normality to Large Samples. *Journal of the Royal Statistical Society. Series C (Applied Statistics)*, 31(2), 115-124. doi:10.2307/2347973
- Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American journal of orthopsychiatry*, 57(3), 316. doi: 10.1111/j.1939-0025.1987.tb03541.x
- Rutter, M. (2006). Implications of Resilience Concepts for Scientific Understanding. *Annals of the New York Academy of Sciences*, 1094(1), 1-12. doi:10.1196/annals.1376.002
- Sarkar, M., & Fletcher, D. (2013). How should we measure psychological resilience in sport performers? *Measurement in Physical Education and Exercise Science*, 17(4), 264-280. doi: 10.1080/1091367x.2013.805141
- Sarkar, M., & Fletcher, D. (2014a). Psychological resilience in sport performers: a review of stressors and protective factors. *Journal of Sports Science*, 32(15), 1419-1434. doi: 10.1080/02640414.2014.901551
- Sarkar, M., & Fletcher, D. (2014b). Supplemental material for ordinary magic, extraordinary performance: psychological resilience and thriving in high achievers. *Sport, Exercise, and Performance Psychology*, 3(1), 46-60. doi: 10.1037/spy0000003.supp
- Sarkar, M., Fletcher, D., & Brown, D. J. (2015). What doesn't kill me...: adversity-related experiences are vital in the development of superior Olympic performance. *Journal of Science and Medicine in Sport*, 18(4), 475-479. doi:10.1016/j.jsams.2014.06.010

- Schlomer, G. L., Bauman, S., & Card, N. A. (2010). Best practices for missing data management in counseling psychology. *Journal of Counseling psychology*, 57(1), 1. doi: 10.1037/a0018082
- Secades, X. G., Molinero, O., Salguero, A., Barquin, R. R., de la Vega, R., & Marquez, S. (2016). Relationship between resilience and coping strategies in competitive sport. *Perceptual Motor Skills*, 122(1), 336-349. doi: 10.1177/0031512516631056
- Seery, M. D. (2011). Challenge or threat? Cardiovascular indexes of resilience and vulnerability to potential stress in humans. *Neuroscience & Biobehavioral Reviews*, 35(7), 1603-1610.
- Seligman, M. E. P. (2011). Building resilience. *Harvard Business Review*, 89(4), 100-106.
- Seligman, M. E. P., Nolen-Hoeksema, S., Thornton, N., & Thornton, K. M. (1990). Explanatory style as a mechanism of disappointing athletic performance. *Psychological Science*, 1(2), 143-146. doi:10.1111/j.1467-9280.1990.tb00084.x
- Sherlock-Storey, M., Moss, M., & Timson, S. (2013). Brief coaching for resilience during organisational change - an exploratory study. *Coaching Psychologist*, 9(1), 19-26.
- Shin, J., Taylor, M. S., & Seo, M.-G. (2012). Resources for change: the relationships of organizational inducements and psychological resilience to employees' attitudes and behaviors toward organizational change. *Academy of Management Journal*, 55(3), 727-748. doi:10.5465/amj.2010.0325
- Shoenfelt, E. L. (2016). How Much Do We Really Know About Employee Resilience? More, If We Include the Sport Psychology Resilience Research. *Industrial and Organizational Psychology*, 9(2), 442-446. doi:10.1017/iop.2016.36
- Smith, R. E., Schutz, R. W., Smoll, F. L., & Ptacek, J. T. (1995). Development and validation of a multidimensional measure of sport-specific psychological skills: The Athletic

- Coping Skills Inventory-28. *Journal of Sport and Exercise Psychology*, 17(4), 379-398. doi:10.1123/jsep.17.4.379
- Smith, R. E., Smoll, F. L., & Ptacek, J. T. (1990). Conjunctive moderator variables in vulnerability and resiliency research: Life stress, social support and coping skills, and adolescent sport injuries. *Journal of Personality and Social Psychology*, 58(2), 360-370. doi: 10.1037/0022-3514.58.2.360
- Southwick, S. M., & Charney, D. S. (2012). The science of resilience: Implications for the prevention and treatment of depression. *Science*, 338(6103), 79-82. doi: 10.1126/science.1222942
- Southwick, S. M., Bonanno, G. A., Masten, A. S., Panter-Brick, C., & Yehuda, R. (2014). Resilience definitions, theory, and challenges: interdisciplinary perspectives. *European journal of psychotraumatology*, 5, 1-14. doi:10.3402/ejpt.v5.25338
- Spector, P. E. (1992). *Summated rating scale construction : an introduction*. Newbury Park,(Calif.) ;; Sage.
- Steidle, A., Gonzalez-Morales, M. G., Hoppe, A., Michel, A., & O'Shea, D. (2017). Energizing respites from work: a randomized controlled study on respite interventions. *European Journal of Work and Organizational Psychology*, 26(5), 650-662. doi:10.1080/1359432X.2017.1348348
- Strean, W. B. (1998). Possibilities for qualitative research in sport psychology. *Sport Psychologist*, 12, 333-345.
- Subhan, S., & Ijaz, T. (2012). Resilience Scale for Athlete. *FWU Journal of Social Sciences*, 6(2), 171-176.
- Tabachnick, B. G. (2014). *Using multivariate statistics* (Sixth edition. ed.). Harlow, Essex: Pearson.

- Tedeschi, R. G., & Calhoun, L. G. (1996). The Posttraumatic Growth Inventory: Measuring the positive legacy of trauma. *Journal of Traumatic Stress, 9*(3), 455-471.
doi:10.1002/jts.2490090305
- Tenenbaum, G., Edmonds, W. A., & Eccles, D. W. (2008). Emotions, coping strategies, and performance: A conceptual framework for defining affect-related performance zones. *Military Psychology, 20*(Suppl 1), S11-S37. doi:10.1080/08995600701804772
- Tugade, M. M., & Fredrickson, B. L. (2007). Regulation of positive emotions: Emotion regulation strategies that promote resilience. *Journal of Happiness Studies, 8*(3), 311-333. doi:10.1007/s10902-006-9015-4
- Uphill, M. A., Lane, A. M., & Jones, M. V. (2012). Emotion Regulation Questionnaire for use with athletes. *Psychology of Sport & Exercise, 13*(6), 761-770.
doi:10.1016/j.psychsport.2012.05.001
- Uphill, M. A., Rossato, C. J. L., Swain, J., & O'Driscoll, J. (2019). Challenge and Threat: A Critical Review of the Literature and an Alternative Conceptualization. *Frontier in Psychology, 10*(1255). doi:10.3389/fpsyg.2019.01255
- Vallacher, R. R., & Nowak, A. (1997). Dynamical Social Psychology: The Next Iteration. *Psychological Inquiry, 8*(2), 152-160. doi:10.1207/s15327965pli0802_12
- Van Buuren, S., & Groothuis-Oudshoorn, C. G. M. (2011). MICE: Multivariate Imputation by Chained Equations in R. *Journal of statistical software, 45*(3), urn:issn:1548-7660.
doi:10.18637/jss.v045.i03
- Van Geert, P., & Steenbeek, H. (2005). Explaining After by Before: Basic Aspects of a Dynamic Systems Approach to the Study of Development. *Developmental Review, 25*, 408-404), p.408-442. doi:10.1016/j.dr.2005.10.003

- Vanderbilt-Adriance, E., & Shaw, D. S. (2008). Conceptualizing and re-evaluating resilience across levels of risk, time, and domains of competence. *Clinical child and family psychology review*, *11*(1-2), 30-58. doi:10.1007/s10567-008-0031-2
- Vanhove, A. J., Herian, M. N., Perez, A. L. U., Harms, P. D., & Lester, P. B. (2016). Can resilience be developed at work? A meta-analytic review of resilience-building programme effectiveness. *Journal of Occupational and Organizational Psychology*, *89*(2), 278-307. doi: 10.1111/joop.12123
- Vitali, F., Bortoli, L., Bertinato, L., Robazza, C., & Schena, F. (2015). Motivational climate, resilience, and burnout in youth sport. *Sport Sciences for Health*, *11*(1), 103-108. doi: 10.1007/s11332-014-0214-9
- Vitaliano, P. P., Russo, J., Carr, J. E., Maiuro, R. D., & Becker, J. (1985). The ways of coping checklist: Revision and psychometric properties. *Multivariate Behavioral Research*, *20*(1), 3-26. doi:10.1207/s15327906mbr2001_1
- Vries, H. D., & Shields, M. (2006). Towards a theory of entrepreneurial resilience: a case study analysis of New Zealand SME owners operators. *Applied Research Journal*, *5*(1), 33-43.
- Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the resilience scale. *Journal of Nursing Measurement*, *1*(2), 165-178.
- Waite, P. J., & Richardson, G. E. (2004). Determining the efficacy of resiliency training in the work site. *Journal of Allied Health*, *33*(3), 178-183.
- Werner, E. E., & Smith, R. S. (1992). *Overcoming the odds: High risk children from birth to adulthood*: Cornell University Press.
- Werner, E. E. (1993). Risk, resilience, and recovery: Perspectives from the Kauai Longitudinal Study. *Development and Psychopathology*, *5*(4), 503-515. doi: 10.1017/S095457940000612X

- Werner, E. E. (1997). Vulnerable but invincible: high-risk children from birth to adulthood. *Acta Paediatrica*, 86, 103-105. doi: 10.1111/j.1651-2227.1997.tb18356.x
- Werner, E. (2012). Risk, Resilience, and Recovery. *Reclaiming Children and Youth*, 21(1), 18.
- Westphal, M., & Bonanno, G. A. (2007). Posttraumatic growth and resilience to trauma: Different sides of the same coin or different coins? *Applied Psychology*, 56(3), 417-427. doi:10.1111/j.1464-0597.2007.00298.x
- Whetten, D. A. (1989). What Constitutes a Theoretical Contribution? *The Academy of Management Review*, 14(4), 490-495. doi:10.5465/AMR.1989.4308371
- White, R. L., & Bennie, A. (2015). Resilience in youth sport: A qualitative investigation of gymnastics coach and athlete perceptions. *International Journal Of Sports Science & Coaching*, 10(2-3), 379-393. doi: 10.1260/1747-9541.10.2-3.379
- Windle, G., Bennett, K. M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and quality of life outcomes*, 9, 8-8. doi:10.1186/1477-7525-9-8
- Winkel, D. E., Wyland, R. L., Shaffer, M. A., & Clason, P. (2011). A new perspective on psychological resources: Unanticipated consequences of impulsivity and emotional intelligence. *Journal of Occupational and Organizational Psychology*, 84(1), 78-94.
- Wolak, M. E., Fairbairn, D. J., & Paulsen, Y. R. (2012). Guidelines for estimating repeatability. *Methods in Ecology and Evolution*, 3(1), 129-137. doi:10.1111/j.2041-210X.2011.00125.x
- Xue C, Ge Y, Tang B, Liu Y, Kang P, Wang M, et al. (2015) A Meta-Analysis of Risk Factors for Combat-Related PTSD among Military Personnel and Veterans. *PLoS ONE* 10(3): e0120270. <https://doi.org/10.1371/journal.pone.0120270>

- Yeager, D. S., & Dweck, C. S. (2012). Mindsets That Promote Resilience: When Students Believe That Personal Characteristics Can Be Developed. *Educational Psychologist*, 47(4), 302-314. doi:10.1080/00461520.2012.722805
- Yi, J. P., Smith, R. E., & Vitaliano, P. P. (2005). Stress-resilience, illness, and coping: a person-focused investigation of young women athletes. *Journal of Behavioural Medicine*, 28(3), 257-265. doi: 10.1007/s10865-005-4662-1
- Youssef, C. M., & Luthans, F. (2007). Positive organizational behavior in the workplace the impact of hope, optimism, and resilience. *Journal of Management*, 33(5), 774-800. doi:10.1177/0149206307305562
- Zautra, A. J., Arewasikporn, A., & Davis, M. C. (2010). Resilience: Promoting Well-Being Through Recovery, Sustainability, and Growth. *Research in Human Development*, 7(3), 221-238. doi:10.1080/15427609.2010.504431
- Zellars, K. L., Justice, L., & Beck, T. E. (2011). Resilience: New paths for building and sustaining individual and organizational capacity. *Research in occupational stress and well being: The role of individual differences in occupational stress and well being*, 9, 1-37. doi:10.1108/S1479-3555(2011)0000009005

Appendix A: SUPPLEMENTARY INFORMATION

Table 1 Definitions of Resilience

Source of definition	Definition of resilience	Cited by (included author/Year)
Antonovsky (1979)	"see reality, to judge the likelihood of desirable outcomes in view of the countervailing forces operative in all of life"	Wilson, S. M., & Ferch, S. R. (2005)
Block and Kremem, (1996)	"Trait Like" (i.e. stable) ability to bounce back from adversity and hardship and to flexibility adapt to shifting demands"	Shin and Seo (2012)
Bonanno, (2004)	"Resilience refers to the human ability to adapt and bounce back in the face of tragedy, trauma and other adversity"	Ayala and Manzano (2014); Jones and Jetten (2011); Vanhove et al. (2016)*
Britt et al. (2013)	"the demonstration of positive adaptation in the face of significant adversity"	Britt et al. (2016); Gillispie et al. (2016);
Bryant (1995)	"whenever a change occurs in a person's life, the individual traits and skills (e.g., time management) interact with both	Arora and Rangnekar (2014)

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environmental and situational factors to produce a behaviour that leads to the successful adaptation toward change, called resilience"

Carver and Schieier, (1998)

“The ability to "bounce back" from stressful experiences quickly and efficiently”

Subhan and Ijaz (2012)

Cooper, Estes and Allen (2004)

“Resilience can be thought of as consisting of a ‘set of ongoing behaviours’ rather than a specific characteristic or trait”

Vries and Sheilds (2006)

Fletcher and Sarkar (2012)

“The role of mental processes and behaviour in promoting personal assets and protecting an individual from the potential negative effect of stressors”

Galli & Gonzalez, (2014); Robertson et al. (2015); Sarkar & Fletcher, 2014; Shoenfelt (2016); Secades et al. (2016)

Galli and Vealey (2008)

“an athlete’s ability to positively adapt and develop resilient qualities in the presence of adversity"

Brown et al. (2015)

Goldberg (1999)

“Athletes’ ability to recover from mistakes and failures quickly as their performance will suffer otherwise; dwelling

Paul, Khanna et al. (2012)

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on mistakes while the competition continues results in making more mistakes.”

Grunspun, (2006)

“The Human capacity to buffer adverse experiences without harming their own development, overcoming and even getting stronger from adversities of life”

Fontes and Brandao (2013)

Herrman (2011)

“Refers to positive adaptation, or the ability to maintain or regain mental health, despite experiencing adversity”

Palmer (2012)

King and Rothstein (2010)

"a dynamic process that unfolds over time involving self-regulatory and protective processes and situational variables as well as individual difference variables.”

McLarnon and Rothstein (2013)

(Luthans et al. (2007)

“When beset by problems and adversity, sustaining and bouncing back and even beyond to attain success”

Luthans and Avey (2010); Roche, Haar et al. (2014); Sherlock-Storey et al. (2013); Youssef and Luthans (2007)

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Luthans (2002)

“Capacity to bounce back from adversity and failure-and even eustressful events such as new responsibilities”

Fleck and Mills (2013); Hayek (2012); Luthans, Avolio et al. (2007); Luthans, Luthans et al. (2012); Peterson, Luthans et al. (2011); Luthans, et al. (2006)

Luthar et al. (2000)

“Dynamic process encompassing positive adaptation within the context of significant adversity”

Fletcher and Sarkar (2012); Galli and Vealey (2008)*; Gucciardi, Jackson et al. (2011); Hosseini and Besharat (2010)*; Loh and Dahesihsari (2013); Machida and Irwin (2013); Manzano-Garcia and Ayala Calvo (2013); Sarkar and Fletcher (2013); Sarkar and Fletcher (2014); Rothstein et al. (2016)*; King et al. (2016); Vanhove et al. (2016)*

Martin and Marsh (2003)

“The capacity for successful adaptation in the face of challenging or threatening circumstances.”

Cloete and Ballard (2012)

Masten et al. (1994, 2000)

"The process of, capacity for, or outcome of successful adaptation despite challenging circumstances."

Collins and MacNamara (2012); Galli and Vealey (2008)*

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Masten (2001)	“An individual’s capacity to maintain psychological and physical well-being in the face of adversity.”	Yi, Smith et al. (2005); Hosseini and Besharat (2010)*; Rothstein, McLarnon, & King, 2016*
Reivich and Shatte (2002)	“Person’s ability to persevere in the face of challenges, setbacks and conflicts”	Abbot et al. (2009)
Richardson (1990)	“Resilience is the process, capacity, or outcome where individuals experience successful adaptation despite hardship, by responding positively to stress.”	
Rutter (1985, 1987)	“The ability to bounce back or cope successfully despite substantial adversity”	Mummery, Schofield et al. (2004); Young (2014)
Saleebey (1996)	“The human capacity to face, overcome and emerge stronger or transform by adverse experiences.”	Ayala and Manzano (2010)
Tedeschi and Calhoun (2004)	“An ability to go on with life, or to continue living a purposeful life, after hardship or adversity.”	Bullough, Renko et al. (2014)

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Windle, Bennett and Noyes (2011)

“Individual adaptation to stress, trauma or unpredictability”

Cardoso and Sacomori (2014)

Articles reporting their own definition of resilience:

Belem, Caruzzo et al. (2014)

“A psychological characteristic that explains the favourable responses of athletes during competitions even after they had experienced adverse circumstances”

Green et al. (2016)

"positive adaptation in the face of a broader range of stressors beyond objectively significant adversity"

Holt and Dunn (2004)

“The term resilience is used here to reflect the ability to bounce back after adversity”

Nezhad and Besharat, (2010)

“Resilience generally refers to an individual capacity in the face of stressful events and a pattern of functioning indicative of positive adaptation in context of risk or adversity, underlying two conditions: (a) exposure to risk and (b) positive adaptation.”

Owens and Kirwin (2013)

“Reflects the degree to which an individual is calm and confident rather than anxious and insecure.”

Vitali et al. (2015)

"Resilience is thought as a personal trait that enables an individual to thrive in the face of adversity."

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No guiding definition provided

Danes (2013); Galli and Reel (2012); Gould, Dieffenbach et al. (2002); Grant, Curtayne, & Burton (2009); Howells and Fletcher (2015); Krumm and Sarrazin et al. (2002); Miller, Burke and Attridge (2011); Mills, Butt, et al. (2012); Sarkar, Fletcher et al. (2014); Schinke & Jerome, 2002; Seligman and Nolen-Hoeksema (1990); Seligman, 2011; Smith, Smoll and Ptacek (1990).

Definitions of Resilience

*Paper provided a guiding definition accompanied by two citations

Appendix B: MIXED METHODS APPRAISALS TOOL

Study	Rating	Qualitative	Quantitative				Final quality score	Notes	Sample	Measures / Assessment
Vitali, et al. (2015)	****		Y	Y	Y	Y	100%		Adolescent Basketball players(n=87)	10 item Connor-Davidson Resilience Scale
Grant, Curtayne, and Burton (2009)	***		Y	Y	N	Y	75%		Public health executives (n=41)	18-item version of the Cognitive Hardiness Scale (Nowack, 1990)
Waite and Richardson (2004)	***		Y	Y	N	Y	75%	No measurement of resilience used	American government tax-form processing workers (n=232)	20 items of the Spirit Core Scale (Johnson, 1998)
Smith, Smoll and Ptacek (1990)	***		Y	Y	N	Y	75%	Coping measurement of resilience used	High School varsity athletes (n=451)	Athletic Coping Skills Inventory (Smith et al. 1995)
Shin and Seo (2012)	***		Y	Y	N	Y	75%	Scale not appropriate for monitoring resilience change	A large organisations employees (n=234) and managers (n=45)	Block and Kremen (1996) 14 item scale
Youssef and Luthans (2007)	****		Y	Y	Y	Y	100%		University management Students (n=167)	Block and Kremen (1996) 14-item, 4-point Likert-type Ego-Resiliency Scale

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Nezhad and Besharat (2010)	****		Y	Y	Y	Y	100%		Club level athletes (n=149)	Conor-Davidson (2003) Resilience Scale
Hosseini and Besharat (2010)	****		Y	Y	Y	Y	100%		Volunteer club athletes (n=139)	Conor-Davidson (2003) Resilience Scale
Gillispie, et al. (2016)	**		N	N	Y	Y	50%	Undergraduate sample	Undergraduate students (n=170)	Conor-Davidson Resilience Scale
Liossis et al. (2009)	*		Y	N	N	N	25%	No measurement of resilience used	Australian Civil servants (n=19)	Only measured outcomes and protective factors of resilience
Millear et al. (2008)	*		Y	N	N	N	25%		Resource Sector company staff (n=20)	Only measured outcomes and protective factors of resilience
Burton et al. (2010)	*		Y	N	N	N	25%	No measurement of resilience used	Australian University office staff (n=16)	Only measured outcomes and protective factors of resilience
Martin-Krumm et al. (2003)	*		N	N	N	Y	25%	Inexperienced school sample	Youth basketball school players (n=62)	Physical basketball dribbling task
Luthans, Avolio et al. (2007)	****		Y	Y	Y	Y	100%		Employees from 35 organisations (n=1032)	PsyCap questionnaire (PCQ) (Luthans et al., 2007)
Luthans and Avey (2010)	****		Y	Y	Y	Y	100%		Over 12 years experienced managers (n=80)	PsyCap questionnaire (PCQ) (Luthans et al., 2007)
Sherlock-Storey, Moss, and Timson (2013)	***		Y	Y	Y	N	75%		Public sector middle managers (n=12)	PsyCap was measured with the use of the 24-item

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										psychological capital questionnaire
Roche, Haar et al. (2014)	****		Y	Y	Y	Y	100%		CEOs/presidents/top (n=205), middle (n=183), and junior (n=202) managers, and entrepreneurs (n=107)	Psychological Capital was measured using the 12-item version of the PCQ (Luthans, Youssef, et al., 2007)
Cowden et al. (2016)	****		Y	Y	Y	Y	100%		Competitive South African Tennis Players (n=333)	Resilience Scale for Adults (RSA; Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005)
Subhan and Ijaz (2012)	***		Y	N	Y	Y	75%	Low level sample, sport no reported	College level Athletes (n=150)	Resilience scale for athletes (RSA) consisted of 27 items.- Study Designed
Gonzalez et al. (2016)	****		Y	Y	Y	Y	100%		Post collegiate runners (n= 405)	Resilience scale: Connor and Davidson (2003)
Manzano and Ayala (2013)	****		Y	Y	Y	Y	100%		Spanish Entrepreneurs (n=783)	Resilience scale: Connor and Davidson, (2003)
Ayala and Manzano (2010)	****		Y	Y	Y	Y	100%		Founders/owners and managers of Spanish companies (n=596)	Resilience scale: Connor and Davidson, (2003)
Gucciardi, Jackson et al. (2011)	****		Y	Y	Y	Y	100%		Adolescent Australian cricket players (n=199)	Resilience scale: Connor and Davidson, 2003

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Ayala and Manzano (2014)	****		Y	Y	Y	Y	100%		Spanish tourism Entrepreneurs (n=495)	Resilience scale: Connor and Davidson, (2003)
Lu et al. (2016)	****		Y	Y	Y	Y	100%		Taiwanese Division-I college student-athletes (n=218)	Resilience scale: Connor and Davidson, 2003 (shortened 2-item CD-RISC2; Vaishnavi, Connor & Davidson, 2007)
Yi, Smith et al. (2005)	****		Y	Y	Y	Y	100%		Female high school athletes (n=404)	Revised Ways of Coping Checklist (WOCC; Vitaliano et al., 1985, 1987) and Life stress-Adolescent Perceived Events Scale (Compas et al., 1987; Smith et al., 1990).
Secades et al. (2016)	****		Y	Y	Y	Y	100%		Senior Spanish athletes (n=235)	Spanish version of the resilience scale (Wagnild & Young, 1993)
Arora and Rangnekar (2014)	****		Y	Y	Y	Y	100%		Managers from Public and private sector organisations (n=205)	Sub-scale of the Career Commitment Measure (Carson & Bedeian, 1994)
Burke and Attridge (2011)	***		Y	Y	N	Y	75%	Not appropriate resilience scale	€100k+ earning Businessmen (n=106)	The 5-item Challenge subscale of the Dispositional Resiliency Scale (Bartone, 2007a, 2007b)
Belem, Caruzzo et al. (2014)	****		Y	Y	Y	N	75%	Sample size small	Beach Volleyball Athletes (n=48)	The Athletic Coping Skills Inventory-28 (ACSI-28)
Abbot et al. (2009)	**		Y	Y	N	N	50%	Small Sample	Australian Sales Managers (n=53)	The Resilience Factor Inventory (Jackson & Watkin, 2004)

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Pidgeon et al., (2014)	**					Y	N	Y	N	75%	Few male participants	Human Service professionals (N=35)	The Resilience Scale (RS-14; Wagnild and Young, 1993)
Cardoso and Sacomori (2014)	****					Y	Y	Y	Y	100%		Regional and National level disability Athletes (n=136)	Wagnild and Young (1993)
McLarnon and Rothstein (2013)	****					Y	Y	Y	Y	100%		Previously employed (n=170) and currently employed (n=73) Canadian university students	Workplace Resilience Inventory (WRI) Self-proposed
Galli and Vealey (2008)	****	Y	Y	Y	Y					100%		Ex-professional Athletes (n=10)	Richardson and colleagues' (1990) resiliency model-Structure Questions
Vries and Sheilds (2006)	***	Y	N	Y	Y					75%		Small to medium business Entrepreneurs (n=13)	Self-composed
Machida and Irwin (2013)	****	Y	Y	Y	Y					100%		Wheelchair rugby players (n=12)	Self-structured
Sarkar and Fletcher (2014)	****	Y	Y	Y	Y					100%		High Achievers from 11 professions (n=13)	Self-structured using an interpretative phenomenological approach (Smith & Osborn, 2003)
Mills, Butt, et al. (2012)	***	N	Y	Y	Y					75%	Small Sample of only coach experiences	Expert development coaches (n=10)	Semi structured interview questions

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Brown, Lafferty, and Triggs (2015)	****	Y	Y	Y	Y		100%		Elite British winter sports Athletes (n=7)	Semi structured interview questions based from Galli and Vealey, (2008)		
Fletcher and Sarkar (2012)	****	Y	Y	Y	Y		100%		Olympic Champions (n=12)			
Galli and Reel (2012)	****	Y	Y	Y	Y		100%		Top American college athletes (n=11)			
Holt and Dunn (2004)	****	Y	Y	Y	Y		100%		Youth Soccer Players (n=34) and Professional Coaches (n=6)			
Loh and Dahesihsari (2013)	****	Y	Y	Y	Y		100%		Female Indonesian entrepreneurs (n=30)			
Sarkar et al. (2015)	****	Y	Y	Y	Y		100%		Olympic Gold Medallists (n=10)			
White and Bennie (2015)	****	Y	Y	Y	Y		100%		Australian Female gymnasts (n=22) and gymnastics coaches (n=7)			
Mixed Methods												
Seligman and Nolen-Hoeksema (1990)	*					N	Y	N	33%	Poor qualitative measures	International American varsity swimming team (n=48)	Attributional Style Questionnaire

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Mummery, Schofield et al. (2004)	**		N	Y	Y		67%	Poor measure of resilience	National Australian Age Group swimmers (n=272)	3 Questionnaires, including Athletic coping skills inventory (Smith & Smoll, 1995)
Jones and Jetten (2011)	*		Y	N	N		33%	Not appropriate resilience scale, small sample	Members of the British Royal Airforce (n=12) and University Students (n=56)	Personality questionnaire and pain tests with heart rate recovery
Paul, Khanna et al. (2012)	**		Y	Y	N		67%		University-international level athletes (n=100)	The Mental Toughness Questionnaire (TSS), Rebound ability test is a 6-item subscale (Goldberg, 1999)
Gould, Dieffenbach et al. (2002)	***		Y	Y	Y		100%		US Olympic Champions (n=10)	An Array of Psych skills tests, including optimism, and coping skills inventory (Smith, 1995) no Specific resilience measure
Meggs et al. (2016)	***		Y	Y	Y		100%		National and International swimmers from England and Australia (n=41)	The Academic Resilience Scale (Martin & Marsh, 2006) was adapted to suit the sports context.

Qualitative criteria: (1) Are the sources of qualitative data relevant to address the research question?; (2) Is the process for analyzing qualitative data relevant to address the research questions?; (3) Is appropriate consideration given to how findings relate to the context?; (4) Is appropriate consideration given to how findings relate to the researcher's influence?

Quantitative descriptive criteria: (1) Is the sampling strategy relevant to address the quantitative research questions?; (2) Is the sample representative of the population under study?; (3) Are measurements appropriate?; (4) Is there and acceptable response rate?

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Mixed-methods criteria: (1) Is the mixed-methods research design relevant to address the qualitative and quantitative research questions, or the qualitative and quantitative aspects of the mixed-methods question?; (2) Is the integration of qualitative and quantitative data relevant to address the research questions?; (3) Is appropriate consideration given to the limitations associated with this integration, in a triangulation design.

Appendix C: ETHICS APPLICATION FORM



UNIVERSITY of LIMERICK

O L L S C O I L L U I M I N I G H

Kemmy Business School Research Ethics Committee

Application Form

The completion of this form is only necessary where the proposed research involves working with human subjects.¹

Faculty and PhD Research Students (please note that your answers must be typed)

Name: Christopher Bryan

E-mail Address: Christopher.bryan@ul.ie

Date: 1st November 2015

Title of Project (please do not use acronyms):

The resilience process: A cross-lagged observation of the mediation of daily stress during pro-active goal pursuits.

¹ Examples of research involving human subjects include (but are not limited to): carrying out interviews; conducting a survey; distributing a questionnaire; using focus groups; and the observation of individuals or groups.

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“The regulation of resilience with appraisals and temporal construal in the mediation of proactive goal regulation in the face of everyday stress: Evidence from cross-lagged data of various hierarchical employees in the information technology industry.”

The scale demonstrates that resilience is modifiable and can improve with treatment, with greater improvement corresponding to higher levels of global improvement.

Names of other researchers involved:

Faculty researchers:

Dr. Deirdre O’Shea, Kemmy Business School, University Of Limerick

M.Sc. dissertation students:

James Tierney, MSc in Work and Organisational Psychology

PART A

Research Purpose: **(50-100 words)**

This research pertains to the conceptualization of goal-oriented resilience within employees. Currently resilience is linked with success towards new venture start-ups (Cloete & Ballard, 2012; Peterson, Luthans, Avolio, Walumbwa, & Zhang, 2011) and towards long term sustainable success (Ayala & Manzano, 2014; Markman, Baron, & Balkin, 2005; Sarkar & Fletcher, 2014). However, major contrasts in empirical measures and definitions of resilience exist. Currently researchers tend to conceptualise resilience as either a ‘dynamic process’ (Ayala & Manzano, 2014; Luthans, Avolio, Avey, & Norman, 2007; Luthar, Cicchetti, & Becker, 2000) or ‘characteristic trait’ (Block & Kremen, 1996; Loh & Dahesihsari, 2013). Many researchers echo the concern of erratic methodologies used and more longitudinal approaches are necessary to investigate whether resilience can be malleable and learned (Ayala & Manzano, 2014; Galli & Gonzalez, 2015; Pangallo, Zibarras, Lewis, & Flaxman, 2015). This research design will observe the regulation of resilience with appraisals and

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temporal construal in the mediation of pro-active goal regulation in the face of everyday stress.

Research Methodology: (100-150 words)

Participants: Participants will be recruited among employees across multiple information technology organisations who volunteer to take part.

Research design and procedure:

A longitudinal quantitative design will be employed to assess the regulation of resilience of various hierarchical employees over a period of 8 weeks.

- Participants will be allocated appropriate published standardised surveys over a time lag of two weeks, where repeated measures of resilience, stress, stress appraisal, pro-active goal regulation, goal progress and temporal construal will be assessed.
- Participants will receive reminders via e-mail to complete the above measures every two weeks when required.
- SPSS and the PROCESS macro will be used to assess mediational hypotheses, and MPLus to investigate longitudinal growth curve analysis.

1. Human Subjects

Does the research proposal involve:

- | | | | | | | | |
|-----|---|-------------------------------------|--------------------------|--------------------------|--------------------------|----|--------------------------|
| (a) | Any person under the age of 18? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No | <input type="checkbox"/> |
| (b) | Adult patients? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No | <input type="checkbox"/> |
| (c) | Adults with psychological impairments? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No | <input type="checkbox"/> |
| (d) | Adults with learning difficulties? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No | <input type="checkbox"/> |
| (e) | Adults under the protection/ control/influence
of others (e.g., in care/ in prison)? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No | <input type="checkbox"/> |
| (f) | Relatives of ill people
(e.g., parents of sick children)? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | No | <input type="checkbox"/> |
| (g) | People whose comprehension of the research | | | | | | |

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and its requirements might be compromised by their linguistic competence? (e.g. individuals whose mother tongue is another language, who are being asked to participate in research in English)

No

2. Subject Matter

Does the research proposal involve:

- (a) Sensitive personal issues? (e.g., suicide, bereavement, gender identity, sexuality, fertility, abortion, gambling)? No
- (b) Illegal activities, illicit drug taking, substance abuse or the self reporting of criminal behaviour? No
- (c) Any act that might diminish self-respect or cause shame, embarrassment or regret? No
- (d) Research into politically and/or racially/ethically sensitive areas? No

3. Procedures

Does the proposal involve:

- (a) Use of personal or company records without consent? No
- (b) Deception of participants? No
- (c) The offer of disproportionately large inducements to participate? No
- (d) Audio or visual recording without consent? No
- (e) Invasive physical interventions or treatments? No

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- (f) Research which might put researchers or participants at risk? No

4. (a) Who will your informants be?

Participants will be employees from a variety of organisations who consent to take part in the research.

- (b) Do you have a **pre-existing relationship** with the informants and, if so, what is the nature of that relationship?

One of the research team is the managing director for one of the sample organisations and this will be controlled for when compiling results.

- (c) How do you plan to gain **access to /contact/approach** potential informants?

Participants will be recruited through 2 separate venues:

1. Initially networking through pre-existing business relationships with company managers.
2. Further advertisement followed by liason if then needed of nearby relevant information technology companies if data sample is not sufficient after exploring venue 1.

- (d) What arrangements have you made for **anonymity and confidentiality**?

Participant's identification will be concealed through the use of multiple matching datafiles where participants are allocated an identity code/ID which will be inserted onto all surveys. The principle investigator will have access to a separate file matching

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code/ID to participant identification information in order to send reminders via e-mail. Once data collection is completed, this file will be destroyed.

- (e) What, if any, is the **particular vulnerability of your informants**?

None foreseen

- (f) What arrangements are in place to ensure that informants know the **purpose of the research** and what they are going to inform about?

Upon agreement with relevant organisational leaders, the research will be verbally presented and explained to all prospect participants by the researcher(s). Here a training brief prior to commencement of the research and followed by an open forum of questions concerning participation. Participants will then be allocated with an information sheet coupled with informed consent.

- (g) How will you ensure that informants are aware of their **right to refuse** to participate or **withdraw** at any time?

This will be outlined in the above liaison with the prospective participants.

- (h) How would you handle any unforeseen **safety issues** should they arise?

These will be dealt with on a case by case basis as no safety issues are envisaged. However, as the research team comprises of a qualified psychologist, coupled with a senior firm director working in the IT industry, the majority of issues can be dealt with by the research team. If not the relevant authorities will be notified.

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- (i) How do you propose to **store the information**?

Data will be stored on password protected computers and in a locked storing cabinet and locked office.

If you have answered **YES** to any of the questions in **PART A, sections 1-3**, you will also need to **comply with** the requirements of **PART B** of this form.

If you have answered **NO** to all of the questions in **PART A, sections 1-3** above, please **ignore PART B** of the form.

You should return **8 hard copies** of this form to Michelle Cunningham, Research Administrator, Room SG-09, Kemmy Business School, University of Limerick or alternatively applications can be left leave in the drop box marked KBS Research Ethics Applications located on level 3 of the Kemmy Business School. This form must be submitted before the research begins.

Signature of principle investigator: _____ Date: _____

Supervisor Signature (where relevant): _____ Date: _____

Insurance Cover

Insurance cover is required for all research carried out by UL employees. Principal Investigators/Supervisors should carefully view the University's 'Insurance Guidelines for Researchers' document and the University's Insurance cover to

ascertain if their proposed research is covered. These documents are available at

<http://www.ul.ie/insurance>.

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Where any query arises about whether or not proposed research is covered by insurance, the Principal Investigator/Supervisor must contact the University's Insurance Administrator at insurance@ul.ie to confirm that the required level of insurance cover is in place.

Please indicate by way of signature that the research project is covered by UL's insurance policies:

PI/Supervisor signature: _____

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PART B

This part of the application form is only relevant where researchers have answered **'YES'** to any of the questions in **sections 1-3 of PART A**.

Please attach a report to this application addressing the following questions with a maximum of 300 words per question.

You **must** answer the following questions:

1. What are the ethical issues involved in your research?
2. Explain why the use of human participants is essential to your research project.
3. How will you ensure that informed consent is freely given by human participants?

Answer the following questions **where relevant** to your research project and after consultation with your supervisor (where relevant) **and** a member of the KBS Research Ethics Committee:

4. How will you protect human participants if your research deals with sensitive issues?
5. How will you ensure that vulnerable research participants are protected? (Please state clearly if you abide by the Child Protection Guidelines and/or have Garda Clearance where necessary)
6. How will you protect human participants if your research deals with sensitive research procedures?
7. Outline how you intend to comply with any established procedures which have been approved by ULREG for your research.

APPENDICES

8. How will you manage data protection issues?

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Ethical Approval:

From: Michelle.Cunningham
Sent: 23 November 2015 12:26
To: Christopher.Bryan
Cc: Deirdre.OShea; Tadhg.MacIntyre
Subject: KBSREC - November 15 - PhD - Christopher Bryan

Dear Chris,

Many thanks for your research ethics application which was reviewed by the KBS Research Ethics Committee on the 10th November 2015. I am pleased to inform you, that your application has been given research ethics approval.

Kind regards.

Michelle

Michelle Cunningham
KBS Research Office
Kemmy Business School
University of Limerick
Limerick
Ph: 353 81 202627 - Room SG-09
Email: michelle.cunningham@ul.ie

Appendix D: RECRUITMENT EMAILS

Company recruitment email

Hi,

Thank you for your interesting in joining us in this exciting research. Attached is further information and I look forward to answering relevant questions to make this venture most valuable to all parties involved.

- This study requires only 20 minutes filling in a battery of surveys on Wednesdays through-out February (8th, 22nd) and March (8th, 22nd), just 4 times over 8 weeks.
- All office employees welcome, where a link will be emailed the morning of testing and surveys will be competed online.
- Company feedback and presentation aimed at expanding employee work practices through resilience behaviours.
- There will be a draw to win one of four ALL4ONE vouchers worth **€200** each for those who complete all surveys.

We will need a list of employee emails for those who are able to partake in this survey; from there we will then contact them individually when required. A minimum of 20 employees is needed to gain accurate useful information on behalf of the individual company.

Best Regards,

Chris

Participant recruitment email

Dear Sir/Madame,

I would like to invite you to participate in a research project, conducted under the auspices of University Of Limerick, which will explore how stress contributes towards pro-active effort in daily work life.

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As part of a successful Information technology Organisation you are particularly well placed to comment on the difficulties and demands of balancing daily hassles while working in a growing ever changing industry. As you know, it is through the insights and experiences of successful staff that others are both encouraged and able to learn; and through which policies and workplace interventions can be designed.

If you were willing to participate in this project it would require commitment to four, thirty minute periods spread out over eight weeks. For the purpose of this study it is important to participate in all four periods which are two weeks apart. In order to incentivise this adherence a raffle of 4x €200 all for one Vouchers will be held as a reward for the candidates who complete the four surveys to conclusion.

I have attached a brief outline of the project for your information. If you can reply by the 18th of January to confirm participation I can be contacted on mobile 086-1695597, or Christopher.bryan@ul.ie and I look forward to your reply.

Yours Sincerely,

Christopher Bryan

Appendix E: PARTICIPANT INFORMATION SHEET



PROJECT INFORMATION STATEMENT

Project Title – Sustainable performance environments: Daily stress effect on pro-active work drive

Dr. Deirdre O'Shea

Mr. Christopher Bryan

Ms. Mary Duffy

Introduction to Project

This project is being undertaken to develop some insights into the nature of daily stressors, its impact on individual pro-active effort, and ultimately how certain individuals cognitively process this.

What this project is about and why it is being undertaken

It is suggested that dealing with stress is a necessary but insufficient affecter of work; that dealing with stress is established through a combination of both internal and external factors. However, successful individuals have a degree of insight and self-reflection that moderates their stress and in so doing contributes to their daily effort. While we see and hear in the press that stress should be avoided, some research dictates that it is an inevitable part of day-to-day life. Within organisational psychology daily stress, its origins and consequences, are not well understood and have not been systematically addressed. We are hoping that through recording data from in excess of 200 of office staff we will gain insights into dynamic on-going changes of hassles and stress responses. The results will be compared with similar organisations and parallel pressure contexts such as that of sporting domains to shed light on the nature of optimal daily stress responses within organisations and individuals.

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The aims of this research are to:

- Establish how daily hassles impact on effort.
- Develop a set of principles that explains the role of stress reaction in pressure organisational environments.

Project interests

The purpose of the project is mainly to satisfy the requirements for an academic qualification and to contribute to academic literature through cross-context perspectives. However it is hoped that this activity will also give participating organisations an opportunity to reflect on the nature of their workforces' daily proactive goal regulation and impacting external environments.

What participation will involve

You will be asked to give up a few minutes of your time on four Wednesday mornings through-out February (8th, 22nd) and March (8th, 22nd) 2017 to participate in an online survey designed to:

- Collect demographic data on participants
- Understand the effects of daily hassles and uplifts on mood and work drive
- Collection of participant email address in order to facilitate survey reminder (to be sent at 9a.m. on the morning of survey completion)

Our time scale for the Surveys are as follows (provisional dates):

Feb 6 th	Email to participants with details and further information
Feb 8 th	SURVEY 1: Email Participants Survey Link 9am
Feb 22 nd	SURVEY 2: Email Participants Survey Link 9am
Mar 8 th	SURVEY 3: Email Participants Survey Link 9am
Mar 22 nd	SURVEY 4: Email Participants Survey Link 9am
Mar 29 th	Draw of Voucher prizes for those who completed full study

The information gained from the project will be:

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The results of all surveys will be analysed and used to inform a variety of publications including but not restricted to research papers, journal articles thesis and academic forums. **Your name and the name of your company/ies will not be mentioned in any report, thesis, journal article, or any publication whatsoever.** Upon confirmation of the research project participants will be allocated with a log in code and will be referred to as such. Participant confidentiality will be known only to the three researchers and in agreement with ethics any information we obtain is confidential, and will be stored in a secure place, until it is **destroyed a year after the completed research.**

There will be a draw for all participants who complete all the required surveys for a total of 4 ALL4ONE vouchers worth **€200** each.

All of the questions relate to how the candidate feels about a particular item. **To restate none of the questions are specific to the company, so in no way do we seek the Candidate's views good, bad or indifferent to your business, nor do we ask any specific business related question.**

Participant rights and interests

The investigators conducting this research abide by the principles governing the ethical conduct of research. This form and the accompanying participant information package provide an outline of the research project and the benefits to yourself and the community.

You will be asked to sign a release form throughout the process of this research. If so, your response should indicate that:

- You have received the subject information statement and have read its contents.
- You clearly understand the nature of this study and that you have been given an opportunity to discuss the project with the researcher prior to your participation.
- Your participation over the duration of this project is voluntary and may be terminated by yourself in writing at any time without comment or penalty.

You may direct further enquiries about the project to the researchers (details below). You may direct enquiries or complaints regarding the ethical conduct of this investigation to the Kemmy Business School Research Ethics Committee Officer, telephone +353 61 202627

If you would like further information about the project, please do not hesitate to contact:

Christopher Bryan – Project Management

Postgraduate Research Office PG0-59

Faculty of Physical Education and Sports Science,

University Of Limerick,

APPENDICES

Castletroy, Limerick,

Ireland.

Mobile: 086-1695597

Email – Christopher.bryan@ul.ie

Mary Duffy – Principle investigator

Department of Personnel & Employment Relations,
Kemmy Business School, University of Limerick,

Castletroy, Limerick,

Ireland.

Email – 16056671@studentmail.ul.ie

Deirdre O'Shea, PhD - Supervisory Role

Office: KB3-45,

Department of Personnel & Employment Relations,
Kemmy Business School, University of Limerick,
Limerick, Ireland.

Tel: 00 353 61 23 4383;

E-mail: deirdre.oshea@ul.ie

Concerns/complaints about the project – who to contact:

This project has been approved by or on behalf of Kemmy Business School Research Ethics Committee (SUHREC) in line with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the conduct of this project, you can contact: Research Ethics Officer, Michelle Cunningham, KBS Research Office, Kemmy Business School, University of Limerick, Limerick; Ph: 353 61 202627; Room SG-09; Email: michelle.cunningham@ul.ie

Appendix F: QUALTRICS SURVEY

Q1 Informed Consent Form Introduction

This study attempts to collect information about how an individual has felt and reacted in the past two weeks

Procedures

You will be asked groups of questions on how you felt your behavior, planning, stress levels, feelings, ability & drive, and general ability to cope and do your job.

Risks/Discomforts

Risks are minimal for involvement in this study. However, you may be uneasy when asked to make judgments on some of your feelings. However, we do not expect any serious risks or discomforts.

Benefits

There are no direct benefits for participants. However, it is hoped that through your participation, we will learn more about designing IT related jobs which will be more

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considerate towards those doing them, but also achieving the desired outcomes in a cost effective way.

Confidentiality

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results and never reporting individual ones).

All questionnaires will be concealed, and no one other than then James Tierney and Christopher Bryan will have access to them. The data collected will be stored in the HIPPA-compliant, Qualtrics-secure database for one year after which they will be deleted.

Compensation

As this survey will be carried out on four separate occasions, all who complete all four surveys will be entered into a draw, and four luck winners will each receive a €200 all for one voucher. Participation Participation in this research study is completely voluntary. You have the right to withdraw at anytime or refuse to participate entirely without jeopardy to your status in your place of work. If you desire to withdraw, please close your Internet browser and notify James Tierney at this email: 10142797@studentmail.ul.ie

Questions about the Research

If you have questions regarding this study, you may contact James Tierney or Christopher Bryan by email at 10142797@studentmail.ul.ie and Christopher.Bryan@ul.ie respectively. Questions about your Rights as Research Participants If you have questions you

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do not feel comfortable asking either James or Christopher, you may contact our supervisor

Dr. Deirdre O'Shea, via email at Deirdre.OShea@ul.ie

Q2 I have read, understood, and printed a copy of, the above consent form and desire of my own free will to participate in this study.

- Yes (1)
- No (2)

If No Is Selected, Then Skip To End of Survey

Q3 Please indicate your gender

- Male (1)
- Female (2)

Q4 Please your current age

Q5 What is your marital status?

- Single (1)
- Married or Living with a Partner (2)
- Separated (3)
- Widowed (4)
- Divorced (5)

Q6 How long have you worked for the current organization (Years, Months)?

Q7 What is Your Role within organization

- Managerial (1)
- Non-Managerial (2)

Q8 Please enter a Cell Number for Text Reminders over the next 8 Week

Q9 We would like to know a little about your Sporting Background

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Q10 Do you have any history of competitive sport?

- Yes (1)
- No (2)

If No Is Selected, Then Skip To End of Block

Q11 At what standard did you compete

- Recreational (1)
- At Local Level (2)
- At County Level (3)
- At National Level (4)
- At International Level (5)

Q12 At what age did you retire

- Primary School (1)
- Secondary School - Junior Cycle (2)
- Secondary School - Senior Cycle (3)
- Before your 25th Birthday (4)
- Older than 25 (5)

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Proactive behavior (PrA) (Rank et al., 2007)

Thinking about how you have carried out your core tasks in the past two weeks, to what extent have you:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Proactively shared information with customers to meet their needs (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Anticipated issues or needs customers might have and proactively developed solutions (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Used your own judgment and understanding of risk to determine when to make exceptions or improvise solutions (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took ownership by following through with customer interactions and ensured a smooth transition to other service representatives (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Actively created partnerships with other service representatives to better serve customers (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Took initiative to communicate client requirements to other service areas and collaborated in implementing solutions (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proactively checked with customers that expectations were met or exceeded. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Pro-active goal regulation (PGR) (Bindl et al., 2012)

Thinking about how you have carried out your core tasks in the past two weeks, to what extent have you:(1

= Not at all; 2 = A little; 3 = Moderately; 4 = Quite a bit; 5 = To a great extent)

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	Not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	To a great extent (5)
Monitored the effects of your efforts to improve the customer service (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thought about ways to save costs or increase efficiency at work (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thought about how to better perform your tasks (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gone through different scenarios in your head about how to best bring about a work change (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Got yourself into the right mood before trying to make a change or put forward a suggestion (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Thought about a how to use your technical strategies in different ways, before deciding how to act (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Monitored the effects of your efforts to improve the customer service (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sought feedback from others regarding your efforts to improve the customer service (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Extracted lessons for the future from the actions you engaged in (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Stress Appraisals (STRESSA) (Peacock & Wong, 1990)

Indicate over the last two weeks at work that you have felt:(1 = Not at all; 2 = A little; 3 = Moderately; 4 = Quite a bit; 5 = To a great extent)

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	Not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	To a great extent (5)
You have had the ability to do well (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You have what it takes (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You could overcome problems (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You had the skills necessary (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were threatening situations (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You felt anxious (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were negative outcomes (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There was negative impact (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were important consequences (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You were affected (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were serious implications (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were long-term consequences (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Any actions were totally hopeless (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The outcome was uncontrollable (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Success was beyond anyone's power (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Problems were unresolvable (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have had someone I can turn to (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There has been help available (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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There have been resources available (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There has been someone who can help (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There was positive impact (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You were eager to tackle the work (22)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You could become stronger from work (23)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
You were excited about the outcomes (24)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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The PANAS (PANAS) (Watson et al., 1988)

Indicate to what extent you have felt the following emotions in the past 2 weeks (1=Very slightly or not at all; 2=A little; 3=Moderately; 4=Quite a bit; 5=Extremely)

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	Very slightly/ not at all (1)	A little (2)	Moderately (3)	Quite a bit (4)	Extremely (5)
Interested (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excited (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enthusiastic (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Active (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distressed (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upset (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Connor-Davidson Resilience Scale (CD25) (Connor & Davidson, 2003)

From your work behaviors over the past 2 weeks answer the following questions in relation to yourself:(1 =

Not true at all; 2 = Rarely true; 3 = Sometimes true; 4 =often true; 5 = nearly true all the time)

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	Not true at all (1)	Rarely true (2)	Sometimes true (3)	Often True (4)	Nearly true all the time (5)
I put in my best effort no matter what (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thought I could achieve my goals (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When things look hopeless, I didn't give up (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was not easily discouraged by failure (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thought of myself as strong person (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I enjoyed the challenges (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I worked in order to attain my goals (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had pride in my achievements (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I saw the humorous side of things (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Believed coping with stress would strengthen me (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Under pressure, I focused and thought clearly (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preferred to take the lead in problem solving (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was able to make unpopular or difficult decisions (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Could handle unpleasant feelings (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Was able to act on a hunch (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was able to adapt to change (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had close and secure relationships (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I could deal with whatever comes (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Past success gave me confidence for new challenges (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I tended to bounce back after illness or hardship (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I knew where to turn for help (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I had a strong sense of purpose (22)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I was control of my life (23)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I thought sometimes faith or God could help (24)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believed things happen for a reason (25)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Psychological Capital Quotient (PCQ) (Peterson et al., 2011)

Describe how you may have thought about yourself over the past two weeks

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	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Somewhat Agree (4)	Agree (5)	Strongly Agree (6)
I feel confident in representing my work area in meetings with management (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident analyzing a long-term problem to find a solution (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident contributing to discussions about the organization's strategy (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident helping to set targets/goals in my work area. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident presenting information to a group of colleagues (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident contacting people outside the organization (e.g., suppliers, customers) to discuss problems helping to set targets/goals in my work area (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I see myself as being pretty successful at work (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am energetically pursuing my work goals. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There are lots of ways around any problem (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can think of many ways to reach my current work goals (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am meeting the work goals that I have set for myself. (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I should find myself in a jam at work, I could think of many ways to get out of it (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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When I have a set-back at work, I have trouble recovering from it, moving on (rev) (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually manage difficulties one way or another at work (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can be "on my own," so to speak, at work if I have to. (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can get through difficult times at work because I've experienced difficulty before (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel I can handle many things at a time at this job (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I usually take stressful things at work in stride (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always look on the bright side of things regarding my job (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When things are uncertain for me at work, I usually expect the best. (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I'm optimistic about what will happen to me in the future as it pertains to work. (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In this job, things never work out the way I want them to. (22)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I approach this job as if "every cloud has a silver lining." (23)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If something can go wrong for me work-wise, it will (24)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Daily Hassles and Uplifts Scale (DHas & Dup) (DeLongis et al., 1988)

Please indicate how much of a hassle and an uplift each item was for you over the last two weeks?(1 = not applicable 2 = None, 3 = somewhat, 4 = Quite a bit, 5 = great deal)

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	Hassle					Uplift				
	N/A (1)	None (2)	somewhat (3)	Quite a bit (4)	A great deal (5)	N/A (1)	None (2)	somewhat (3)	Quite a bit (4)	A great deal (5)
Your child(ren) (1)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your parents or parents-in-law (2)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other relatives (3)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your spouse (4)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Time spent with family (5)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Health or well- being of a family member (6)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Family related obligations (7)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your friend(s) (8)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fellow workers (9)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Clients, customers, patients, etc. (10)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your supervisor or employer (11)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The nature of your work (12)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your workload (13)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your job security (14)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Meeting deadlines or goals on the job (15)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enough money for necessities (e.g. food, clothing, housing, health care, taxes, insurance) (16)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enough money for education (17)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enough money for emergencies (18)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enough money for extras (e.g., entertainment, recreation, vacations) (19)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Financial car for someone who doesn't live with you (20)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Investments (21)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The weather (22)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
New events (23)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your environment (e.g. quality of air, noise level, greenery) (24)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Political or social issues (25)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Your neighborhood (Neighbors, setting) (26)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Conserving (gas, electricity, water, gasoline, etc.) (27)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pets (28)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Cooking (29)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Housework (30)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home repairs (31)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hardwork (32)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Car maintenance (33)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Taking care of paperwork (e.g., paying for bills, filling out forms) (34)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Home entertainment (e.g., TV, music, reading) (35)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amount of free time (36)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recreation and entertainment outside the home (e.g., movies, sports, eating out, walking) (37)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eating (at home) (38)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Church or community organizations (39)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Legal matters (40)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Being organized (41)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social commitments (42)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Emotion Regulation Scale (DERS) (Gratz & Roemer, 2004)

How often has each of the items applied to you over the past 2 weeks: (1 = Almost never; 2 = Sometimes; 3 = About half the time; 4 = Most of the time; and 5 = Almost always)

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	Almost never (1)	Sometimes (2)	About half the time (3)	Most of the time (4)	Almost always (5)
When I was stressed, I had difficulty concentrating at work (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I had difficulty focusing on other things (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I had difficulty getting work done (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I had difficulty thinking about anything else (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I could still get things done (rev) (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I ended up stressing myself to a breaking point (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I remained that way for a long time (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, wallowing in it was all I could do (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, it took me a long time to feel better (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I believed there was nothing I could do to make myself feel better (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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When I was stressed, I knew that I could find a way to eventually feel better (rev) (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, my emotions felt overwhelming (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I was stressed, I started to feel bad about myself (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Appendix G: R STUDIO ANALYSES AND CORRELATION TABLES

Section 1: Analysis 1 R studio Outputs

1a. Test for Normlity:

Shapiro-Wilk normality test

data: LRes\$REST_
W = 0.93945, p-value = 2.445e-10

hapiro-Wilk normality test

data: LRes\$DHAST_
W = 0.97592, p-value = 2.58e-05

1b. Non-parametric test for ANOVA

Kruskal-Wallis rank sum test

data: REST_ by TIME
Kruskal-Wallis chi-squared = 8.297, df = 3, p-value = 0.04026

The test is significant then at least one sample stochastically dominates another sample. Resilience does change over time.

1c. Unconditional Growth Model of resilience

Optimization method	NLMINB
Number of free parameters	9
	Used Total

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Number of observations 73 93

Estimator ML
 Model Fit Test Statistic 3.977
 Degrees of freedom 5
 P-value (Chi-square) 0.553

Parameter Estimates:

Information Expected
 Information saturated (h1) model Structured
 Standard Errors Standard

Latent Variables:

	Estimate	Std.Err	z-value	P(> z)
i =~				
REST_.1	1.000			
REST_.2	1.000			
REST_.3	1.000			
REST_.4	1.000			
s =~				
REST_.1	0.000			
REST_.2	1.000			
REST_.3	2.000			
REST_.4	3.000			

Covariances:

	Estimate	Std.Err	z-value	P(> z)
i ~~				
s	-22.891	11.896	-1.924	0.054

Intercepts:

	Estimate	Std.Err	z-value	P(> z)
.REST_.1	0.000			
.REST_.2	0.000			
.REST_.3	0.000			
.REST_.4	0.000			
i	70.314	1.712	41.083	0.000
s	1.263	0.597	2.116	0.034

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_.1	13.529	22.486	0.602	0.547
.REST_.2	142.830	26.334	5.424	0.000
.REST_.3	79.165	17.148	4.617	0.000
.REST_.4	22.881	22.535	1.015	0.310
i	201.026	40.726	4.936	0.000
s	22.119	5.751	3.846	0.000

df chisq rmsea srmr cfi
 5.000 3.977 0.000 0.034 1.000

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1d. Conditional Latent growth curve model of resilience with time varying covariate hassles

Lavaan 0.6-3 ended normally after 107 iterations

Optimization method	NLMINB		
Number of free parameters	16		
	Used	Total	
Number of observations		73	93
Estimator	ML		
Model Fit Test Statistic	22.444		
Degrees of freedom	14		
P-value (Chi-square)	0.070		

Parameter Estimates:

Information	Expected
Information saturated (h1) model	Structured
Standard Errors	Standard

Latent Variables:

	Estimate	Std.Err	z-value	P(> z)
i =~				
REST_1	1.000			
REST_2	1.000			
REST_3	1.000			
REST_4	1.000			
s =~				
REST_1	0.000			
REST_2	1.000			
REST_3	2.000			
REST_4	3.000			

Regressions:

	Estimate	Std.Err	z-value	P(> z)
REST_1 ~				
DHAST_1	0.412	0.146	2.827	0.005
REST_2 ~				
DHAST_2	-0.270	0.147	-1.837	0.066
REST_3 ~				
DHAST_3	0.261	0.177	1.474	0.141
REST_4 ~				
DHAST_4	0.053	0.203	0.259	0.795
REST_2 ~				
DHAST_1	0.581	0.169	3.443	0.001
REST_3 ~				
DHAST_2	-0.018	0.152	-0.115	0.908
REST_4 ~				
DHAST_3	0.090	0.231	0.391	0.696

Covariances:

	Estimate	Std.Err	z-value	P(> z)
--	----------	---------	---------	---------

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```
i =~
s      -15.386  10.781  -1.427  0.154
```

Intercepts:

	Estimate	Std.Err	z-value	P(> z)
.REST_.1	0.000			
.REST_.2	0.000			
.REST_.3	0.000			
.REST_.4	0.000			
i	29.339	14.586	2.011	0.044
s	10.129	6.452	1.570	0.116

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_.1	22.057	21.290	1.036	0.300
.REST_.2	125.825	23.575	5.337	0.000
.REST_.3	78.879	17.115	4.609	0.000
.REST_.4	24.991	22.420	1.115	0.265
i	170.099	36.053	4.718	0.000
s	19.975	5.523	3.617	0.000

```
> fitmeasures(fit, fit.measures = order)
df chisq rmsea srmr cfi
14.000 22.444 0.091 0.048 0.953
```

1d. Conditional Latent growth curve model of resilience with time varying co-variate major life event

lavaan 0.6-3 ended normally after 163 iterations

Optimization method	NLMINB		
Number of free parameters	16		
	Used	Total	
Number of observations	73	93	
Estimator	ML		
Model Fit Test Statistic	22.012		
Degrees of freedom	14		
P-value (Chi-square)	0.078		

Parameter Estimates:

Information	Expected
Information saturated (h1) model	Structured
Standard Errors	Standard

Latent Variables:

	Estimate	Std.Err	z-value	P(> z)
i =~				
REST_.1	1.000			

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```

REST_2      1.000
REST_3      1.000
REST_4      1.000
s =~
REST_1      0.000
REST_2      1.000
REST_3      2.000
REST_4      3.000

```

Regressions:

```

      Estimate Std.Err z-value P(>|z|)
REST_1 ~
  MLE.1      0.565  2.961  0.191  0.849
REST_2 ~
  MLE.2      1.182  3.528  0.335  0.738
REST_3 ~
  MLE.3     -0.291  4.088 -0.071  0.943
REST_4 ~
  MLE.4     13.231  4.356  3.038  0.002
REST_2 ~
  MLE.1      4.682  3.957  1.183  0.237
REST_3 ~
  MLE.2     12.398  3.434  3.610  0.000
REST_4 ~
  MLE.3      3.371  4.318  0.781  0.435

```

Covariances:

```

      Estimate Std.Err z-value P(>|z|)
i ~~
s      -24.853  11.120 -2.235  0.025

```

Intercepts:

```

      Estimate Std.Err z-value P(>|z|)
.REST_1      0.000
.REST_2      0.000
.REST_3      0.000
.REST_4      0.000
i      69.367  5.314  13.053  0.000
s     -9.152  3.718  -2.461  0.014

```

Variances:

```

      Estimate Std.Err z-value P(>|z|)
.REST_1      8.130  21.526  0.378  0.706
.REST_2     141.010  25.624  5.503  0.000
.REST_3      85.026  17.232  4.934  0.000
.REST_4     -0.787  19.848 -0.040  0.968
i      207.331  40.863  5.074  0.000
s      22.340  5.314  4.204  0.000

```

```
> fitmeasures(fit, fit.measures = order)
```

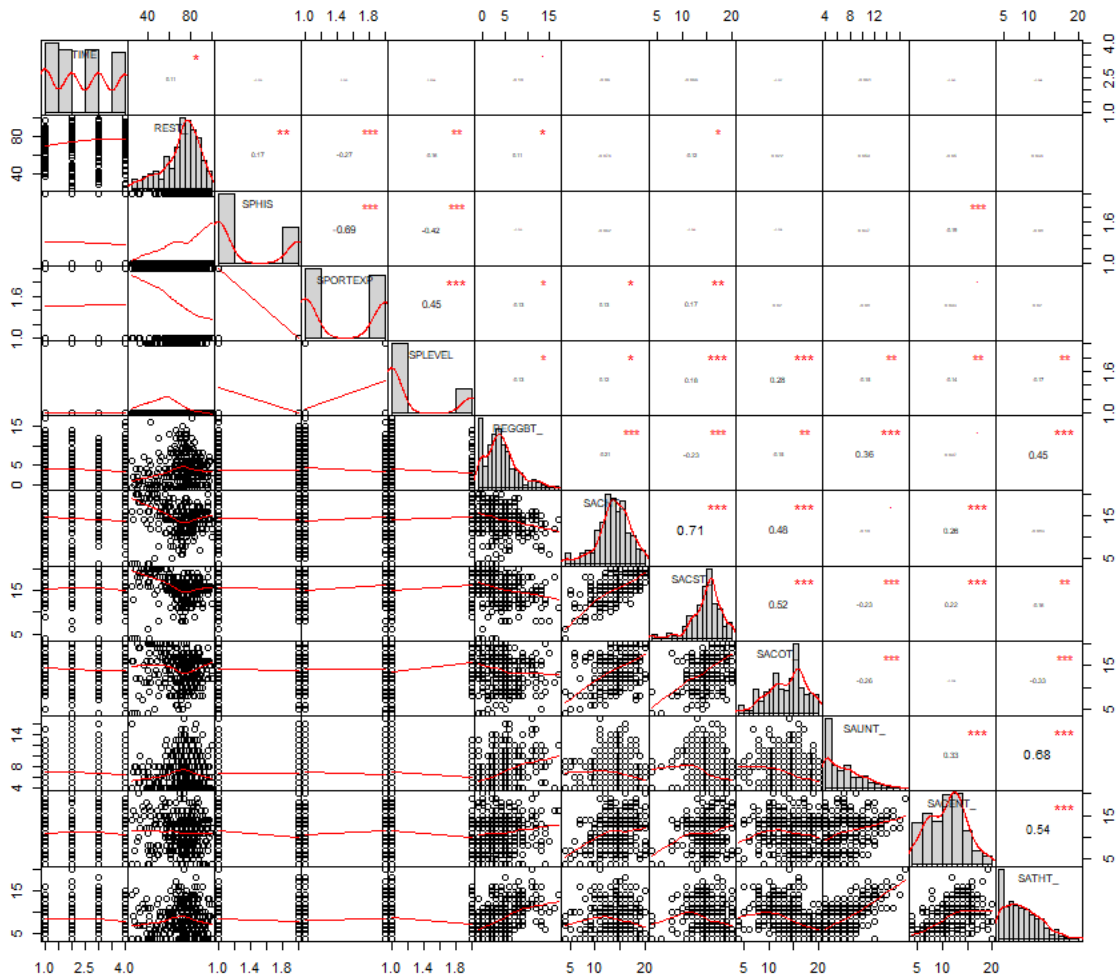
```

df chisq rmsea srmr cfi
14.000 22.012 0.089 0.087 0.956

```

Section 2: Analysis 2 R studio Outputs

Figure 2.1 Correlation and histogram plot of all paths analyses



1. Path Analysis with SACST_. (Controllable by self)

df chisq rmsea srmr cfi
 31.000 95.215 0.151 0.095 0.888

Optimization method NLMINB
 Number of free parameters 47

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Number of observations	91
Estimator	ML
Model Fit Test Statistic	95.215
Degrees of freedom	31
P-value (Chi-square)	0.000

Parameter Estimates:

Information	Expected
Information saturated (h1) model	Structured
Standard Errors	Standard

Regressions:

Estimate	Std.Err	z-value	P(> z)
REST_1 ~			
REST_2	0.541	0.061	8.804 0.000
SACST_2	-0.957	0.523	-1.830 0.067
REGGBT_2	-0.012	0.409	-0.029 0.977
SACST_3	-0.278	0.575	-0.483 0.629
REGGBT_3	0.999	0.544	1.835 0.067
REGGBT_4	-0.290	0.381	-0.763 0.446
SACST_4	0.337	0.428	0.788 0.431
REST_2 ~			
REST_3	0.659	0.084	7.835 0.000
SACST_3	0.313	0.619	0.505 0.614
REGGBT_3	-0.423	0.605	-0.700 0.484
SACST_4	-1.097	0.557	-1.969 0.049
REGGBT_4	0.577	0.499	1.156 0.248
REST_3 ~			
REST_4	0.814	0.065	12.612 0.000
SACST_4	-0.543	0.340	-1.598 0.110
REGGBT_4	0.111	0.275	0.404 0.686
SACST_1 ~			
SACST_2	0.544	0.081	6.698 0.000
REGGBT_2	-0.017	0.084	-0.202 0.840
REGGBT_3	-0.065	0.091	-0.716 0.474
SACST_2 ~			
SACST_3	0.644	0.077	8.398 0.000
REGGBT_3	-0.080	0.093	-0.859 0.391
REGGBT_4	0.039	0.076	0.516 0.606
SACST_3 ~			
SACST_4	0.533	0.076	6.994 0.000
REGGBT_4	-0.118	0.063	-1.876 0.061
REGGBT_1 ~			
REGGBT_2	0.845	0.086	9.835 0.000
REGGBT_2 ~			
REGGBT_3	0.708	0.087	8.144 0.000
REGGBT_3 ~			
REGGBT_4	0.569	0.064	8.952 0.000

Covariances:

Estimate	Std.Err	z-value	P(> z)
.REST_1 ~~			
.SACST_1	-3.392	2.029	-1.671 0.095
.REST_2 ~~			

APPENDICES

.SACST_2	1.513	2.487	0.608	0.543
.REST_3	~~	~~	~~	~~
.SACST_3	-1.029	2.058	-0.500	0.617
SACST_4	~~	~~	~~	~~
REST_4	4.666	4.637	1.006	0.314
.SACST_1	~~	~~	~~	~~
.REGGBT_1	-0.781	0.565	-1.383	0.167
.SACST_2	~~	~~	~~	~~
.REGGBT_2	-0.747	0.508	-1.472	0.141
.SACST_3	~~	~~	~~	~~
.REGGBT_3	-0.820	0.496	-1.654	0.098
REGGBT_4	~~	~~	~~	~~
SACST_4	-1.715	1.116	-1.537	0.124
.REST_1	~~	~~	~~	~~
.REGGBT_1	-0.721	2.689	-0.268	0.789

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1	91.692	13.593	6.745	0.000
.REST_2	154.265	22.870	6.745	0.000
.REST_3	87.001	12.898	6.745	0.000
.SACST_1	3.962	0.587	6.745	0.000
.SACST_2	3.725	0.552	6.746	0.000
.SACST_3	4.560	0.676	6.746	0.000
.REGGBT_1	7.168	1.063	6.745	0.000
.REGGBT_2	6.172	0.915	6.745	0.000
.REGGBT_3	4.778	0.708	6.745	0.000
REGGBT_4	12.998	1.927	6.745	0.000
SACST_4	8.591	1.273	6.747	0.000
REST_4	231.365	34.300	6.745	0.000

2. Path Analysis with SATHT_. (Threat)

```

df chisq rmsea srmr cfi
31.000 112.757 0.170 0.117 0.864
summary(modxfit)
lavaan 0.6-3 ended normally after 143 iterations

```

```

Optimization method          NLMINB
Number of free parameters    47

Number of observations        91

Estimator                    ML
Model Fit Test Statistic     112.757
Degrees of freedom            31
P-value (Chi-square)         0.000

```

Parameter Estimates:

```

Information                    Expected

```

APPENDICES

Information saturated (h1) model Structured
Standard Errors Standard

Regressions:

Estimate	Std.Err	z-value	P(> z)
REST_1 ~			
REST_2	0.561	0.062	9.037 0.000
SATHT_2	0.002	0.383	0.004 0.997
REGGBT_2	-0.028	0.436	-0.065 0.948
SATHT_3	-0.534	0.490	-1.090 0.276
REGGBT_3	1.269	0.559	2.270 0.023
REGGBT_4	-0.147	0.416	-0.354 0.724
SATHT_4	0.308	0.434	0.710 0.478
REST_2 ~			
REST_3	0.652	0.085	7.705 0.000
SATHT_3	0.388	0.588	0.659 0.510
REGGBT_3	-0.188	0.616	-0.306 0.760
SATHT_4	-0.663	0.567	-1.170 0.242
REGGBT_4	0.635	0.541	1.176 0.240
REST_3 ~			
REST_4	0.828	0.064	12.973 0.000
SATHT_4	0.513	0.354	1.449 0.147
REGGBT_4	-0.024	0.308	-0.079 0.937
SATHT_1 ~			
SATHT_2	0.426	0.089	4.811 0.000
REGGBT_2	-0.047	0.114	-0.416 0.677
REGGBT_3	0.233	0.118	1.967 0.049
SATHT_2 ~			
SATHT_3	0.521	0.105	4.982 0.000
REGGBT_3	0.263	0.134	1.971 0.049
REGGBT_4	-0.117	0.112	-1.047 0.295
SATHT_3 ~			
SATHT_4	0.526	0.085	6.178 0.000
REGGBT_4	0.213	0.075	2.826 0.005
REGGBT_1 ~			
REGGBT_2	0.845	0.086	9.835 0.000
REGGBT_2 ~			
REGGBT_3	0.708	0.087	8.144 0.000
REGGBT_3 ~			
REGGBT_4	0.569	0.064	8.952 0.000

Covariances:

Estimate	Std.Err	z-value	P(> z)
.REST_1 ~~			
.SATHT_1	5.418	2.788	1.944 0.052
.REST_2 ~~			
.SATHT_2	0.030	3.535	0.008 0.993
.REST_3 ~~			
.SATHT_3	3.418	2.238	1.527 0.127
SATHT_4 ~~			
REST_4	-3.081	4.436	-0.695 0.487
.SATHT_1 ~~			
.REGGBT_1	1.793	0.765	2.344 0.019
.SATHT_2 ~~			
.REGGBT_2	2.132	0.766	2.783 0.005
.SATHT_3 ~~			

APPENDICES

.REGGBT_3	0.987	0.530	1.863	0.063
	REGGBT_4 ~~			
SATHT_4	5.271	1.306	4.037	0.000
	.REST_1 ~~			
.REGGBT_1	-1.171	2.768	-0.423	0.672

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1	97.086	14.393	6.745	0.000
.REST_2	158.415	23.485	6.745	0.000
.REST_3	87.521	12.975	6.745	0.000
.SATHT_1	6.981	1.035	6.745	0.000
.SATHT_2	7.915	1.173	6.745	0.000
.SATHT_3	5.279	0.782	6.752	0.000
.REGGBT_1	7.168	1.063	6.745	0.000
.REGGBT_2	6.172	0.915	6.745	0.000
.REGGBT_3	4.778	0.708	6.745	0.000
REGGBT_4	12.998	1.927	6.745	0.000
SATHT_4	9.838	1.457	6.751	0.000
REST_4	231.365	34.300	6.745	0.000

3. Path Analysis with SACENT_. (Centrality)

df chisq rmsea srmr cfi
31.000 87.049 0.141 0.093 0.897

lavaan 0.6-3 ended normally after 152 iterations

Optimization method	NLMINB
Number of free parameters	47
Number of observations	91
Estimator	ML
Model Fit Test Statistic	87.049
Degrees of freedom	31
P-value (Chi-square)	0.000

Parameter Estimates:

Information	Expected
Information saturated (h1) model	Structured
Standard Errors	Standard

Regressions:

	Estimate	Std.Err	z-value	P(> z)
	REST_1 ~			
REST_2	0.547	0.065	8.416	0.000
SACENT_2	0.120	0.373	0.322	0.747
REGGBT_2	0.028	0.428	0.065	0.948
SACENT_3	-0.222	0.460	-0.483	0.629

APPENDICES

REGGBT_3	1.194	0.564	2.118	0.034
REGGBT_4	-0.224	0.403	-0.556	0.578
SACENT_4	-0.112	0.368	-0.303	0.762
REST_2 ~				
REST_3	0.650	0.083	7.830	0.000
SACENT_3	0.502	0.492	1.020	0.308
REGGBT_3	-0.091	0.596	-0.152	0.879
SACENT_4	-0.869	0.455	-1.907	0.057
REGGBT_4	0.578	0.495	1.167	0.243
REST_3 ~				
REST_4	0.807	0.065	12.366	0.000
SACENT_4	-0.104	0.285	-0.366	0.714
REGGBT_4	0.197	0.278	0.711	0.477
SACENT_1 ~				
SACENT_2	0.755	0.078	9.660	0.000
REGGBT_2	-0.083	0.112	-0.744	0.457
REGGBT_3	-0.066	0.120	-0.553	0.580
SACENT_2 ~				
SACENT_3	0.635	0.090	7.057	0.000
REGGBT_3	0.353	0.136	2.597	0.009
REGGBT_4	-0.208	0.112	-1.865	0.062
SACENT_3 ~				
SACENT_4	0.548	0.079	6.960	0.000
REGGBT_4	-0.044	0.078	-0.564	0.573
REGGBT_1 ~				
REGGBT_2	0.845	0.086	9.835	0.000
REGGBT_2 ~				
REGGBT_3	0.708	0.087	8.144	0.000
REGGBT_3 ~				
REGGBT_4	0.569	0.064	8.952	0.000

Covariances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1 ~~				
.SACENT_1	2.590	2.722	0.951	0.341
.REST_2 ~~				
.SACENT_2	-4.482	3.641	-1.231	0.218
.REST_3 ~~				
.SACENT_3	-1.287	2.605	-0.494	0.621
SACENT_4 ~~				
REST_4	4.476	5.591	0.801	0.423
.SACENT_1 ~~				
.REGGBT_1	0.633	0.736	0.861	0.389
.SACENT_2 ~~				
.REGGBT_2	1.541	0.755	2.040	0.041
.SACENT_3 ~~				
.REGGBT_3	-0.624	0.608	-1.026	0.305
REGGBT_4 ~~				
SACENT_4	1.779	1.342	1.326	0.185
.REST_1 ~~				
.REGGBT_1	-1.369	2.782	-0.492	0.623

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1	97.995	14.528	6.745	0.000
.REST_2	152.556	22.616	6.745	0.000

APPENDICES

.REST_3	89.327	13.243	6.745	0.000
.SACENT_1	6.814	1.010	6.745	0.000
.SACENT_2	8.161	1.209	6.751	0.000
.SACENT_3	6.977	1.034	6.746	0.000
.REGGBT_1	7.168	1.063	6.745	0.000
.REGGBT_2	6.172	0.915	6.745	0.000
.REGGBT_3	4.778	0.708	6.745	0.000
REGGBT_4	12.998	1.927	6.745	0.000
SACENT_4	12.451	1.846	6.746	0.000
REST_4	231.365	34.300	6.745	0.000

4. Path Analysis with SAUNT_ (Uncontrollable)

df chisq rmsea srmr cfi
 31.000 120.590 0.178 0.114 0.850

lavaan 0.6-3 ended normally after 144 iterations

Optimization method	NLMINB
Number of free parameters	47
Number of observations	91
Estimator	ML
Model Fit Test Statistic	120.590
Degrees of freedom	31
P-value (Chi-square)	0.000

Parameter Estimates:

Information	Expected
Information saturated (h1) model	Structured
Standard Errors	Standard

Regressions:

Estimate	Std.Err	z-value	P(> z)	
REST_1 ~				
REST_2	0.567	0.063	9.000	0.000
SAUNT_2	0.040	0.414	0.095	0.924
REGGBT_2	0.016	0.426	0.036	0.971
SAUNT_3	-0.713	0.593	-1.204	0.229
REGGBT_3	0.905	0.553	1.637	0.102
REGGBT_4	-0.172	0.399	-0.429	0.668
SAUNT_4	1.143	0.523	2.186	0.029
REST_2 ~				
REST_3	0.651	0.084	7.734	0.000
SAUNT_3	1.015	0.708	1.433	0.152
REGGBT_3	-0.388	0.611	-0.635	0.526
SAUNT_4	-0.920	0.672	-1.369	0.171
REGGBT_4	0.580	0.511	1.135	0.257
REST_3 ~				
REST_4	0.814	0.064	12.671	0.000

APPENDICES

SAUNT_4	0.309	0.372	0.829	0.407
REGGBT_4	0.111	0.288	0.387	0.698
	SAUNT_1 ~			
SAUNT_2	0.425	0.087	4.870	0.000
REGGBT_2	-0.081	0.102	-0.797	0.426
REGGBT_3	0.153	0.106	1.452	0.147
	SAUNT_2 ~			
SAUNT_3	0.504	0.101	4.989	0.000
REGGBT_3	0.232	0.121	1.909	0.056
REGGBT_4	-0.140	0.099	-1.412	0.158
	SAUNT_3 ~			
SAUNT_4	0.652	0.073	8.916	0.000
REGGBT_4	0.124	0.058	2.150	0.032
	REGGBT_1 ~			
REGGBT_2	0.845	0.086	9.835	0.000
	REGGBT_2 ~			
REGGBT_3	0.708	0.087	8.144	0.000
	REGGBT_3 ~			
REGGBT_4	0.569	0.064	8.952	0.000

Covariances:

	Estimate	Std.Err	z-value	P(> z)
	.REST_1 ~~			
.SAUNT_1	1.261	2.395	0.527	0.598
	.REST_2 ~~			
.SAUNT_2	-2.615	3.205	-0.816	0.415
	.REST_3 ~~			
.SAUNT_3	2.610	1.850	1.411	0.158
	SAUNT_4 ~~			
REST_4	1.364	4.235	0.322	0.747
	.SAUNT_1 ~~			
.REGGBT_1	1.551	0.684	2.268	0.023
	.SAUNT_2 ~~			
.REGGBT_2	1.907	0.694	2.749	0.006
	.SAUNT_3 ~~			
.REGGBT_3	0.840	0.438	1.920	0.055
	REGGBT_4 ~~			
SAUNT_4	3.044	1.099	2.768	0.006
	.REST_1 ~~			
.REGGBT_1	-0.915	2.707	-0.338	0.735

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1	92.902	13.773	6.745	0.000
.REST_2	155.680	23.080	6.745	0.000
.REST_3	88.797	13.164	6.745	0.000
.SAUNT_1	5.600	0.830	6.745	0.000
.SAUNT_2	6.550	0.971	6.749	0.000
.SAUNT_3	3.577	0.530	6.751	0.000
.REGGBT_1	7.168	1.063	6.745	0.000
.REGGBT_2	6.172	0.915	6.745	0.000
.REGGBT_3	4.778	0.708	6.745	0.000
REGGBT_4	12.998	1.927	6.745	0.000
SAUNT_4	7.758	1.150	6.746	0.000
REST_4	231.365	34.300	6.745	0.00

5. Path Analysis with SACOT_. (Controllable by others)

df chisq rmsea srmr cfi
 31.000 93.570 0.149 0.091 0.896

lavaan 0.6-3 ended normally after 151 iterations

Optimization method	NLMINB
Number of free parameters	47
Number of observations	91
Estimator	ML
Model Fit Test Statistic	93.570
Degrees of freedom	31
P-value (Chi-square)	0.000

Parameter Estimates:

Information	Expected
Information saturated (h1) model	Structured
Standard Errors	Standard

Regressions:

Estimate	Std.Err	z-value	P(> z)
REST_.1 ~			
REST_.2	0.543	0.063	8.603 0.000
SACOT_.2	-0.757	0.407	-1.860 0.063
REGGBT_.2	0.070	0.412	0.171 0.864
SACOT_.3	0.275	0.541	0.509 0.611
REGGBT_.3	1.122	0.551	2.035 0.042
REGGBT_.4	-0.317	0.395	-0.802 0.422
SACOT_.4	0.125	0.459	0.273 0.785
REST_.2 ~			
REST_.3	0.668	0.085	7.844 0.000
SACOT_.3	0.079	0.596	0.133 0.894
REGGBT_.3	-0.436	0.600	-0.726 0.468
SACOT_.4	-0.798	0.584	-1.367 0.172
REGGBT_.4	0.562	0.504	1.114 0.265
REST_.3 ~			
REST_.4	0.811	0.065	12.444 0.000
SACOT_.4	-0.360	0.294	-1.224 0.221
REGGBT_.4	0.125	0.277	0.453 0.650
SACOT_.1 ~			
SACOT_.2	0.645	0.089	7.249 0.000
REGGBT_.2	-0.022	0.123	-0.175 0.861
REGGBT_.3	0.014	0.135	0.102 0.919
SACOT_.2 ~			
SACOT_.3	0.692	0.079	8.802 0.000
REGGBT_.3	-0.044	0.121	-0.369 0.712
REGGBT_.4	0.005	0.101	0.052 0.959

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	SACOT_3 ~			
SACOT_4	0.743	0.068	10.965	0.000
REGGBT_4	-0.141	0.065	-2.174	0.030
	REGGBT_1 ~			
REGGBT_2	0.845	0.086	9.835	0.000
	REGGBT_2 ~			
REGGBT_3	0.708	0.087	8.144	0.000
	REGGBT_3 ~			
REGGBT_4	0.569	0.064	8.952	0.000

Covariances:

	Estimate	Std.Err	z-value	P(> z)
	.REST_1 ~~			
.SACOT_1	-2.908	3.001	-0.969	0.333
	.REST_2 ~~			
.SACOT_2	2.614	3.290	0.795	0.427
	.REST_3 ~~			
.SACOT_3	2.664	2.178	1.224	0.221
	SACOT_4 ~~			
REST_4	9.506	5.513	1.724	0.085
	.SACOT_1 ~~			
.REGGBT_1	0.586	0.823	0.713	0.476
	.SACOT_2 ~~			
.REGGBT_2	-0.313	0.653	-0.480	0.631
	.SACOT_3 ~~			
.REGGBT_3	-0.406	0.503	-0.807	0.420
	REGGBT_4 ~~			
SACOT_4	-2.061	1.300	-1.586	0.113
	.REST_1 ~~			
.REGGBT_1	-0.810	2.737	-0.296	0.767

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1	94.985	14.081	6.745	0.000
.REST_2	155.388	23.036	6.745	0.000
.REST_3	87.964	13.041	6.745	0.000
.SACOT_1	8.541	1.266	6.745	0.000
.SACOT_2	6.311	0.936	6.745	0.000
.SACOT_3	4.859	0.720	6.746	0.000
.REGGBT_1	7.168	1.063	6.745	0.000
.REGGBT_2	6.172	0.915	6.745	0.000
.REGGBT_3	4.778	0.708	6.745	0.000
REGGBT_4	12.998	1.927	6.745	0.000
SACOT_4	11.889	1.761	6.751	0.000
REST_4	231.365	34.300	6.745	0.000

6. Path Analysis with SACTH_. (Challenge)

```
df chisq rmsea srmr cfi
31.000 95.208 0.151 0.099 0.885
```

lavaan 0.6-3 ended normally after 153 iterations

```
Optimization method      NLMINB
Number of free parameters 47

Number of observations      91

Estimator      ML
Model Fit Test Statistic 95.208
Degrees of freedom      31
P-value (Chi-square)    0.000
```

Parameter Estimates:

```
Information      Expected
Information saturated (h1) model  Structured
Standard Errors      Standard
```

```
Regressions:
Estimate Std.Err z-value P(>|z|)
REST_.1 ~
REST_.2      0.561 0.065 8.676 0.000
SACTH_.2     -0.113 0.433 -0.261 0.794
REGGBT_.2    0.075 0.411 0.181 0.856
SACTH_.3     -0.718 0.542 -1.326 0.185
REGGBT_.3    1.050 0.550 1.908 0.056
REGGBT_.4    -0.239 0.396 -0.604 0.546
SACTH_.4     0.798 0.431 1.849 0.064
REST_.2 ~
REST_.3      0.657 0.081 8.092 0.000
SACTH_.3     0.399 0.586 0.681 0.496
REGGBT_.3    -0.279 0.583 -0.479 0.632
SACTH_.4    -1.634 0.515 -3.170 0.002
REGGBT_.4     0.354 0.491 0.721 0.471
REST_.3 ~
REST_.4      0.822 0.064 12.769 0.000
SACTH_.4    -0.608 0.325 -1.868 0.062
REGGBT_.4     0.068 0.277 0.244 0.807
SACTH_.1 ~
SACTH_.2     0.626 0.091 6.895 0.000
REGGBT_.2    -0.102 0.107 -0.954 0.340
REGGBT_.3     0.141 0.118 1.202 0.229
SACTH_.2 ~
```

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SACHT_3	0.619	0.093	6.659	0.000
REGGBT_3	-0.096	0.114	-0.840	0.401
REGGBT_4	-0.062	0.095	-0.651	0.515
SACHT_3 ~				
SACHT_4	0.517	0.075	6.873	0.000
REGGBT_4	-0.113	0.065	-1.743	0.081
REGGBT_1 ~				
REGGBT_2	0.845	0.086	9.835	0.000
REGGBT_2 ~				
REGGBT_3	0.708	0.087	8.144	0.000
REGGBT_3 ~				
REGGBT_4	0.569	0.064	8.952	0.000

Covariances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1 ~~				
.SACHT_1	0.218	2.565	0.085	0.932
.REST_2 ~~				
.SACHT_2	3.702	3.021	1.226	0.220
.REST_3 ~~				
.SACHT_3	0.144	2.100	0.069	0.945
SACHT_4 ~~				
REST_4	5.207	4.830	1.078	0.281
.SACHT_1 ~~				
.REGGBT_1	-0.106	0.707	-0.150	0.881
.SACHT_2 ~~				
.REGGBT_2	-0.537	0.615	-0.874	0.382
.SACHT_3 ~~				
.REGGBT_3	-0.428	0.499	-0.858	0.391
REGGBT_4 ~~				
SACHT_4	-2.470	1.188	-2.079	0.038
.REST_1 ~~				
.REGGBT_1	-0.686	2.726	-0.252	0.801

Variances:

	Estimate	Std.Err	z-value	P(> z)
.REST_1	94.275	13.976	6.745	0.000
.REST_2	146.550	21.726	6.745	0.000
.REST_3	86.159	12.773	6.745	0.000
.SACHT_1	6.348	0.941	6.745	0.000
.SACHT_2	5.620	0.833	6.746	0.000
.SACHT_3	4.697	0.696	6.745	0.000
.REGGBT_1	7.168	1.063	6.745	0.000
.REGGBT_2	6.172	0.915	6.745	0.000
.REGGBT_3	4.778	0.708	6.745	0.000
REGGBT_4	12.998	1.927	6.745	0.000
SACHT_4	9.529	1.412	6.749	0.000
REST_4	231.365	34.300	6.745	0.000

DEVELOPING HYPOTHESES OF THE CONCEPT OF RESILIENCE

Section 3: Analysis 3 correlation matrices

Analysis 3 Correlation Table: Participants who didn't persist in sport past final exams (N=48)

	REST_1	REGGBT_1	SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACEN_1	SATH_1	REST_2	REGGBT_2	SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACEN_2	SATH_2	REST_3	REGGBT_3	SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACEN_3	SATH_3	REST_4	REGGBT_4	SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACEN_4	SATH_4				
REST_1																																				
REGGBT_1	0.265																																			
SACHT_1	0.039	-0.158																																		
SACST_1	-0.239	-0.332*	0.416*																																	
SACOT_1	0.022	-0.075	0.452**	0.442**																																
SAUNT_1	0.196	0.446**	-0.014	-0.272	-0.333*																															
SACEN_1	-0.119	0.122	0.116	0.053	-0.117	0.481**																														
SATH_1	0.106	0.496**	-0.055	-0.243	-0.369**	0.720**	0.585**																													
REST_2	0.634**	0.14	-0.046	0.074	0.142	0.045	-0.25	-0.125																												
REGGBT_2	0.261	0.728**	-0.197	-0.285*	-0.043	0.22	0.014	0.300*	0.123																											
SACHT_2	-0.023	-0.228	0.516**	0.279	0.132	-0.242	0.18	-0.142	-0.054	-0.305*																										
SACST_2	-0.315*	-0.249	0.257	0.471**	0.063	-0.272	0.07	-0.311*	-0.017	-0.378**	0.614**																									
SACOT_2	-0.23	-0.176	0.205	0.303*	0.668**	-0.493**	-0.14	-0.373**	0.024	-0.24	0.435*	0.397**																								
SAUNT_2	-0.053	0.167	-0.045	-0.194	-0.413**	0.509**	0.258	0.465**	-0.275	0.215	0.072	-0.127	-0.330*																							
SACEN_2	-0.171	0.077	0.11	-0.041	-0.269	0.254	0.737**	0.471**	-0.414*	0.181	0.226	0.064	-0.223	0.419*																						
SATH_2	-0.064	0.278	-0.078	-0.202	-0.542**	0.547**	0.497**	0.611**	-0.351*	0.316*	-0.082	-0.136	-0.519**	0.629**	0.691**																					
REST_3	0.290*	-0.129	0.1	0.094	0.072	-0.153	-0.21	-0.098	0.507**	-0.092	0.069	0.119	0.083	-0.242	-0.286*	-0.303*																				
REGGBT_3	0.347*	0.724**	-0.092	-0.398**	-0.198	0.515**	0.195	0.606**	0.177	0.624**	-0.317*	-0.283	-0.353*	0.259	0.192	0.448**	-0.013																			
SACHT_3	-0.300*	-0.106	0.231	0.14	0.123	-0.158	0.04	-0.164	-0.186	-0.294*	0.520**	0.504**	0.420*	0.005	0.048	-0.068	-0.063	-0.2																		
SACST_3	-0.390*	-0.228	0.068	0.336*	0.051	-0.251	0.02	-0.228	-0.137	-0.328*	0.363*	0.533**	0.277	-0.091	0.057	-0.147	0.018	-0.454**	0.682**																	
SACOT_3	-0.188	-0.212	0.044	0.039	0.486**	-0.383*	-0.163	-0.421**	0.02	-0.199	0.213	0.2	0.693**	-0.326*	-0.179	-0.425**	0.133	-0.302*	0.574**	0.465**																
SAUNT_3	0.165	0.279	-0.213	-0.21	-0.406*	0.533**	0.149	0.373**	0.05	0.273	-0.281	-0.216	-0.501**	0.508**	0.113	0.459**	-0.121	0.541**	-0.116	-0.326*	-0.349*															
SACEN_3	-0.184	0.047	0.064	0.14	-0.098	0.183	0.616**	0.351*	-0.346*	-0.009	0.178	0.196	-0.057	0.205	0.612**	0.407**	-0.179	0.115	0.18	0.241	-0.013	0.277														
SATH_3	0.153	0.331*	-0.204	-0.158	-0.432**	0.517**	0.257	0.566**	-0.019	0.272	-0.244	-0.154	-0.484**	0.502**	0.26	0.543**	0.079	0.579**	-0.102	-0.234	-0.385**	0.828**	0.393**													
REST_4	0.102	-0.118	0.263	0.242	0.241	-0.085	-0.019	-0.173	0.341*	-0.174	0.235	0.419**	0.254	-0.367*	-0.139	-0.285*	0.484**	-0.055	0.146	0.15	0.195	-0.284	-0.034	-0.203												
REGGBT_4	0.257	0.726**	-0.195	-0.308*	-0.189	0.376*	0.053	0.474**	0.117	0.728**	-0.252	-0.318*	-0.308*	0.186	0.094	0.397**	-0.062	0.708**	-0.135	-0.354*	-0.24	0.349*	-0.016	0.393**	-0.21											
SACHT_4	-0.055	-0.144	0.505**	0.1	0.184	-0.174	-0.058	-0.255	-0.119	-0.275	0.676**	0.470**	0.344*	0.022	0.075	-0.05	0.101	-0.209	0.577**	0.334*	0.343*	-0.349*	-0.02	-0.312*	0.379*	-0.311*										
SACST_4	-0.227	-0.21	0.251	0.25	0.087	-0.269	-0.107	-0.389**	-0.053	-0.384*	0.576**	0.673**	0.357*	-0.072	-0.04	-0.178	0.137	-0.351*	0.571**	0.602**	0.325*	-0.382*	-0.003	-0.309*	0.285*	-0.451**	0.764**									
SACOT_4	-0.179	-0.141	0.12	0.032	0.528**	-0.336*	-0.137	-0.347*	-0.065	-0.175	0.288*	0.117	0.649**	-0.261	-0.115	-0.324*	0.029	-0.331*	0.413**	0.283	0.742**	-0.471**	-0.199	-0.451**	0.169	-0.225	0.428**	0.378**								
SAUNT_4	0.232	0.328*	-0.036	-0.256	-0.338*	0.644**	0.243	0.550**	0.047	0.278	-0.235	-0.340*	-0.513**	0.569**	0.221	0.576**	-0.108	0.583**	-0.169	-0.277	-0.412**	0.791**	0.282	0.709**	-0.215	0.349*	-0.232	-0.289*	-0.325*							
SACEN_4	-0.026	0.136	0.255	-0.016	-0.063	0.313*	0.458*	0.298*	-0.172	0.11	0.287*	0.199	-0.045	0.406*	0.637**	0.563**	-0.143	0.272	0.208	0.05	-0.006	0.203	0.553**	0.281	-0.008	0.089	0.398*	0.284	0.096	0.452**						
SATH_4	0.234	0.482**	0.016	-0.310*	-0.376*	0.587**	0.356*	0.624**	-0.007	0.424*	-0.007	-0.221	-0.405*	0.647**	0.441*	0.697**	-0.12	0.666**	-0.144	-0.323*	-0.371*	0.663**	0.305*	0.681**	-0.257	0.471**	-0.033	-0.207	-0.231	0.825**	0.617**					

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATH = Threat; SACEN = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACH = Challenge); Computed correlation used pearson-method with listwise-deletion.

APPENDICES

Analysis 3 Correlation Table: Participants who competed to a high competitive level in sport previously (N=67)

	REST_1	REGGBT_SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACENT_1	SATH_1	REST_2	REGGBT_SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACENT_2	SATH_2	REST_3	REGGBT_SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACENT_3	SATH_3	REST_4	REGGBT_SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACENT_4	SATH_4			
REST_1																															
REGGBT_1	0.175																														
SACHT_1	-0.331	-0.296																													
SACST_1	-0.540*	-0.365	0.654**																												
SACOT_1	-0.492*	-0.204	0.292	0.445*																											
SAUNT_1	0.153	-0.039	0.177	0.149	-0.124																										
SACENT_1	-0.148	-0.151	0.388	0.195	0.089	0.338																									
SATH_1	-0.036	0.129	0.265	0.062	-0.218	0.506*	0.610**																								
REST_2	0.659**	0.361	-0.287	-0.393	-0.36	-0.075	-0.133	-0.105																							
REGGBT_2	0.262	0.864**	-0.344	-0.452*	-0.388	0.1	-0.112	0.196	0.303																						
SACHT_2	-0.35	-0.336	0.758**	0.698**	0.124	0.174	0.253	0.045	-0.398	-0.385																					
SACST_2	-0.404	-0.353	0.226	0.654**	0.39	-0.01	-0.085	-0.2	-0.417*	-0.466*	0.630**																				
SACOT_2	-0.191	-0.334	-0.171	0.182	0.455*	-0.16	-0.14	-0.135	-0.189	-0.517**	-0.11	0.303																			
SAUNT_2	0.216	0.328	0.033	-0.121	-0.254	0.459*	0.377	0.388	0.189	0.487*	-0.028	-0.315	-0.393																		
SACENT_2	-0.157	-0.059	0.265	0.339	-0.053	0.154	0.531**	0.531**	-0.138	-0.15	0.198	0.006	0.047	0.37																	
SATH_2	-0.06	0.243	0.333	0.093	-0.172	0.17	0.397	0.565**	0.071	0.312	0.033	-0.352	-0.204	0.718**	0.570**																
REST_3	0.619*	0.249	-0.113	-0.323	-0.347	0.074	0.113	0.059	0.720**	0.334	-0.362	-0.460*	-0.440*	0.318	-0.004	0.218															
REGGBT_3	0.094	0.482*	-0.149	-0.286	-0.149	0.175	0.041	0.142	-0.123	0.555**	-0.169	-0.252	-0.444*	0.477*	0.122	0.335	0.104														
SACHT_3	-0.394	-0.549**	0.509*	0.639**	0.153	-0.012	0.165	0.115	-0.586*	-0.512*	0.545**	0.409*	0.148	-0.339	0.311	-0.09	-0.366	-0.440*													
SACST_3	-0.422*	-0.326	0.227	0.646**	0.298	-0.058	-0.176	-0.054	-0.573**	-0.402	0.440*	0.770**	0.253	-0.317	0.129	-0.158	-0.442*	-0.202	0.673**												
SACOT_3	-0.196	-0.504*	-0.042	0.28	0.508*	-0.087	-0.281	-0.252	-0.315	-0.596**	-0.026	0.460*	0.680**	-0.614*	-0.105	-0.507*	-0.288	-0.540*	0.417*	0.491*											
SAUNT_3	0.244	0.362	-0.166	-0.234	-0.214	0.490*	0.105	0.113	0.102	0.482*	-0.026	-0.061	-0.342	0.714**	0.17	0.334	0.175	0.645**	-0.454*	-0.24	-0.38										
SACENT_3	-0.036	-0.236	0.303	0.264	-0.16	-0.116	0.173	0.149	-0.02	-0.343	0.365	0.157	-0.054	0.153	0.629**	0.19	-0.058	-0.144	0.431*	0.219	-0.031	-0.041									
SATH_3	0.025	0.530**	-0.002	-0.013	-0.147	0.09	0.28	0.382	0.133	0.493*	-0.156	-0.332	-0.208	0.711**	0.506*	0.753**	0.12	0.540*	-0.257	-0.182	-0.555**	0.480*	0.232								
REST_4	0.642**	0.246	-0.051	-0.142	-0.224	0.134	-0.088	-0.115	0.754**	0.235	-0.206	-0.229	-0.328	0.312	-0.031	0.139	0.876**	0.092	-0.384	-0.309	-0.232	0.269	0.036	0.131							
REGGBT_4	0.315	0.829**	-0.401	-0.365	-0.275	0.082	-0.2	0.137	0.273	0.760**	-0.286	-0.16	-0.218	0.322	-0.068	0.186	0.194	0.641**	-0.636**	-0.218	-0.391	0.514*	-0.301	0.470*	0.203						
SACHT_4	-0.305	-0.452*	0.462*	0.693**	0.271	0.021	-0.069	-0.055	-0.487*	-0.517*	0.654**	0.664**	0.298	-0.275	0.297	-0.125	-0.530**	-0.319	0.764**	0.733**	0.487*	-0.142	0.443*	-0.152	-0.357	-0.353					
SACST_4	-0.36	-0.274	0.239	0.589**	0.441*	-0.17	-0.271	-0.145	-0.303	-0.383	0.376	0.761**	0.36	-0.410*	0.044	-0.197	-0.440*	-0.336	0.457*	0.774**	0.599**	-0.186	0.119	-0.241	-0.282	-0.157	0.763**				
SACOT_4	-0.351	-0.334	-0.009	0.265	0.622**	-0.202	-0.415*	-0.398	-0.219	-0.444*	-0.009	0.449*	0.620**	-0.377	-0.265	-0.363	-0.451*	-0.382	0.128	0.362	0.700**	-0.258	-0.029	-0.343	-0.282	-0.307	0.355	0.619**			
SAUNT_4	0.049	-0.025	0.201	0.059	-0.097	0.613**	0.278	0.302	-0.182	0.057	0.185	0.048	-0.211	0.630**	0.357	0.476*	0.08	0.504*	-0.067	0.094	-0.18	0.757**	0.18	0.412*	0.147	0.16	0.095	-0.052	-0.153		
SACENT_4	-0.354	-0.294	0.430*	0.446*	0.184	0.058	0.508*	0.254	-0.191	-0.317	0.373	0.297	-0.118	0.263	0.529**	0.256	0.078	-0.021	0.359	0.27	0.02	0.048	0.663**	0.217	0.033	-0.313	0.285	0.146	0.075	0.363	
SATH_4	-0.187	0.359	0.166	0.055	-0.001	0.238	0.567**	0.454*	-0.034	0.404	0.039	-0.153	-0.356	0.668**	0.373	0.677**	0.232	0.610**	-0.227	-0.132	-0.533**	0.509*	0.038	0.720**	0.101	0.386	-0.246	-0.258	-0.409*	0.560**	0.462*

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATH = Threat; SACEN = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACH = Challenge); Computed correlation used pearson-method with listwise-deletion.

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Analysis 2 Correlation Table: Participants who competed up to local county level in sport previously (N=24)

	REST_1	REGGBT_1	SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACENT_1	SATH_1	REST_2	REGGBT_2	SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACENT_2	SATH_2	REST_3	REGGBT_3	SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACENT_3	SATH_3	REST_4	REGGBT_4	SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACENT_4	SATH_4		
REST_1																																		
REGGBT_1	0.191																																	
SACHT_1	-0.009	-0.084																																
SACST_1	-0.175	-0.213	0.582**																															
SACOT_1	-0.053	0.027	0.451**	0.470**																														
SAUNT_1	0.123	0.399**	-0.022	-0.287*	-0.267*																													
SACENT_1	-0.039	0.048	0.22	0.208	-0.142	0.350**																												
SATH_1	0.215	0.453**	-0.15	-0.308*	-0.396**	0.645**	0.463**																											
REST_2	0.654**	0.084	-0.088	0.052	0.006	-0.032	-0.153	-0.024																										
REGGBT_2	0.246*	0.666**	-0.173	-0.154	-0.049	0.202	0.029	0.310*	0.16																									
SACHT_2	-0.073	-0.193	0.542**	0.411**	0.255*	-0.259*	0.252*	-0.221	-0.093	-0.311*																								
SACST_2	-0.254*	-0.148	0.336*	0.576**	0.146	-0.243*	0.250*	-0.282*	-0.052	-0.221	0.719**																							
SACOT_2	-0.13	-0.078	0.283*	0.439**	0.601**	-0.510**	-0.1	-0.392**	0.037	-0.113	0.520**	0.459**																						
SAUNT_2	0.071	0.197	-0.099	-0.266*	-0.395**	0.482**	0.107	0.425**	-0.043	0.318*	-0.112	-0.187	-0.269*																					
SACENT_2	-0.065	0.137	0.159	0.095	-0.189	0.233	0.728**	0.382**	-0.18	0.232	0.265*	0.221	-0.078	0.412**																				
SATH_2	0.077	0.320**	-0.072	-0.114	-0.437**	0.493**	0.423**	0.510**	-0.037	0.471**	-0.101	-0.018	-0.324*	0.718**	0.695**																			
REST_3	0.564**	-0.119	-0.066	0.002	0.042	-0.182	-0.119	0.009	0.587**	0.045	-0.034	-0.012	0.199	-0.025	-0.125	-0.119																		
REGGBT_3	0.311*	0.727**	-0.078	-0.257*	-0.078	0.377*	0.04	0.501**	0.149	0.675**	-0.279*	-0.245*	-0.135	0.337*	0.19	0.437**	0.102																	
SACHT_3	-0.162	-0.036	0.411**	0.372*	0.202	-0.142	0.112	-0.121	-0.104	0.626**	0.576**	0.409**	-0.118	0.071	-0.084	-0.058	-0.146																	
SACST_3	-0.256*	-0.108	0.326*	0.568**	0.215	-0.176	0.198	-0.21	-0.047	-0.207	0.522**	0.656**	0.366*	-0.141	0.213	-0.03	-0.047	-0.315*	0.725**															
SACOT_3	-0.01	-0.119	0.155	0.206	0.473**	-0.369*	-0.128	-0.344**	0.098	-0.098	0.327**	0.272*	0.682**	-0.307*	-0.128	-0.339**	0.341**	-0.145	0.553**	0.511**														
SAUNT_3	0.158	0.260*	-0.268*	-0.275*	-0.275*	0.403**	-0.094	0.248*	0.113	0.248*	-0.290*	-0.245*	-0.287*	0.467**	0.037	0.315*	0.046	0.508**	-0.174	-0.353*	-0.247*													
SACENT_3	-0.141	0.079	0.008	0.169	-0.11	0.076	0.607**	0.302*	-0.105	0.1	0.135	0.22	-0.05	0.076	0.581**	0.309*	-0.126	0.083	0.152	0.280*	-0.026	0.118												
SATH_3	0.103	0.401**	-0.203	-0.167	-0.334*	0.463**	0.152	0.534**	0.024	0.346*	-0.268*	-0.148	-0.407**	0.468**	0.245*	0.495**	-0.01	0.568**	-0.084	-0.188	-0.377**	0.709**	0.355*											
REST_4	0.457**	-0.108	-0.001	0.057	0.168	-0.156	-0.042	-0.069	0.488**	0.008	0.021	0.11	0.270*	-0.172	-0.112	-0.156	0.768**	0.075	0.043	0.029	0.417**	-0.121	-0.091	-0.213										
REGGBT_4	0.092	0.647**	-0.203	-0.168	-0.045	0.262*	-0.013	0.329**	0.045	0.711**	-0.290*	-0.191	-0.167	0.195	0.094	0.377**	-0.051	0.688**	-0.148	-0.214	-0.169	0.277	0.067	0.450**	-0.109									
SACHT_4	-0.034	-0.087	0.389**	0.189	0.348**	-0.144	0.018	-0.250*	-0.199	-0.162	0.619**	0.449**	0.425**	-0.127	0.05	-0.131	0.108	-0.069	0.556**	0.358*	0.475**	-0.323**	-0.129	-0.297*	0.268*	-0.157								
SACST_4	-0.116	-0.116	0.218	0.346*	0.282*	-0.201	0.064	-0.301*	-0.108	-0.123	0.490**	0.563**	0.430**	-0.204	0.022	-0.124	0.123	-0.113	0.494**	0.544**	0.466**	-0.375**	-0.028	-0.264*	0.257*	-0.112	0.811**							
SACOT_4	-0.043	-0.043	0.128	0.154	0.534**	-0.290*	-0.153	-0.288*	-0.053	-0.027	0.364**	0.217	0.651**	-0.243*	-0.108	-0.238	0.215	-0.089	0.420**	0.334*	0.758**	-0.290*	-0.196	-0.376*	0.336*	-0.075	0.600**	0.569**						
SAUNT_4	0.249*	0.341*	-0.22	-0.373**	-0.320*	0.559**	0.13	0.517**	0.032	0.371*	-0.205	-0.251*	-0.371**	0.511**	0.169	0.429**	0.047	0.534**	-0.176	-0.338*	-0.295*	0.732**	0.136	0.606**	-0.04	0.295*	-0.135	-0.191	-0.147					
SACENT_4	0.032	0.234	0.021	-0.007	0.005	0.261*	0.466**	0.317**	-0.12	0.319*	0.193	0.205	0.022	0.203	0.551**	0.391**	0.008	0.318*	0.142	0.091	0.074	0.103	0.522**	0.284*	0.077	0.242*	0.394**	0.403**	0.225	0.413**				
SATH_4	0.212	0.437**	-0.129	-0.305*	-0.254*	0.585**	0.351**	0.584**	-0.024	0.468**	-0.009	-0.183	-0.333*	0.554**	0.433**	0.589**	-0.036	0.571**	-0.195	-0.298*	-0.308*	0.501**	0.251*	0.646**	-0.149	0.453**	0.044	-0.025	-0.11	0.729**	0.665**			

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATH = Threat; SACEN = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACH = Challenge); Computed correlation used pearson-method with listwise-deletion.

APPENDICES

Analysis 3 Correlation Table: Participants who didn't have any history of competitive sport (N=29)

	REST_1	REGGBT	SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACENT_1	SATH_1	REST_2	REGGBT	SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACENT_2	SATH_2	REST_3	REGGBT	SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACENT_3	SATH_3	REST_4	REGGBT	SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACENT_4	SATH_4	
REST_1																																	
REGGBT_1	0.209																																
SACHT_1	-0.187	-0.108																															
SACST_1	-0.364**	-0.292*	0.689**																														
SACOT_1	-0.365**	-0.187	0.396*	0.506**																													
SAUNT_1	0.192	0.310*	0.038	-0.221	-0.251																												
SACENT_1	0.01	0.018	0.266*	0.199	-0.161	0.213																											
SATH_1	0.25	0.353**	-0.096	-0.317	-0.472**	0.513**	0.422**																										
REST_2	0.651**	0.181	-0.182	-0.116	-0.224	-0.046	-0.025	-0.007																									
REGGBT_2	0.244	0.711**	-0.207	-0.22	-0.243	0.155	0.083	0.281*	0.280*																								
SACHT_2	-0.242	-0.178	0.680**	0.649**	0.339*	-0.07	0.219	-0.167	-0.208	-0.261*																							
SACST_2	-0.268*	-0.169	0.376*	0.660**	0.308*	-0.138	0.207	-0.223	-0.138	-0.14	0.765**																						
SACOT_2	-0.165	-0.228	0.229	0.457**	0.616**	-0.451**	-0.111	-0.417**	-0.066	-0.147	0.391**	0.448**																					
SAUNT_2	0.283*	0.383**	-0.096	-0.292*	-0.394*	0.510**	0.134	0.457**	0.222	0.447**	-0.199	-0.263*	-0.326*																				
SACENT_2	0.03	0.225	0.163	0.224	-0.15	0.121	0.643**	0.368**	0.093	0.279*	0.196	0.267*	0.052	0.358*																			
SATH_2	0.199	0.448**	0.04	-0.069	-0.394*	0.359*	0.368**	0.537**	0.247	0.537**	-0.087	-0.066	-0.248	0.777**	0.635**																		
REST_3	0.651**	0.024	-0.123	-0.145	-0.083	-0.122	0.12	0.139	0.573**	0.226	-0.153	-0.195	0.058	0.214	0.167	0.151																	
REGGBT_3	0.257*	0.644**	-0.084	-0.278*	-0.126	0.24	0.005	0.301*	0.069	0.684**	-0.146	-0.179	-0.112	0.476**	0.233	0.462**	0.145																
SACHT_3	-0.17	-0.155	0.595**	0.597**	0.292*	-0.065	0.118	-0.014	-0.174	-0.259*	0.684**	0.536**	0.334*	-0.286*	0.097	-0.092	-0.156	-0.205															
SACST_3	-0.266*	-0.151	0.439**	0.754**	0.374*	-0.164	0.089	-0.197	-0.102	-0.186	0.551**	0.702**	0.368**	-0.304*	0.239	-0.032	-0.178	-0.234	0.690**														
SACOT_3	-0.054	-0.270*	0.186	0.368**	0.617**	-0.311*	-0.182	-0.352**	-0.009	-0.221	0.265*	0.338**	0.741**	-0.464**	-0.102	-0.404**	0.177	-0.222	0.464**	0.489**													
SAUNT_3	0.248	0.417**	-0.204	-0.393**	-0.203	0.436**	-0.116	0.153	0.161	0.336*	-0.117	-0.199	-0.206	0.594**	0.087	0.325*	0.137	0.595**	-0.350**	-0.397**	-0.320*												
SACENT_3	-0.012	0.042	0.086	0.124	-0.238	-0.037	0.487**	0.302*	0.111	0.036	0.151	0.158	-0.158	0.072	0.602**	0.291*	0.059	0.029	0.184	0.209	-0.166	-0.021											
SATH_3	0.128	0.578**	-0.074	-0.237	-0.305*	0.342*	0.198	0.536**	0.058	0.425**	-0.17	-0.197	-0.359**	0.604**	0.361*	0.641**	0.004	0.567**	-0.161	-0.239	-0.537**	0.516**	0.337*										
REST_4	0.645**	0.038	-0.088	-0.069	-0.024	-0.068	0.027	0.027	0.578**	0.213	-0.109	-0.1	0.02	0.122	0.074	0.077	0.885**	0.154	-0.189	-0.149	0.163	0.093	0.032	-0.032									
REGGBT_4	0.152	0.723**	-0.193	-0.232	-0.153	0.241	0.001	0.217	0.13	0.695**	-0.23	-0.078	-0.182	0.335*	0.144	0.418**	0.043	0.674**	-0.243	-0.142	-0.275*	0.399*	0.102	0.577**	0.074								
SACHT_4	-0.115	-0.114	0.400**	0.464**	0.438**	-0.012	-0.013	-0.139	-0.295*	-0.158	0.617**	0.501**	0.433**	-0.255	0.039	-0.172	-0.069	0.01	0.614**	0.427**	0.512**	-0.143	-0.026	-0.158	0.038	-0.037							
SACST_4	-0.159	-0.085	0.249	0.512**	0.471**	-0.117	0.01	-0.183	-0.159	-0.011	0.433**	0.572**	0.450**	-0.356*	0.031	-0.132	-0.075	0.005	0.455**	0.557**	0.553**	-0.271*	-0.044	-0.235	0.068	0.08	0.824**						
SACOT_4	-0.114	-0.132	0.147	0.334*	0.653**	-0.238	-0.283*	-0.362**	-0.111	-0.081	0.293*	0.335**	0.691**	-0.333*	-0.211	-0.325*	0.121	-0.034	0.329*	0.319*	0.779**	-0.137	-0.267*	-0.365**	0.186	-0.118	0.634**	0.680**					
SAUNT_4	0.247	0.304*	-0.145	-0.367**	-0.325*	0.551**	0.171	0.424**	-0.015	0.307*	-0.027	-0.09	-0.338**	0.488**	0.209	0.414**	0.138	0.532**	-0.163	-0.268*	-0.297*	0.706**	0.156	0.462**	0.161	0.322*	0.058	-0.049	-0.098				
SACENT_4	0.003	0.19	0.061	0.097	0.018	0.198	0.482**	0.339**	0.006	0.248	0.168	0.24	-0.073	0.105	0.479**	0.297*	0.158	0.327*	0.152	0.102	0.01	0.135	0.572**	0.332*	0.18	0.272*	0.322*	0.337**	0.155	0.472**			
SATH_4	0.127	0.503**	-0.107	-0.261*	-0.221	0.491**	0.406*	0.526**	0.027	0.489**	-0.126	-0.141	-0.364**	0.531**	0.363*	0.584**	0.121	0.608**	-0.226	-0.289*	-0.406*	0.506**	0.164	0.685**	0.057	0.528**	0.036	0.008	-0.177	0.647**	0.644**		

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATH = Threat; SACEN = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACH = Challenge); Computed correlation used pearson-method with listwise-deletion.

APPENDICES

Analysis 3 Correlation Table: Participants who had some history of competitive sport (N=59)

	REST_1	REGGBT_1	SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACENT_1	SATHI_1	REST_2	REGGBT_2	SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACENT_2	SATHI_2	REST_3	REGGBT_3	SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACENT_3	SATHI_3	REST_4	REGGBT_4	SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACENT_4	SATHI_4	
REST_1																																	
REGGBT_1	0.223																																
SACHT_1	0.14	-0.217																															
SACST_1	-0.083	-0.219	0.394*																														
SACOT_1	0.189	0.15	0.462**	0.487**																													
SAUNT_1	0.076	0.292	-0.042	-0.18	-0.268																												
SACENT_1	-0.004	0.036	0.126	0.132	-0.182	0.605**																											
SATHI_1	0.108	0.468**	-0.069	-0.192	-0.287	0.768**	0.650**																										
REST_2	0.660**	0.13	-0.006	0.081	0.191	0.024	-0.231	-0.036																									
REGGBT_2	0.306	0.714**	-0.239	-0.245	0.062	0.231	-0.149	0.318	0.04																								
SACHT_2	0.034	-0.362*	0.428*	0.153	0.094	-0.353*	0.182	-0.22	-0.063	-0.476*																							
SACST_2	-0.370*	-0.293	0.196	0.460**	0.048	-0.347	0.059	-0.392*	-0.108	-0.569**	0.601**																						
SACOT_2	-0.243	-0.025	0.208	0.347	0.604**	-0.445*	-0.139	-0.326	0.003	-0.279	0.501**	0.481**																					
SAUNT_2	-0.17	-0.006	-0.064	-0.175	-0.379*	0.436*	0.225	0.401*	-0.355*	0.196	0.021	-0.167	-0.279																				
SACENT_2	-0.126	-0.101	0.125	-0.094	-0.353*	0.392*	0.733**	0.527**	-0.541*	-0.046	0.249	-0.042	-0.234	0.528**																			
SATHI_2	-0.123	0.061	-0.147	-0.195	-0.520**	0.579**	0.486**	0.578**	-0.458**	0.231	-0.176	-0.241	-0.472**	0.645**	0.716**																		
REST_3	0.377*	-0.102	0.056	0.065	0.005	-0.08	-0.291	-0.115	0.694**	-0.131	0.011	0.129	0.003	-0.252	-0.462**	-0.361*																	
REGGBT_3	0.304	0.733**	-0.126	-0.276	-0.089	0.521**	0.174	0.649**	0.172	0.590**	-0.474*	-0.418*	-0.390*	0.193	0.15	0.381*	0.034																
SACHT_3	-0.400*	-0.219	0.126	0.04	0.06	-0.217	0.114	-0.191	-0.341	-0.408*	0.502**	0.571**	0.424*	0.022	0.181	-0.104	-0.121	-0.259															
SACST_3	-0.416*	-0.235	0.032	0.169	0.034	-0.176	0.108	-0.224	-0.297	-0.411*	0.453**	0.647**	0.397*	0.015	0.047	-0.24	-0.025	-0.450**	0.780**														
SACOT_3	-0.245	-0.187	-0.001	-0.045	0.329	-0.337	-0.229	-0.382*	-0.077	-0.221	0.31	0.342	0.623**	-0.248	-0.239	-0.424*	0.099	-0.324	0.671**	0.630**													
SAUNT_3	0.076	0.16	-0.316	-0.149	-0.392*	0.456*	0.176	0.341	0.024	0.283	-0.402*	-0.27	-0.524**	0.470*	0.205	0.486**	-0.079	0.488**	-0.119	-0.285	-0.313												
SACENT_3	-0.142	0.008	-0.028	0.143	-0.105	0.223	0.614**	0.298	-0.388*	-0.077	0.119	0.13	0.001	0.225	0.577**	0.338	-0.344	0.106	0.222	0.185	0.062	0.374*											
SATHI_3	0.1	0.258	-0.329	-0.037	-0.369*	0.459*	0.22	0.499**	0.087	0.324	-0.395*	-0.229	-0.457**	0.431*	0.257	0.481**	0.116	0.579**	-0.112	-0.175	-0.306	0.868**	0.402*										
REST_4	0.065	-0.122	0.213	0.206	0.297	-0.091	-0.069	-0.242	0.440*	-0.326	0.165	0.431*	0.380*	-0.489**	-0.364*	-0.439*	0.462**	-0.105	0.252	0.238	0.424*	-0.356*	-0.184	-0.311									
REGGBT_4	0.218	0.643**	-0.378*	-0.275	-0.126	0.237	-0.018	0.470**	0.069	0.763**	-0.454**	-0.491**	-0.29	0.07	0.002	0.27	-0.028	0.691**	-0.336	-0.462**	-0.244	0.272	-0.107	0.326	-0.3								
SACHT_4	-0.098	-0.318	0.444*	-0.043	0.192	-0.315	-0.081	-0.359*	-0.194	-0.412*	0.658**	0.496*	0.415*	-0.036	0.098	-0.153	0.095	-0.397*	0.607**	0.484*	0.463**	-0.513*	-0.041	-0.476*	0.375*	-0.569**							
SACST_4	-0.286	-0.378*	0.192	0.18	0.105	-0.408*	-0.163	-0.488**	-0.174	-0.591**	0.574**	0.710**	0.458**	-0.099	-0.094	-0.308	0.165	-0.576**	0.590**	0.722**	0.461**	-0.509*	-0.071	-0.392*	0.281	-0.705**	0.767**						
SACOT_4	-0.176	-0.136	0.062	-0.026	0.455**	-0.378*	-0.205	-0.303	-0.08	-0.179	0.352*	0.179	0.662**	-0.225	-0.14	-0.296	0.004	-0.372*	0.463**	0.455**	0.762**	-0.513*	-0.156	-0.449**	0.247	-0.247	0.453*	0.445*					
SAUNT_4	0.192	0.247	-0.139	-0.207	-0.288	0.631**	0.271	0.599**	0.051	0.326	-0.339	-0.466**	-0.459**	0.652**	0.316	0.616**	-0.078	0.536*	-0.185	-0.294	-0.360*	0.809**	0.287	0.762**	-0.377*	0.259	-0.408*	-0.505**	-0.345				
SACENT_4	-0.096	-0.054	0.182	-0.009	-0.062	0.269	0.456*	0.313	-0.367*	-0.027	0.278	0.072	0.053	0.504*	0.691**	0.537**	-0.187	0.075	0.271	0.092	0.029	0.139	0.577**	0.229	-0.184	-0.169	0.366*	0.172	0.094	0.345			
SATHI_4	0.252	0.29	-0.045	-0.233	-0.316	0.557**	0.365*	0.679**	-0.014	0.379*	-0.066	-0.365*	-0.347	0.709**	0.518*	0.685**	-0.064	0.559**	-0.186	-0.301	-0.365*	0.645**	0.386*	0.696**	-0.410*	0.325	-0.238	-0.438*	-0.296	0.873**	0.552**		

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATH = Threat; SACEN = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACHT = Challenge); Computed correlation used pearson-method with listwise-deletion.

APPENDICES

Analysis 3 Correlation Table: Participants who persisted in sport past final exam (N=43)

	REST_1	REGGBT_1	SACHT_1	SACST_1	SACOT_1	SAUNT_1	SACENT_1	SATHI_1	REST_2	REGGBT_2	SACHT_2	SACST_2	SACOT_2	SAUNT_2	SACENT_2	SATHI_2	REST_3	REGGBT_3	SACHT_3	SACST_3	SACOT_3	SAUNT_3	SACENT_3	SATHI_3	REST_4	REGGBT_4	SACHT_4	SACST_4	SACOT_4	SAUNT_4	SACENT_4	SATHI_4		
REST_1																																		
REGGBT_1	0.095																																	
SACHT_1	-0.161	-0.103																																
SACST_1	-0.204	-0.175	0.731**																															
SACOT_1	-0.372*	-0.022	0.388*	0.527**																														
SAUNT_1	0.107	0.085	0.037	-0.147	-0.162																													
SACENT_1	0.111	-0.062	0.314*	0.252	-0.183	0.204																												
SATHI_1	0.293	0.226	-0.115	-0.29	-0.416**	0.467**	0.404*																											
REST_2	0.658**	0.145	-0.175	-0.127	-0.209	-0.102	0.032	0.103																										
REGGBT_2	0.199	0.674**	-0.206	-0.131	-0.214	0.138	0.052	0.278	0.229																									
SACHT_2	-0.211	-0.225	0.649**	0.651**	0.357*	-0.106	0.229	-0.253	-0.216	-0.320*																								
SACST_2	-0.243	-0.132	0.347*	0.687**	0.349*	-0.155	0.222	-0.268	-0.18	-0.129	0.773**																							
SACOT_2	-0.15	-0.137	0.236	0.549**	0.539**	-0.395**	-0.118	-0.377*	-0.101	-0.148	0.439**	0.533**																						
SAUNT_2	0.281	0.340*	-0.112	-0.305*	-0.359**	0.462**	0.087	0.399**	0.269	0.531**	-0.285	-0.312*	-0.29																					
SACENT_2	0.135	0.222	0.193	0.24	-0.118	0.18	0.642**	0.346*	0.17	0.234	0.184	0.229	0.13	0.418**																				
SATHI_2	0.24	0.426**	0.026	-0.058	-0.330*	0.333*	0.358*	0.490**	0.324*	0.633**	-0.161	-0.126	-0.159	0.807**	0.654**																			
REST_3	0.737**	-0.01	-0.139	-0.132	-0.13	-0.089	0.126	0.163	0.670**	0.199	-0.14	-0.165	0.022	0.255	0.175	0.198																		
REGGBT_3	0.164	0.601**	-0.083	-0.138	-0.005	0.124	-0.068	0.216	-0.003	0.675**	-0.174	-0.205	-0.046	0.491**	0.235	0.449**	0.156																	
SACHT_3	-0.159	-0.255	0.594**	0.676**	0.277	-0.081	0.153	0.009	-0.23	-0.316*	0.696**	0.570**	0.320*	-0.330*	0.15	-0.138	-0.155	-0.231																
SACST_3	-0.183	-0.068	0.489**	0.798**	0.447**	-0.084	0.142	-0.176	-0.13	-0.121	0.623**	0.794**	0.497**	-0.288	0.251	-0.082	-0.145	-0.118	0.747**															
SACOT_3	-0.047	-0.297	0.206	0.460*	0.569**	-0.247	-0.208	-0.279	-0.077	-0.254	0.352*	0.465*	0.707**	-0.447**	-0.084	-0.387*	0.175	-0.208	0.482**	0.608**														
SAUNT_3	0.157	0.277	-0.285	-0.355*	-0.113	0.29	-0.237	0.016	0.153	0.28	-0.145	-0.195	-0.091	0.589**	0.115	0.302*	0.161	0.525**	-0.391**	-0.326*	-0.283													
SACENT_3	0.05	0.017	0.045	0.12	-0.275	-0.085	0.442**	0.24	0.203	0.016	0.115	0.12	-0.156	0.057	0.561**	0.236	0.013	-0.005	0.205	0.179	-0.175	-0.049												
SATHI_3	0.05	0.625**	-0.131	-0.161	-0.193	0.205	0.145	0.440**	0.148	0.532**	-0.273	-0.253	-0.286	0.575**	0.392**	0.634**	-0.023	0.549**	-0.177	-0.17	-0.530**	0.421**	0.327*											
REST_4	0.712**	0.013	-0.123	-0.084	-0.022	-0.077	0.019	0.01	0.649**	0.18	-0.125	-0.11	0.041	0.122	0.04	0.088	0.896**	0.137	-0.167	-0.092	0.249	0.063	-0.019	-0.1										
REGGBT_4	0.042	0.656**	-0.283	-0.152	-0.076	0.086	-0.043	0.118	0.061	0.691**	-0.326*	-0.075	-0.131	0.293	0.132	0.380*	-0.001	0.640**	-0.381**	-0.088	-0.298	0.292	0.084	0.573**	0.023									
SACHT_4	-0.131	-0.218	0.333*	0.471**	0.506**	-0.067	-0.008	-0.206	-0.372*	-0.18	0.583**	0.510**	0.511**	-0.342*	0.046	-0.258	-0.056	-0.032	0.627**	0.526**	0.634**	-0.224	-0.037	-0.248	0.027	-0.107								
SACST_4	-0.144	-0.128	0.202	0.519**	0.549**	-0.178	-0.005	-0.227	-0.211	0.017	0.390**	0.561**	0.547**	-0.406**	-0.003	-0.201	-0.018	-0.016	0.437**	0.596**	0.684**	-0.327*	-0.082	-0.274	0.106	0.086	0.838**							
SACOT_4	-0.113	-0.112	0.125	0.392**	0.645**	-0.229	-0.318*	-0.314*	-0.157	-0.023	0.367*	0.441*	0.693**	-0.313*	-0.185	-0.274	0.107	0.039	0.329*	0.459**	0.787**	-0.098	-0.247	-0.333*	0.227	-0.1	0.713**	0.795**						
SAUNT_4	0.195	0.169	-0.244	-0.358*	-0.276	0.493**	0.149	0.409**	-0.068	0.319*	0.008	-0.055	-0.21	0.539**	0.27	0.406**	0.172	0.455*	-0.152	-0.241	-0.221	0.651**	0.113	0.383*	0.136	0.213	0.048	-0.098	-0.032					
SACENT_4	-0.051	0.096	-0.01	0.142	0.067	0.127	0.507**	0.350*	-0.07	0.239	0.152	0.203	-0.033	0.087	0.475**	0.238	0.166	0.227	0.164	0.157	0.034	0.01	0.589**	0.301	0.137	0.184	0.295	0.315*	0.188	0.400**				
SATHI_4	0.078	0.385*	-0.166	-0.209	-0.098	0.421**	0.454*	0.503**	0.011	0.516**	-0.194	-0.193	-0.311*	0.531**	0.410**	0.564**	0.184	0.509**	-0.284	-0.268	-0.411**	0.359*	0.165	0.677**	0.053	0.463**	-0.058	-0.052	-0.175	0.577**	0.630**			

(REST = Resilience; SPORTEXP = Past sporting experience; REGGBT = Regulation of goal directed behaviour at work; SACST = Controllable by self; SATHI = Threat; SACEN = Centrality; SAUN = Uncontrollable; SACO = Controllable by others; SACHT = Challenge); Computed correlation used pearson-method with listwise

DEVELOPING HYPOTHESES OF THE CONCEPT OF RESILIENCE

Section 4: R code merge and data cleaning

Note: See accompanying CD with Rstudio analysis code