DEVELOPMENT AND VALIDATION OF RESILIENCE TOOL

A thesis submitted during December 2020 to the Centre for Health Psychology, School of Medical Sciences, University of Hyderabad in partial fulfilment of the award of

DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

by

AARTHI RAJENDRAN

Centre for Health Psychology
School of Medical Sciences

University of Hyderabad
Central University Campus (P.O.)
Gachibowli, Prof. C.R. Rao Road
Hyderabad - 500 046, Telangana, India

Development and Validation of Resilience Tool

A thesis submitted during December 2020 to the Centre for Health Psychology, School of Medical Sciences,
University of Hyderabad in partial fulfilment of the award of a

DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

by
AARTHI RAJENDRAN
Registration No. 13CPPH03
Senior Research Fellow, UGC-NFOBC

Guide:
Prof. Meena Hariharan

Centre for Health Psychology
School of Medical Sciences

University of Hyderabad
Central University Campus P.O.
Gachibowli, Prof. C.R. Rao Road
Hyderabad - 500 046, Telangana, India

DECLARATION

I, Aarthi Rajendran, hereby declare that this thesis entitled “Development and Validation of Resilience Tool" submitted by me under the guidance and supervision of Prof. Meena Hariharan is a bonafide research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or Institution for the award of any degree or diploma. I hereby agree that my thesis can be deposited in Shodganga/INFLIBNET.

A report on plagiarism statistics from the University Librarian is enclosed.

Date: 14/12/2020

AARTHI RAJENDRAN
Regd. No. 13CPPH03
Senior Research Fellow, UGC-NFOBC

// Countersigned //

Prof. MEENA HARIHARAN
Guide

CERTIFICATE

This is to certify that the thesis entitled *"Development and Validation of Resilience Tool"* submitted by Aarthi Rajendran, Senior Research Fellow, UGC-NFOBC, bearing Registration Number 13CPPH03 in partial fulfilment of the requirements for award of Doctor of Philosophy in Psychology in the Centre for Health Psychology under School of Medical Sciences is a bonafide work carried out by her under my supervision and guidance.

This thesis is free from plagiarism and has not been submitted previously in part or in full to this or any other University or Institution for award of any degree or diploma.

Further, the student has the following publications before submission of the thesis for adjudication and has produced evidence for the same in the form of the reprint in the relevant area of her research:

1. **Rajendran, A.** (2020). Evolution of the Construct of Resilience: Challenges in Measurement. *Journal of Health Studies, 2*(2), 85-99.

2. **Rajendran, A.,** Hariharan, M. & Rao, C. R. (2019). A Holistic Approach to Measuring Resilience: Development and Initial Validation of Resilience Test Battery. *International Journal of Humanities & Social Science Studies, 6(3),* 52-64. (p-ISSN: 2349-6711, e-ISSN: 2349-6959(e)) (This publication appears in the chapter II of review of literature)

3. Nagpal, A. N., **Rajendran, A**., Hariharan, M., Naga Seema, N. D. S., & Rao, C. R. (2017). Conceptualizing HIV/AIDS: Developmental Trend in School Children. Journal of Nursing and Health Science, 6(6), 74-81. (p-ISSN: 2320–1940, e-ISSN: 2320–1959)

4. Sushma, B., **Rajendran, A.,** Agarwal, S., Das, S. & Caroline. A. (2015). Learning Styles and Self-Regulation: An Exploratory Study among University Students in India. The International Journal of Humanities & Social Studies, 3(3), 134-138. (ISSN 2321 - 9203)

5. Sushma, B., **Rajendran, A.** (2015). Substance Use in Urban Residential and Non-Residential College Students: A Knowledge Attitude and Practise Study. Steward Social Sciences and Humanities Review, 1(2), 1-4. (ISSN: 2347-7466)

6. Fernandes, T. **Rajendran, A.,** & Bohra, S. (2015). Cognitive Emotional Regulation: In the Context of Breast Cancer. The International Journal of Indian Psychology, 2(4), 14-25. (ISSN: 2349-3429)

She has made presentations in the following conferences:

1. Pathways to Resilience IV organised by Resilience Research Centre, Dalhousie University, held at Cape Town, South Africa, between 14th-16th June 2017 (International)

2. National Seminar on Health Psychology: Contributions to Health and Wellbeing organised by and held at Centre for Health Psychology, University of Hyderabad, Hyderabad, India, between 4th-6th August 2016

3. International Conference on Psychology and Allied Sciences, organized by Indian Association of Health, Research, and Welfare, held at Goa, India, between 16th-18th January 2016

4. National Seminar on Psychology on Cross-roads: Integrating theory, research, and practice organized by Periyar University held at Salem, Tamil Nadu, India, between 20th-21st February 2015

5. XXIII Annual Convention of National Academy of Psychology (NAOP) organised by National Institute of Technology, held at Rourkela, India, between 13th-15th December 2013

6. National Seminar on Obesity Contemporary Issues and Challenges organised by and held at Centre for Health Psychology, University of Hyderabad, Hyderabad, India, between 6th-7th August 2013

Further, the student has passed the following courses towards fulfilment of coursework requirement for Ph.D.

Course Code	Name	Credits	Pass/Fail
1. HP 826	Research Methodology and Advanced Statistics (Theory Paper I)	4	Pass
2. HP 827	Book Review (Paper II)	4	Pass
3. HP 828	Review Paper (Paper III)	4	Pass
4. HP 829	Empirical Paper (Paper IV)	4	Pass

Guide Head of the Centre Dean of the School

*This above proper channel is followed through e-governance portal while doing the online submission of the thesis.

ACKNOWLEDGEMENTS

The journey of PhD. is an interesting one. I have met many people in this journey. Some of them were for a brief time, some came into my life en route, some have left, and some continue even now. I am grateful to all of them, for whatever duration they have been with me. I have learnt valuable lessons, cried out to them, laughed with them and now miss them. Overall, I am grateful to every person and experience that has touched me, helped me pause and get a perspective. Such an expression seems infinite. However, with the compulsion to make it finite, I make a humble attempt to offer my gratitude to the people who have been and who continue to be my spine.

Firstly, I am grateful for being alive through this journey. I am grateful to God to keep alive through, for giving me such a loving family. My parents, I can call them love personified. They have given me the freedom and support to pursue my dreams. They continue to stand strong with me in every decision I make in my life. I am grateful to my brother, my buddy, who has tolerated all my tantrums and mood swings and continues to be my rock. He manages to make me laugh in the gloomiest of times. I am grateful to my grandmother, who is no more but lives through every action of mine. She has taught me to live courageously, disciplined, true to oneself, and undeterred by external factors. She is the pioneer of my spiritual journey and the person behind who I am today. I am thankful to my steadfast companion Ms. Shwethambari. Though she joined my journey lately, she has been with me in every high and low tide, like the sails of my ship.

I am grateful to my teachers who made me read, write, speak, and laid the foundation for my pursuit of higher studies. I am thankful to my teachers of my Intermediary education and my Bachelor’s education, for taking efforts in carving my character and personality especially during the times of adolescence. I am grateful to

Dr. Tina Fernandes and Ms. Anoopa Lima for seeing the research aptitude in me at a very early age and encouraging me to hone my skills and move in that direction. My heartful gratitude to my teachers of my Masters education, Prof. Meena Hariharan, Dr. G. Padmaja, Dr. Meera Padhy, Dr. Suvashisa Rana, Dr. Thomas Kishore, Dr. N. D. S. Nagaseema, and Dr. B. Sushma for being supportive and encouraging. They have not just taught what is found in books but taught discipline, which further shaped my character and ethics.

I am thankful to my first guide of my doctoral research Dr. B. Sushma for guiding me and teaching me research skills and ethics. However, it came to an early close due to her personal commitments. After a period of lull, it was Prof. Meena Hariharan who agreed to guide me with my doctoral research. I am ever grateful to my mentor and guide, Meena madam for reviving my PhD journey, for being an encouraging critic of my work and at the same time giving me emotional support. Research acumen, involvement in working, an eye for details, and an organised way of functioning are the aspects from you that I will always carry with me. You not just challenged me by setting the bar high but believed that I have it in me to reach it. I express my sincere gratitude to Prof. Meena ma'am and Dr. Rana sir for proposing such a complex and comprehensive model – Synergy Model of Resilience, which is the backbone of my PhD. work. I'm grateful to Prof. C. Raghavendra Rao sir (Professor, School of Computer and Information Sciences, University of Hyderabad) for being patient with me and helping us out, throughout the conception and functioning of the formula. I'm thankful to Dr. Balakrishna sir (Scientist E (Retd), National Institute of Nutrition) for helping us out during our final results phase with his timely help and inputs.

I fondly thank all my senior doctoral scholars, especially Dr. Swati Agarwal, and Dr. Asher Andrew for being a hand to teach and a hand to hold to cross rough

patches. I am grateful to my friend Ms. Maya Sravanthi who has her vivid ways of making sense to me always. I fondly thank all my juniors, especially Ms. Swarajya Kopparty, Ms. Aarti Nagpal Mehta, Ms, Sandra Monteiro, Ms. Matatey Ralte, and Ms. D. Asha Benjamin who very beautifully transitioned into my friends. Further, I am thankful to my juniors Ms. Sharon Shulamite and M. Suma Lavanya Mutnury, whom I had taught and later was fortunate to have them as fellow scholars and fondly my dear friends. All thanks to these wonderful people that my PhD journey has been full of colour, joy, and the fortune to have a hearty laugh even amidst tears.

My sincere gratitude to the office staff of Centre for Health Psychology, Ms. Sucharita Dandigari, Ms. Srilatha, Mr. Varaprasad, and Mr. Shyam. I sincerely thank Ms. Sucharita Dandigari for her timely administrative communication, her personal dedication in every official work she is entrusted with and for always being a reliable and trustworthy support through my PhD journey.

I convey my gratitude to the esteemed academic institutions Centre for Health Psychology, University of Hyderabad, and University Grants Commission (for covering me with fellowship). I thank them for giving me an opportunity to pursue my dream. I also extend my gratitude to all the researchers whose work has been the skeletal system of my academic literature. I also deeply thank my participants of the study for consenting and cooperating with me through the course of the research.

I am so very grateful to every heart that prayed for me, and wished me well that kept me going strong throughout this journey. Lastly, I am thankful to this very journey, for it made me a better person. It has made me a little more patient, sensitive, sensible, and empathetic that just as I have one, everyone has their own journey.

AARTHI RAJENDRAN

Abstract

Resilience as a construct has been studied by various disciplines like Physics, Engineering Sciences, and Psychology. The discipline of Psychology has studied resilience for more than four decades. When the consequence of a risk factor or adversity, transitioned from maladaptive coping (vulnerability) to achievement and growth (invulnerability), the construct of resilience gained attention. Since then resilience has to its credit multitude of definitions, theories, models, and tools measuring it. However, the same construct faces conceptual absurdity, and methodological issues. Reasons for such a contradiction are lack of conceptual understanding, and inefficient and ineffective transition from conceptual understanding to measurement of the construct. Such a misalignment has resulted in misreflection or non-reflection of the characteristics of resilience viz. multidimensional, multifactorial, multilevel, and dynamic. This solicits the need for theory, psychometrics and testing to be aligned and function like a well-lubricated machine. Thus, the present study builds on the foundation of Hariharan-Rana Synergy Model of Resilience, and proceeds with construction of Resilience Test (REST) Battery, validating it, and using it to test the Synergy Model of Resilience. The study adopted a mixed method, to develop the REST Battery and test the Synergy Model of Resilience. This involved steps like development of REST Battery, evolution of a mathematical approach to quantify resilience through Resilience Index, categorising the levels of resilience, and testing the model (quantitatively and qualitatively). To meet the requirements of every stage, a multistage purposive sampling technique was used. A total of 1843 participants were recruited phase-wise. The sample belonged to the age range of 19 years – 39 years, from major cities of Southern States of India and inclusive of different socio-economic levels. The developed REST Battery comprised of five scales viz. Adversity scale, Protective factors scale, Promotive factors scale, Achievement scale, and Flourishing scale. The

cascading formulae evolved the Resilience Index, which was capable to quantify, identify resilience and categorise the sample into three levels of resilience viz. Resilients, Survivors, and Non-Resilients. Testing of the Synergy Model of Resilience using the REST Battery was achieved through Structural Equation Model. This was successful and further led to the meaningful revision of the model. The techniques used like In-depth interviews and thematic analysis were successful in qualitatively validating Synergy Model of Resilience. The uniqueness, strengths, implications and limitations of the study are discussed further.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

INTRODUCTION

"When life gives you lemons, make lemonade out of them", reads an, English proverb, which means even when life presents one with tough situations, one needs to make the best out of it. This proverb can be a very 'literary' illustration of the concept of Resilience. The construct of Resilience gained significance especially when there was a paradigm shift from the deficiency model of human functioning to more positive framework of efficiency, competence, and wellbeing.

The construct of resilience was initially referred to as being 'invulnerable', wherein it was considered as a rare 'trait' of a few individuals. These individuals made the best of themselves despite experiencing adverse situations. Resilience has been researched for past four decades. With every wave of research new revelations about the construct unfolds. For instance, what was called as a 'trait' (innate) in 1970s was later called as a trainable ability or capacity (Ordinary Magic) (Masten, 1999). With revelation, the construct underwent changes. For instance, resilience once called a 'product' (Block and Block, 1989) was later called a 'process' (Rutter, 1999). When resilience began to be understood as a 'process', other characteristics of resilience started surfacing i.e. resilience being multifactorial, multidimensional, multilevel, and dynamic.

Multifactorial denotes that, there are certain integral factors that play a pivotal role in the process of resilience viz. adversity, one's resources (internal and external), and outcome or output at the end of the process of resilience. 'Multidimensional' denotes that the factors involved in the process are required to be comprehended in a multidimensional manner, unlike the presence or absence of these factors. For instance, adversity needs to be seen and measured in dimensions like what is the magnitude of the adverse situation (severity), how long has the individual been experiencing the crisis situation (duration) and how often or

seldom the crisis situation occurs to the individual (frequency). The reason behind including these dimensions is that these three dimensions help in segregating the range of adversity i.e. minor aberrations (ill health) to severe adversity (major accident), from daily hassles (work pressure) to critical life events (death of a loved one).

When struck by an adverse situation, the individual makes an assessment and appraisal of one's resources that are operative and functional. These resources consist of two dimensions, viz. one's internal characteristics (positive thinking, being enterprising etc.) and external resources like significant others (supportive parents, teacher, spouse etc.) and important facilities (access to health care). The role of such resources is to act as a buffer against negative impact of adversity, resist such negative impact, and perform and excel amidst tough situations. The question is, do these factors cease to function after helping the individual resist the negative impact or can they be capitalised to excel and achieve. However, it is restrictive to see the outcome unidimensionally i.e. its presence alone. It needs to be understood not just in terms of tangible performance indicators but also in terms of how significant they are to oneself, followed by the positive reflections that the individual exudes.

Multilevel denotes that based on how these integral factors (adversity, one's internal and external resources, and one's outcome indicators) interact with each other, the level of resilience can be recognised. In other words, based on the interaction of these factors, it can be deciphered at what level the individual belongs to i.e. whether the individual is just adapting to and managing to survive the situation, or is successfully emerging resilient.

Having seen the conceptual understanding of resilience, the next focus goes to the way theories and models have handled the construct of resilience. Klein and Zedeck (2004) stated that theories explain and sometimes predict complex processes that illustrate causal

relationship between the concepts. The theories and models do this by building on general ideas inferred from various occurrences and instances.

Dozens of theories and models of resilience have been proposed. Some of the features seen commonly among the approaches are – resilience is a dynamic construct, within the process of resilience there is interaction between various factors and these interactions determine whether the individual is resilient or not. However, it can be observed that the focus, method, and route taken by each theory or model varies.

Fleming and Ledogar (2008) stated that there are three classes of resilience models. Firstly, the Compensatory model, where the resilient factors (one's resources) directly impact the outcome. This impact or effect is independent of the effect of the risk or adverse factors. Secondly, the Protective model or the Buffering model, where the resources or assets of the individual interact with risk factors, to reduce or weaken the negative impact of the adversity, thereby influencing the outcome. Thirdly, the Challenge model, where the adversity or risk is seen as a challenge that enhances competence. However, the level of challenge (adversity) should neither be too high to paralyse the individual nor too low to not challenge the individual. Thus, denoting that the association between the adversity and outcome is 'curvilinear', which means too high or too low level of adversity is associated with negative outcome.

While the Compensatory model denotes a direct effect of resources on outcome, the Protective model denotes interaction between the resources and risk factors and indirectly effecting the outcome. The Challenge model denotes the degree of adversity, just enough to result in positive outcome. Looking at this island approach it can be stated that the study of resilience lacks a holistic approach.

The various theories and models of resilience can be segregated into categories like age specific (adolescent, youth and adults), social setting specific (family related, medical field, sports field, armed forces, and organisational), and non-specific or generic category.

Specific age group related theories of resilience included, the models and theories like Adolescent Resilience Model (Haase, 2004), Conceptual Model for Community and Youth Resilience (Brennan, 2008), and Grounded Theory of Shame and Resilience in Adulthood (Van Vliet, 2008)

Haase (2004) while proposing the Adolescent Resilience Model indicated the interaction between protective factors, risk factors and outcome. This model refers outcome as quality of life and resilience. On the other hand, Conceptual Model for Community and Youth Resilience propounded by Brennan (2008) evolved from the various vulnerabilities faced by the community and especially the youth. These conditions included socio-economic characteristics (depressed economies, limited employment opportunities) and social vulnerabilities (diminished local resources). These factors interacted with each other and influenced the need of the community agency and social support. Social support initiates the interactive activity leading to community agency. Community agency refers to the intervening condition that promotes resilience and influences the quality of life (outcome). Van Vliet (2008) proposed the theory of resilience pertaining to the next developmental stage i.e. adulthood. The Grounded Theory of Shame and Resilience in Adulthood recognised a shame event as an adversity. The theory focused on how adults recover from shame experiences of their life. Resilience is seen as the process of how adults self-construct and rebuild themselves after experiencing a shame event. This process involved five integral sub-processes – connecting, refocusing, accepting, understanding, and resisting.

Social setting related theories of resilience included social settings like family, medical field (nurses and medical students), sports field, armed forces (military, police officers), and organisational set up.

McCubbin and Patterson (1983) proposed the Family Adjustment and Adaptation Response Model that explained how families responded to prolonged separation due to adversities like war. The model explained that the process how families balance the capabilities and demands while interacting with family meanings and norms. Thus, adaptation or adjustment is the outcome. While adaptation is acquiring new adaptive resources, and altering their view of the situation, adjustment is relatively stable and using existing resources and not making changes. The model recognised adaptation as the resilient outcome.

Another social setting considered while theorising resilience is the medical field, where there are four theories/models pertaining to nurses, medical students, and critically ill patients. Polk (1997) proposed The Nursing Model of Resilience and described resilience as an outcome of synergic relationship between dispositional, philosophical, relationship, and situational aspects. Resilience is defined as "an ability to transform disaster into a growth experience and move forward". Polk stated the rationale behind studying resilience in nurses is that resilience as a trait is largely unrecognised in nurses. Another model of resilience based on nurses (operation room nurses) viz. A Revised Resilience Model in Operation Room Nurses denoted the predictors of resilience. Gillespie, Chaboyer, Wallins, and Grimbeck (2007) through the model denoted self efficacy, coping, competence, control, and hope as predictors of resilience, wherein they predicted 60% of variance in resilience.

Dunn et al. (2008) studied resilience in medical students and proposed the Coping Reservoir: A Conceptual Model of Medical Students Wellbeing. The model stated how

resilience can be promoted and how burnout can be prevented. Such a Coping Reservoir is dynamic and effected by factors like coping styles, personality traits, and temperament, and outcome would be either distress and burn out or resilience and wellbeing. Denz-Penhey and Murdoch (2008) built the Grounded Theory of Personal Resiliency based on the narration of seriously ill patients (with survival chances less than 10%). The core theme of the theory was the way these patients were so strongly connected to life through their relationship and rich life experiences that their adversity (critical illness) became secondary. This way they built their resiliency, when they became ill, before, and during recovery. The theory connected resilience to five dimensions – physical, environmental, family, social environment, strong psychological self and experiential inner wisdom.

Sports as a social setting was used while theorising resilience. There are two models which studied resilience in athletes. Firstly, Galli and Vealey (2008) proposed the Conceptual Model of Sports, which explored the perception and experience of athletes about resilience. Based on the experiences of athletes, resilience was seen in tandem with dimensions like agitation, personal resources, sociocultural influences, and positive outcome. Fletcher and Sarkar (2012) propounded The Grounded Theory of Psychological Resilience and Optimal Performance. They stated that various factors like motivation, perceived social support, positive personality, and confidence interact with each other and contribute to 'stress-resilience-performance' triad relationship. These factors influence the athletes' appraisal of challenge and meta cognition. These interactions promote facilitative responses that in turn impact optimal performance in sports. The theory denoted the significant role that resilience plays in the life of an athlete and in the life of their significant others.

The other social setting includes the armed forces that includes military and police officers. The Theory of Risk and Resilience proposed by Palmer (2008) studied the effects that the military risks and resilient factors have on the children of military personnel. The

military risk factors are exposure to PTSD and combat, frequent relocation, deployment and post deployment reunions. The theory found that effect of military risk factors on the children's outcome followed an indirect pathway by involving mediators like psychopathology and parental stress. The theory stated that it is yet to study the resilient factors in the military system. However, they hypothesised that social network of the person with similar experiences and interests, consistent employment, free medical care, and legal assistance are resilient factors. Paton et al. (2008) studied resilience in police officers and proposed the Stress Shield Model of Resilience. The model describes the resilient outcome in terms of job satisfaction, growth, and adaptive capacity. The model stated that factors like the team, the person, and the organisation factors influence and lead to empowerment.

Riolli and Savicki (2003) studied resilience in the social setting of organisation. They proposed the Model of Organisational Resilience pertaining to information system field. The model combines the individual and organisational level of response. The protective factors at an individual level denote the skills and dispositions. The protective factors at organisational level relate to organisation process and structures. The outcome of these processes refers to resilience, retention, productivity or burnout.

Lastly, there are certain generic theories/models of resilience. Firstly, the Resiliency Model proposed by Richardson (2002) stated that the biopsychospiritual homeostasis of an individual is effected by protective factors, adversity, and significant life events. Any disturbance to this state of biopsychospiritual homeostasis resulted in anyone of the four outcomes. The first outcome was resilient reintegration which is indicated by new protective factors and heightened levels of homeostasis. The second outcome was reintegration homeostasis which refers to the individual returning to their comfort zone or status quo. The third outcome is reintegration with loss, reflecting the loss of one's protective factors and reduced level of homeostasis. Fourthly, was the maladaptive outcome i.e.

dysfunctional reintegration wherein the individual resorts to destructive and harmful behaviour.

Agaibi and Wilson (2005) proposed the Generic Model of Resilience in response to psychological trauma. This model is recognised as a person-environment and integrative model. They have emphasised resilience being an interaction between its integral factors – affect modulation, coping styles, personality, ego defense, mobilisation, and utilisation of protective factors.

The Integrative Model of Coping, Resilience, and Development was proposed by Leipold and Greve (2009). Resilience was described as an outcome of coping processes in the model. In turn, the coping processes like accommodation and assimilation are impacted by situational and personal conditions. The model stated that coping and development are the two ends that meet when resilience becomes the conceptual link between the two aspects.

Mancini and Bonnano (2009) proposed the Hypothesized Model of Resilience. They studied people who experienced a loss event and how they cope, recover, and become resilient. In this process, the model included individual factors like personality, identity complexity, comfort from positive emotions, and a priori beliefs. These factors have a direct and indirect (through appraisal process and social support) on coping. In addition to individual factors, exogenous factors like cultural beliefs, financial, and physical resources influence one's coping. The model explained the outcome of the process being resilience and that resilience has a bi-directional relationship with coping.

When all the theories/models of resilience are seen, there are certain fundamental observations that can be made. Firstly, some of the theories/models include the internal and environmental factors, but measurement of adversity is assumed and not measured. Secondly, even when adversity is included, only the presence of singular adversity is included. Thirdly,

resilience is recognised as an outcome, and sometimes adaptation as an outcome is identified as resilience. In some cases, wellbeing related factors like job satisfaction (retention), productivity in work is considered as resilience. Fourthly, resilience as pure construct is not sufficiently studied, as it is combined with its correlates (e.g. coping, Integrative Model of Coping, Resilience, and Development). Thus, there is a need to have a theory/ model that is capable enough to capture the multifactorial, multidimensional, and dynamic characteristics of resilience. Synergy Model of Resilience (Hariharan and Rana, 2017) stated that resilience is a unique function of adversity, operating factors (internal and external resources), and resistance across a time continuum that brings and sustains positive refection in the form of achievement and flourishing.

Thereby, Synergy Model of Resilience (Hariharan and Rana, 2017) handles resilience's characteristics (multifactorial, multidimensional, and dynamic), theorising the inter-factor interaction and synergy, and recognised resilience as both process and product. However, any theory reaches its true significance when it is empirically tested. To gather data empirically, there is a need for a suitable tool to capture and accurately measure the aspects of resilience, identify the levels of resilience, and finally test the interaction seen in the Synergy Model of Resilience. Thus, the focus of the current study is to develop and validate a suitable tool of resilience (development of Resilience Test Battery (REST), and generate empirical evidence to test the Synergy Model of Resilience.

REVIEW OF LITERATURE

The outline of the chapter can be explained in terms of the conceptual commentary of the construct of resilience, critical appraisal of the existing psychometric tools measuring resilience in various contexts of adversities and methods adopted to study resilience. The literature reviewed belonged to the period of past 46 years from 1974 to 2020. This helps in tracing the evolution of the concept of resilience, its application in various contexts, the gaps in research, particularly in identifying a comprehensive model and measurement of resilience. In this manner, both classic theoretical articles and empirical studies across this time period of 46 years have been reviewed. The classic studies help in understanding the origin of the construct, the latest studies help in understanding how the construct is viewed now with advancement in research method and both together show the journey of the construct so far and what avenues would it open up in future.

Conceptual commentary on Resilience

While commenting about the conceptual understanding of resilience, the following are focused upon, the origin of the word, the multitude of definitions of resilience over a period of four decades, factors involved in the construct of resilience-adversity, protective and promotive factors and outcome.

Origin of the word

The word ‘resilience’ originated from the Latin word, ‘resilire’ meaning ‘to leap back’. The roots of the word resilience can be traced back to Physics. In Physics, resilience is defined “as the ability of the strained body, by virtue of high yield strength and low elastic modulus, to recover its size and form following deformations”. The understanding of

resilience as bouncing back must have been inspired by its origin. However, the definition of resilience started changing with more research and scientific account.

Multitude of definitions of Resilience

There are multitude of definitions that resilience has been through in its journey of research and application. After reviewing the existing definitions of resilience, they all can be characterised based on how they define resilience i.e. resilience is defined as a trait, as a capacity, as an ability, as a process, as an outcome or as a holistic function. Based on this categorisation the definitions of resilience are presented hereafter. To begin with, the pioneers of resilience research, defined resilience as "doing well despite multiple risks". They were labelled as "invulnerable" (Anthony, 1974). In the initial years, the notion of resilience being a 'trait' was alluded by Block and Block (1980) while they used the term 'ego resilience'. Ego resilience was described as a set of traits indicating resourcefulness, character strength and functioning in a flexible manner while responding to external situations. Leipold & Greve (2009) defined resilience as a personality characteristic like "an individual's stability or quick recovery (or even growth) under significant adverse conditions''. Connor and Davidson (2003) defined resilience as the personal qualities that enable one to thrive in the face of adversities. Similarly, Agaibi and Wilson (2005) called resilience as a repertoire of behavioural tendencies.

After defining resilience as a trait, in other words implying it as being innate or born with, there was a stream of definitions that defined resilience as a capacity or ability, i.e. resilience was implied as a trainable characteristic. In other words, it is not that one needs to be born resilient, one can become resilient through the course of life.

Henry (1999) stated that resilience is the capacity for successful adaptation, positive functioning or competence despite high risk, chronic stress or prolonged or severe trauma". Garmezy (1991) defined that resilience is designed to reflect the capacity for recovery and

maintain adaptive behaviour in the face of stressful situations. Garmezy (1993) while studying children asserted that the study of resilience focused on answering two major questions that can be postulated as 1) What are the characteristics – risk factors – of children, families, and environments that predispose children to maladjustment following exposure to adversity? 2) What are the characteristics of protective factors that shield them from such major maladjustment? Wolin and Wolin (1993) described resilience as the "capacity to bounce back, to withstand hardship, and to repair yourself. Lee & Cranford (2008) said that resilience "is the capacity of individuals to cope successfully with significant change, adversity or risk". Abrams (2001) defined resilience as the "ability to readily recover from illness, depression and adversity". Gordon (1996) defined resilience as "the ability to thrive, mature, and increase competence in the face of adverse circumstances". Walsh (2003) explained resilience as the "ability to withstand from disruptive life challenges". Bonanno (2004) referred to resilience as ''the ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially high disruptive event such as the death of a close relation or a violent or life-threatening situation to maintain relatively stable, healthy levels of psychological and physical functioning, as well as the capacity for generative experiences and positive emotions".

With more research, the understanding of resilience started expanding. Resilience began to be defined as a multidimensional construct that included the cultural aspects. Ungar (2006) defined resilience as "a multidimensional construct, the definition of which is negotiated between individuals and their communities with tendencies to display both homogeneity and heterogeneity across culturally diverse research settings. Further for a construct having multidimensionality, researchers like Polk (1997) defined resilience as a mid range theory. Mid range theory or a middle range theory refers to the way the construct can integrate theory and empirical research. Thus, Polk (1997) defined resilience as a mid range

theory with four-dimensional constructs viz. dispositional, relational, situational, and philosophical patterns that intermingle with environment to form resilience. This gives equal emphasis on individual characteristics (dispositional), ecological factors (relational and environmental), external adversities (situational) and abstract (philosophical) factors contributing to resilience.

So far, it can be observed through definitions that resilience involves one's adverse situation, one's resources (internal and external) and one's successful adaptation. Rutter (1987) also initially defined resilience in this manner. He defined resilience as "protective factors which modify, ameliorate or alter a person's response to some environmental hazards that predispose a maladaptive outcome". Rutter is one among the famous resilience researchers. He is recognised and acclaimed for his insightful and radical developments introduced to the construct in its definition and measurement. One such important developments is Rutter (1999) introducing the concept of 'Resistance' as part of resilience definition.

In 1999, Rutter defined resilience as relative resistance to psychological risk experiences. By introducing resistance, Rutter explained that resilience is not just a collection of factors like adversity, internal and external factors and adaptation, but a complex interplay of these factors giving rise to by-products like resistance. Rutter (2006) stated that resistance to hazards may be derived from controlled exposure to risk than its avoidance. Secondly, resistance comes from traits or circumstances that are either risky or neutral in the absence of the relevant environmental hazards. Thus, resistance only in the presence of hazard is relevant in the context of resilience. Thirdly, resistance may derive from physiological or psychological coping processes, rather than external risk or protective factors. Reference to coping process perhaps indicates the application of the internal and external factors against adversity that evolved into resistance. Fourthly, in the absence of resistance, adversity may

have damaging and debilitating effect on the cognitive, affective and social functioning resulting in sub-optimal performance. With such a commentary by Rutter, it is understood that another important factor and process associated with resilience is – Resistance. Thus, introducing resistance as the interaction between adversity and one's resources was a significant contribution of Rutter.

It can be observed that from resilience being defined as a trait, characteristic, capacity, and ability in an individual the focus shifted to looking at resilience itself. Rutter's definition of resilience discussed previously is suggestive of viewing resilience as a process. Thus, the focus went on what happens in the process of resilience, what are the components involved in the process and what is the product at the end of this process.

A number of researchers defined it as a 'process'. Masten, Best, & Garmezy (1990) defined resilience as ''the process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances''. Richardson and his colleagues (1990) described that resilience is "the process of coping with disruptive, stressful, or challenging life events in a way that provides the individual with additional protective and coping skills than prior to the disruption that results from the event".

Higgins (1994) briefly explained resilience as the "process of self-righting or growth". Masten (1994) asserted that resilience should be seen as a process wherein it refers to (1) people from high-risk groups who have had better outcomes than expected; (2) good adaptations despite stressful experiences (when resilience is extreme, it refers to patterns in recovery); and (3) recovery from trauma. She explained that resilience must be viewed as an interplay between certain characteristics of the individual and the broader environment, a balance between stress and the ability to cope, and a dynamic and developmental process that is important at life transitions. In early 2000s, resilience was defined as ''a dynamic process encompassing positive adaptation within the context of significant adversity'' (Luthar et al.,

2000; Luther & Cicchetti, 2000). Olsson et al. (2003) described resilience as a "dynamic process of adaptation to a risk setting that involves interaction between a range of risk and protective factors from the individual to the social". Lately, resilience is defined as "process of negotiating, managing and adapting to significant sources of stress or trauma. Assets and resources within the individual, their life and environment facilitate this capacity for adaptation and 'bouncing back' in the face of adversity (Windle, 2011). Resilience as defined by American Psychological Association (2014) refers to ''the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress".

All these definitions state that resilience means the way the negative effects of adversities are tackled and the way the individual copes, adapts, and grows. While defining resilience as a process, these definitions also give an orientation of the components contained and functioning in the process of resilience viz. adversity, one's resources, and positive adaptation. Further, the types of these components can also be observed. For instance, the types of risk and adversity include trauma, threat, stressful situation etc. The types of resources include internal and external resources and type of adaptation denotes successful and positive adaptation.

Having seen as a process, there are researchers who were interested to know and denote the outcome of this process. They denoted the outcome of this process as adaptation. Werner and Smith (1982), Masten and Garmezy (1985) defined resilience as "positive adaptation despite exposure to adversity". Werner and Smith (1992) concluded that a person can be called resilient, if he or she have a good track record of positive adaptations in the face of stress or debilitating change. Masten (2001) used the words "good outcomes" in spite of serious threats. . Thus, their emphasis was on the 'process'.

It should be reiterated that adapting and adjusting to a crisis, threat or adverse situation is more recognised as survival. Whereas, excelling and achieving in the face of

adversities with positive reflections is recognised as resilience. This was reflected in the definition of resilience given by Hariharan and Rana (2017) while proposing the Synergy Model of Resilience. They defined resilience as "a unique function of adversity, operating factors (internal and external resources), resistance across a time continuum that brings and sustains positive reflection in the form of achievement and flourishing".

When the journey of the definition of resilience from 1974 to currently 2017, is seen, it clearly shows how the construct has undergone changes. In the initial years resilience was defined as a trait, as a set of personal qualities, capacity and ability. Then it was defined as a relative resistance and power to withstand adversity, as a behavioural tendency, as a phenomenon, as a dynamic process, as a positive adaptation, and improved competency. In the recent decade, it is defined as negotiating and managing the significant sources of stress and trauma and function of adversity, internal and external factors by reflecting positive outcome in the form of achievement and flourishing.

With the definitions, it is understood that resilience is dynamic, multidimensional, and multifactorial with many factors and components playing a role in the process of resilience. These factors interact among themselves as well have an impact on resilience. They are internal and external factors that vary from individual to individual. The important factors playing an integral role in the process of resilience are adversity, internal and external factors, and outcome in terms of performance, which are discussed in the following section.

Essential components of resilience

Adversity

One predominant factor that can be observed in all the various definitions of resilience is the factor of adversity. In fact, adversity can be described as a pre requisite of resilience, because it is in the face of adversity that resilience evolves and blossoms. Hence, it is important to understand adversity and the way it is measured in resilience studies. There

are various adversities, genetic, physical, cognitive, social, educational, environmental – all of which can be measured in terms of their degree/ magnitude.

Adversity is described as one condition that has the potential to carry high chances of odds of maladjustment (Luthar, 2006; Masten, 2001). Masten and Reed (2002) defined adversity or risk factor as a measurable parameter of an individual that has the potential to impede positive functioning or predict negative outcomes. Luthar and Cicchetti (2000) stated that adversity ‘‘typically encompasses negative life circumstances that are known to be statistically associated with adjustment difficulties’’. This definition of adversity measured the construct based on a threshold or criteria. In other words, they set criteria for a circumstance to be called as adversity.

A few years later Luther (2006) gave adversity a different connotation. Firstly, he emphasized the shade of discreet risk factors and secondly, the shade of multiple adversities/risk index. Discreet risk factors referred to parental depression, exposure to community violence etc that cause negative impact or adversity. Multiple adversity index referred to risk factors like poverty, parental mental illnesses, alcoholic parents, people staying in disaster prone areas etc. It focuses more on the cumulative effect of multiple factors that can predict the logical impact on the individual. In other words, discreet risk factors cause adversity whereas multiple risk factors make one not only vulnerable but also lead to future adversities. With such a description, it can be inferred that risk factors, adversity and vulnerability are related with each other and fluidly used.

The term adversity features on a spectrum, with a scope of its existence in varying degrees. Jackson, Firtko, & Edenborough (2007) defined adversity as “difficulty or misfortune” where difficulty in workplace is also seen as adversity. Similarly, Davis, Luecken, and Lemery-Chalfant (2009) stated that adversity can be disruptions that one faces in day to day life. For example, major life events as well as daily hassles are described as

adversity. In such a spectrum of adversity, debilitating situations on one hand and minor aberrations on the other hand indicate a very important feature of adversity that denotes severity. Severity as a feature or dimensional factor of adversity, gives rise to two more dimensional factors viz. frequency and duration. To explain a strong adversity (death of a close one) with high level of severity is called an adversity. Similarly, a mild adversity (bullying) with high level of frequency and long duration is also called an adverse condition. Thus, by measuring the magnitude of adversity, frequency of its occurrence, and duration of its experience, gives a complete understanding of adversity and its impact on resilience. Davydov et al. (2010) also stated in similar lines. He stated that resilience mechanism differs with regard to contextual severity. This could range from resilience against everyday hassles like work place stress (i.e., mild adversity) to resilience against seldom extensive events like bereavement (i.e., strong adversity). Mild adversities could be one time or sporadic or frequent, in which case the cumulative impact of it needs to be considered.

Keeping this in mind, Luthar et al. (2000) opined, it is very essential for researchers to clearly outline their definition of adversity and reason out a justification for its use. After clearly defining adversity, the next stage is measuring of adversity. It can be seen further, how different researchers adopt different methods of measuring adversity, for want of a definite scale to measure adversity with all its characteristics such as severity, frequency, and duration.

To illustrate, studies have measured adversity or its associates like stress, trauma, psychiatric symptoms before administering resilience scale. A study by Campbell-Sills, Cohan and Stein (2006) who used Connor Davidson Resilience Scale (CD-RISC) to measure resilience used Brief Symptoms Inventory to measure psychiatric symptoms. They used trauma questionnaire along with previous inventory in a study a year later (Campbell-Sills & Stein, 2007). In both the studies, these scales were used to measure adversity.

The other approach is where adversity is included in resilience studies by conducting the study on a sample that has experienced specific adversity. The study by Connor & Davidon (2003), where they chose a sample of general psychiatric out patients, clinical trial patients of generalised anxiety and PTSD where the common aspect is psychological problem. Rajkumar, Premkumar and Tharayan (2008) studied resilience in survivors of Tsunami in Tamil Nadu. Their study investigated the impact of Tsunami (adversity) and the coping mechanism and resilience of the participants through qualitative techniques like focused group discussions. Thus, the study of resilience revolved around an identified 'specific adversity'.

Narrowing down to a particular type of adversity i.e. trauma, experiencing psychiatric conditions, victim of natural calamity etc would have an inherent limitation of ignoring other types of adversities that co-exist. This renders the measurement incomplete, because there was no or very little scope for complete representation of adversities. For example, the trauma questionnaire intends to measure only extreme level of adversity and ignores the coexistence of prolonged moderate adversities and repeated moderate adversities which may add to the impact of the adversity in the form of trauma.

The methods of measuring it varies from self report scale like trauma questionnaire, qualitative techniques or simply by selecting people who experienced a particular adversity. Through all this, four insights emerge, firstly not a wide range of adversities are considered. Secondly, narrowing down to a particular type of adversity i.e. trauma, experiencing psychiatric conditions, victim of natural calamity etc would have an inherent limitation of ignoring other types of adversity. Thirdly, adversity is seen unidimensionally i.e. in its presence or absence but not in terms of the degree of its presence nor in terms of duration and frequency of the adversity which gives a reliable and valid measure of adversities. Daily hassles cannot contribute to adversity unless it refers to deprivation of major daily needs like

food like starvation or poverty or residing in a location where basic needs are not ascertained like in the case of border security and war zones. Fourthly, there are chances that multiple adversities may exist in an individual's life which have a cumulative effect on the individual. Holmes and Rahe (1967) endorsed this while stating that multiple adversities over a period of time can have a severe cumulative impact.

Having reviewed the technical aspects of adversity i.e. definitions and methods involved in measuring it, it is important to know the natural consequence of experiencing the adversity. In other words, it is in the face of adversity that individuals seek ways to cope with the crisis situation. It is at this time that they evaluate and assess the quantum and functionality of the resources (both internal and external) they possess and tap on them. The way they use such resources optimally decides how these factors facilitate the evolution of resilience. In the following section, the facilitating factors of resilience are described.

Facilitating factors of resilience: Internal and external

The factors facilitating the process of resilience pertain to both internal and external realm. Anthony (1974), and Werner and Smith (1984) found that there are factors that facilitate the construct of resilience to function in an individual. Initially both internal and external factors of the individual were called as protective factors. However, in to order explain better Luther and Sexton (2007) cautioned that protective factor is not the inverse of vulnerability factor. They supported this with findings of their study. They found that low maternal warmth (vulnerability factor) reflected poor competence. However, high maternal warmth (inverse of low maternal warmth) did not reflect high competence (protective factor). Thus, inverse of vulnerability factor is not protective factor.

Rutter was first to name these facilitating factors as 'protective factors'. Rutter (1985) defined protective factors as 'influences that modify, ameliorate or alter a person's response

to some environmental hazard that predisposes to a maladaptive outcome'. Rutter was careful in commenting that protective factors do not create resilience and neither are they synonymous to resilience. However, protective factors initiate certain processes in the individual that are capable of creating resilience. There are three such processes i.e. building a positive self image, reducing the effect of the risk factors, and breaking the negative cycle so as to open up new opportunities for the individual.

Some of the identified protective factors are hardiness (Bonanno, 2004), positive emotions (Tugade & Fredrickson, 2004), extraversion (Campbell-Sills, Cohan, & Stein, 2006), self-efficacy (Gu & Day, 2007), spirituality (Bogar & Hulse-Killacky, 2006), self-esteem (Kidd & Shahar, 2008), and positive affect (Zautra, Johnson, & Davis, 2005). Characteristics like autonomy, competence, care, prioritising needs, readiness to meet challenges, flexible coping styles, ego strength, creative abilities, increased personal and physical attractiveness, optimism, self esteem, problem solving skills, sense of purpose, future orientation, and the three components of hardiness—commitment, challenge and control, coherence were studied by resilience research (Werner & Smith, 1982; Hariharan 1990; Hariharan, Karimi & Kishore, 2014; Kobasa, 1982; Antonvosky, 1984; Bernard, 1997; Kidd & Shahar, 2008).

Rutter (1979) and Garmezy et al. (1984) found three levels of protective factors – the individual, the family, and the community. Werner and Smith (1982) stated that external environmental factors like family support, family organisation, and family type were the factors observed to be functioning in resilient individuals. Seccombe (2002) stated that as part of external factors, structural aspects of the society and social policies dynamically influence resilience. Although, not just environmental and societal factors but certain psychosocial phenomena (for example. experiencing success) have an independent productive value and influence on resilience (Sameroff, Gutman, & Peck, 2003).

Internal and external factors are studied together and are called as protective factors, but some researchers differentiated internal from external factors. Internal factors were called as protective factors and external factors were called as promotive factors, while they were measured as part of the Resilience (Hariharan & Rana, 2017) and Resilience Test Battery (REST Battery) (Rajendran, Hariharan, & Rao, 2019).

Though differentiated, the interaction between the internal and external factors was dealt in terms of gene – environment interaction. With the advancements in science, methodology of resilience research shifted attention to biology and genetics. Curtis and Cicchetti (2003) explained the various biological processes ranging from neuroendocrinology to capacities for emotion regulation. Regarding genetic influences, quite a few researchers have written extensively on genetic factors potentially involved in resilience (Rutter, 2003 ; Caspi, Sugden , Moffitt, et al; Kim-Cohen, Moffitt, Caspi, Taylor, 2004). Such studies identified gene–environment interactions. They suggested that, genes and child-specific environmental factors influence behavioural resilience—as well as specific gene markers that contribute to protection or vulnerability in the face of childhood adversities (Moffitt, 2005; Moffitt, Caspi, & Rutter, 2005). With such advancements, the research expanded to intriguing genetic and biological factors and processes. Secondly, it led to developing creative interaction between already existing internal and external factors like self confidence, family support, poverty, and community violence that impact resilience.

Either separately or while interacting with each other the mere possession of internal and external factors alone is not sufficient. It requires the individual to possess the ability to identify and make efforts in the direction to make these factors functional and operate to the advantage and benefit of the individual. However, Luther, Cicchetti, and Becker (2000) clearly stated that resilience is not a combination of protective and promotive factors. They argued that it is important that both protective and promotive factors need to be seen in

specific functional role. Luther Brown and Sawyer (2006) also insisted that it is not mere identification of protective and promotive factors but (the underlying process) the factor that facilitates resilience. This would in fact help in understanding and developing resilience.

The level of functionality of these internal and external facilitating factors in the resilience process, suggests the outcome. Outcome is another important factor playing a role in the process of resilience. Based on the functionality of these facilitating factors, two possible types of outcome emerge. Either the individual stops at using these factors only for mitigating negative impact of the adversity, or the individual uses these factors to go beyond and perform excellently and achieve. This indicates the outcome of the process in terms of achievement and positive reflections.

Outcome

Another integral factor of the process of resilience is Outcome. 'Outcome' is the outcome of functioning of protective (internal) and promotive (external) factors. Outcome could be succumbing or recovery or bounce back; outcome could be performance i.e. tangible, observable behaviour or state of being that manifest post the experience of adversity. Only when the outcome is recovery and achieving despite adversity it is called resilience.

This outcome is described in many different manners. Developmental Psychologists construed outcome as attainment of developmental tasks, manifesting competence, meeting cultural expectations in line with developmental theories despite adversities that are expected to block, delay or deprive normal development (Elder 1998; Masten & Coatsworth 1995; 1998; Waters & Sroufe 1983). Clinical Psychologists denoted outcome as low level impairment and low level or absence of psychopathology (Dubow, Edwards & Ippolito 1997; Felner et al. 1995; Greenberg, Lengua, Coie & Pinderhughes 1999). Research in the field of

Educational Psychology considered scholastic achievement and its concomitant variable amidst poverty, as an outcome (Hariharan, 1990; Dash & Nayak, 1998).

Initially outcome was absence of psychopathology and meeting the developmental yardstick (Masten & Coatsworth, 1998) later it is seen as positive adaptation (Luther, 2006). Positive adaptation is defined as ‘‘behaviourally manifested social competence, or success at meeting stage-salient developmental tasks’’ (Luthar & Cicchetti, 2000) or ‘‘symptoms related to internal well-being’’ (Masten & Obradovic´, 2006). Ungar and Liebenberg (2011) argued that resilience research has been predominantly described as positive adaptation from a Western psychological understanding. Thus, the focus is on individual and relational capacities, such as academic success and healthy relationships. Such outcomes lack sensitivity to cultural factors that contextualize how outcome is understood by different populations and manifested in different practices.

Thus, the factor of Outcome is altered every time a different school of Psychology attempts to study resilience. However, there requires certain criteria to be followed while measuring ‘outcome’ in order to reduce measurement difficulties. First criteria being, the outcome measured should be consistent not only with the adversity but the domain of adversity measured too (Luther, 2006, Luther, Cicchetti, & Becker, 2000). Rutter (2006) stated another criteria for outcome measurement i.e. outcome measures should have a wide range of possible ‘adverse sequelae’. He also stated that outcome is dependent on the balance of risk and protective factors. Thereby, the variations in outcome can be accounted to the summative contribution of risk and one’s resources.

It can be inferred that outcome factor is both objective and subjective. It is objective in terms of its tangibility and measurability. It is subjective in terms of its dependency on the individual’s perception of adversity, endorsement of resources, and value of one’s outcome.

Understanding the objective and subjective nature of outcome, Ungar and Liebenberg (2011) suggested to follow an emic approach than an etic approach. In the emic approach the viewpoints are taken from within the group whereas in an etic approach the viewpoints are taken from outside the group which is the perspective of the observer. Luther Sawyer, and Brown (2006) argued on similar lines. They stated that instead of comparing the outcome measure of one group with another (etic), it is more insightful to study the outcome measures of the group (emic). The reason for choosing an emic approach for outcome is that the purpose is not to know the quantum of outcome between groups but to understand what is the outcome internal to the particular group.

The essential and integral factors in the process viz. adversity, internal and external factors, and outcome have been reviewed so far. The major methodological challenge hereby is as much dynamic as the process of resilience is. Such dynamism of these factors requires to be captured while measuring resilience. All the essential components of resilience are required to be measured with efficacy. All possible interactions between the components also need to be featured in the measuring tools.

Unlike the clichéd opinion that there is dearth in measurement methods, the true concern with resilience research is that there are too many methods to measure the construct defined in varied contexts. The characteristics of such too many methods are, they are restricted in their context which deprives broad generalisation restricting its scope, under representation or over representation of a specific component and possibility of 'mismeasurement'. Such characteristics are reflected in the tools constructed to measure resilience, which will be presented in the following section.

Measurement of Resilience

Given the scenario of resilience as a construct, a major methodological issue was the tools used to measure resilience. Following are a few studies where the tools used called for

critical evaluation. Hemenover (2003) while investigating resilience and emotional disclosure, used the tools of Psychological Wellbeing to measure resilience. Though there is a clear understanding that resilience and wellbeing are two different constructs. Collinshaw, Pickles, Messer, Rutter, Shearer and Maughan (2007) drew data from the famous Isle of Wight study (Rutter, Tizard, Yule, Graham, & Whitemore, 1976). In this study, resilience was measured in restricted manner as absence of psychopathology in adulthood and the assessments that were like the social functioning assessment and personality assessment which did not directly measure resilience. Von Soest, Mossiege, Stefansen, and Hjemdal (2010) developed a 28-item measure named Resiliency Scale for Adolescents (READ). READ was adapted from a validated measure called Resilience Scale for Adults (RSA) constructed by Friborg, Barlaug, Martinussen, Rosenvinge, and Hjemdal (2005) (which is discussed later in this section) used to assess resilience in adults.

Though, resilience is a much debated construct. It is difficult to operationalize. It has measurement issues. Researchers constructed various tools to measure resilience and validated them accordingly. The tools measuring resilience, can be categorised into, resilience measuring tools like Resilience Scale (Wagnild & Young, 1993), Connor Davidson Resilience Scale (Connor & Davidson, 2003), Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher & Bernard, 2008), Predictive 6-Factors Resilience Scale (Roussouw & Roussouw, 2016), and Scale of Protective Factors (Ponce-Garcia, Madwell, & Brown, 2016). There are resilience measuring tools for a specific age group like Child and Youth Resilience Measure (Ungar & Leinbenberg, 2011), Adolescent Resilience Scale (Oshio, Nakaya, Kaneko, & Nagamine, 2002), Adolescent Resilience Scale (Bulut, Dogan, & Altungdag 2013), Youth Resiliency: Assessing Development Strength questionnaire (Donnon & Hammond, 2007), Resilience Scale for Adolescent (Hjemdal, Friborg, Stiles, Martinussen, and Rosenvinge (2006), and Resilience Scale for Adults (Friborg, Barlaug, Martinussen,

Rosenvinge, and Hjemdal, 2005). There are measuring tools with a hybrid approach (with a co-construct) like Brief Resilience Coping Scale (Sinclaire & Wallston, 2004), Dispositional Resilience Scale (Sinclaire, Oliver, Ippolito, & Ascalon, 2003), Resilience Attitude and Skills Profile (Hurtes & Allen, 2001), Academic Resilience Scale (ARS) (Cassidy, 2016), and Academic Resilience Scale (Kaur & Singh, 2016).

The tools from the three categories are presented with their tool description and how resilience is measured and followed by the critical appraisal of the tool.

Tools measuring Resilience

Resilience Scale (Wagnild & Young, 1993), Connor Davidson Resilience Scale (Connor & Davidson, 2003), Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher & Bernard, 2008), Predictive 6-Factors Resilience Scale (Roussouw & Roussouw, 2016) and Scale of Protective Factors (Ponce-Garcia, Madwell, & Brown, 2016) measured only personal characteristics, hypothetical resilient responses, underplaying the measurement of adversity. Resilience Scale (Wagnild & Young, 1993) has two factors viz. personal competence and acceptance of self and life. It has 14 items and the response format is on a 7-point scale that ranges from Disagree (1) and Agree (7). Higher score denotes higher resilience. The scale is a combination of statements of positive characteristics (e.g. humour and self-discipline) and hypothetical resilient response (e.g. finding way out from problem situation). Thus, the scale measured the presence of positive characteristics in an individual and elicited the potential for resilience rather than the presence or absence of it.

Connor and Davidson (2003) constructed the Connor Davidson Resilience Scale (CD-RISC). It is a 5-point scale with 25 items. The items of the scale were drawn from varied sources, to name a few, from the hardiness work by Kobasa (1979), from Rutter's work orienting towards self esteem, self confidence, adaptability, humour, taking responsibility to

tackle stressors, and from Lyon and colleagues' (1999) work on enduring adversity with patience. The scale was administered on four types of sample viz. community sample, primary care outpatients, general psychiatric outpatients, clinical trial of generalized anxiety disorder, and two clinical trials of PTSD. The reliability was 0.98 and the scale had good construct validity. The scale measured resilience as a collection of personal characteristics.

Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher & Bernad, 2008) has six items focusing on recovery from adverse situations. It has a 5-point Likert scale. The scale looked at resilience as bouncing back from hard times, recovery from difficult times and stressful events with less of trouble and not too long to get over from setbacks in life. It may be noted that there is no measure of experienced adversity.

Predictive 6-Factors Resilience Scale (Roussouw & Roussouw, 2016) consisting of 16 items measured resilience as an operation of six domains along with their related concepts. The six domains and their related concepts are – vision (self efficacy and goal setting), composure (emotional regulation and ability to identify and act on physical signals and internal prompts), tenacity (perseverance and hardiness), reasoning (problem solving and thriving), collaboration (support networks, context, and humour), and health (physical health). The items were rated on a 5-point scale where 1 = not at all like me and 5 = very much like me. The average of each of the six domains were taken and explained as the overall resilience score, that ranged between 0 (low resilience) and 1 (highest resilience). Reliability and concurrent validity were established.

Scale of Protective Factors (Ponce-Garcia, Madwell, & Brown, 2016) is a 24-items scale of social and cognitive protective factors that bestow resilience. The scale consists of four factors viz. social skills, planning, social support, and prioritising behaviour. The items are rated on a 5-point Likert scale, where 1 = disagree completely and 5 = completely agree. The scale gives a score that aggregates both internal and external factors and that score

denotes resilience. Scoring of the scale denoted the range of 65-84 as moderate resilience, scores 64 and lower as low resilience, and 85 and above as high resilience. Validity and reliability were established for the scale. Though the scale measured one's protective factors, it is used to measure resilience (Ackerman, 2020). Whereas, in REST Battery (Rajendran, Hariharan, & Rao, 2019), protective factors are segregated into internal and external factors with exclusive scales (Protective factors scale and Promotive factors scale) which are among the other components that measure resilience.

It can be observed that none of the five scales had measurement of adversity or its degree of severity. Adversity was reduced to the level of difficult times/setbacks/hard times. The tools were a list of personal and environmental characteristics possessed by the individual.

Age specific resilience tools

There were resilient tools constructed for a specific age group like the adolescents and adults. To begin with Child and Youth Resilience Measure (Ungar & Liebenberg, 2011). The tool is a list of adversities that were typical to the sample. They included exposure to community violence, institutionalization, mental health problems, social dislocation, homelessness, poverty, exposure to political turmoil, and war. The factors taken into consideration were, Care giving – both physical and psychological, and Contextual factors contributing to an individual's sense of belonging – components related to spirituality, culture, and education. The reliability was between 0.70 – 0.82 and convergent and criterion validity was assessed. This particular study has been extensive in covering various cultures of 11 countries. The scope of adversities is fairly good and the measure includes internal and external atmosphere (which are culture sensitive) for resilience to emerge. This was the first resilient tool to give considerable importance to cultural and spiritual factors contributing to resilience and it was administered on a sample which was culturally diverse. It has also

included both personal and environmental factors. The adverse scenarios are taken into consideration but the severity of such scenarios could not be captured by the tool.

Adolescent Resilience scale (Oshio et al. 2002) consisted of 21 items with three factors viz. Novelty seeking, Emotional regulation and Positive future orientation. In addition to construction of this tool, as part of validation the resilience was correlated with allied constructs. Resilience score did not correlate with Negative Life Events scale and negatively correlated with General Health Questionnaire. Three clusters emerged after conducting a cluster analysis. First cluster were mentally healthy with little experience of Negative Life Events, second cluster showed poorer mental health with many Negative Life Events and the third cluster were mentally healthy despite many Negative Life Events. These three clusters were named as Well adjusted, Vulnerable and Resilient respectively. The mean scores of the Well adjusted and Resilient clusters were higher than the Vulnerable group. This was used as indicator of construct validity. The scale had a 5-point Likert scale, wherein 5 = definitely yes and 1 = definitely no. The reliability was 0.85 (Oshio Kaneko, Nagamine, & Nakaya, 2003). The scale apparently measured the internal characteristics indicating the potential for resilience rather than the actual presence of resilience in the face of adversity.

Another similar adolescent scale is Adolescent Psychological Resilience Scale (Bulut, Dogan, & Altungdag, 2013). It has the following factors included, family support, confidant-friend support, school support, adjustment, sense of struggle and empathy. Reliability was 0.81. It has a 4-point Likert scale, where the responses ranged between ‘not exactly suitable for me’ = 1 and ‘exactly suitable for me’ = 4.

Donnon and Hammond (2007) constructed and validated the Youth Resiliency: Assessing Developmental Strengths questionnaire. It was based on the strength based approach. They defined resilience as a combination of intrinsic or personality attributes like self efficacy, self esteem etc and extrinsic or positive interpersonal environment like family

support, community environments and positive peer influence. It consisted of 94 items with 10 factors measuring aspects of family, community, peers, work—commitment to learning, school culture, social sensitivity, cultural sensitivity, self-concept, empowerment and self-control. There were items to check the frequency of the engagement of at risk behaviour and the pro social behaviour. The reliability ranged between 0.75 and 0.96. Though the tools gave due significance to the environmental factors like family, school, confidant, work and peer support in addition to internal factors like empathy and sense of struggle and adjustment, self concept and self control, the component of adversity is totally missing.

Hjemdal, Friborg, Stiles, Martinussen, and Rosenvinge (2006), adapted 41 items from Resilience Scale for Adults (RSA) to construct Resilience Scale for Adolescents (READ). It consisted of five factors, a) Personal Competence, (b) Social Competence, (c) Structured Style, (d) Family Cohesion, and (e) Social Resources. Out of 41 items, two items were deleted and the rest 39 items were retained in the scale. The initial version of READ was semantic differential scale but later since some adolescent participants found it difficult to understand and respond, it was changed to 5-point Likert scale. Construct validity was checked by validating it with Short Mood and Feelings Questionnaire (SMFQ). The reliability of READ ranged from 0.70 to 0.90. Resilience is measured as a combination of internal and external factors.

The source of Resilience Scale for Adolescents was Resilience Scale for Adults. Friborg, Barlaug, Martinussen, Rosenvinge, and Hjemdal (2005) constructed Resilience Scale for Adults (RSA) consisting of personal strength', 'social competence', 'structured style', 'family cohesion' and 'social resources'. It consisted of 33 items. The unique feature of the scale being in the form of semantic differential scale. Higher the score denotes better adjustment and more resilient. Friborg et al (2005) cross validated RSA with personality, cognitive abilities, and social intelligence. The scale was measured for convergent and

discriminant validity. Resilience factors of the scale were positively correlated to well adjust personality type profile. RSA-personal strength was associated with emotional stability, social competence was correlated with 5-Personality Factors-extroversion and 5-Personality Factors-agreeableness, as well as Troms Social Intelligence Scale-social skills. Structured style was associated with conscientiousness. Interestingly, measures of RSA-family cohesion and RSA-social resources also correlated with personality. These correlations supported convergent validity. RSA was unrelated to cognitive abilities measured by Raven's Progressive Matrices, thereby supporting discriminant validity. However, the validation of RSA was conducted on an exclusive sample of applicants of military training, which could affect the generalisability of the validation.

The critical appraisal of the age specific resilience tools state that among all the six age related resilience tools, only Child and Youth Measure of Resilience (Ungar & Liebenberg 2006) has included adversity as part of the tool. The remaining tools have not included adversity as part of the tool. Neither have they considered any adversity specific to adolescent age group. However, all the tools except Adolescent Resilience Scale (Oshio, Nakaya, Kaneko, & Nagamine, 2002) have included both internal and environmental factors. It is important to observe that the measurement of resilience remains incomplete.

Hybrid approach

Resilience measuring tools with a hybrid approach means, resilience is measured with a co-construct. For example, the Brief Resilience Coping Scale (BRCS) (Sinclair & Wallston, 2004). While constructing the scale, nine items theoretically related to the cognitive behavioural intervention were designed. This was administered on nursing students. After factor analyses, two components emerged. The four items that cleanly loaded in the first component were taken by the authors as it suited their theoretical requirements. This four-item scale is a 5-point Likert scale. Construct validity was investigated and reliability was

0.69. The scale describes an active problem solving coping that reflects resilient coping pattern.

The other tool is Dispositional Resilience Scale (Sinclaire, Oliver, Ippolito, & Ascalon, 2003) with six dimensions, Control, Powerlessness, Commitment, Challenge, Alienation and Rigidity. It is a 5-point likert scale. The name of the scale itself suggested that it measures one's disposition and not resilience. The scale measured the aspects of hardiness and not purely resilience.

Yet another tool that was constructed in early 2000s is Resilience Attitude and Skills Profile (Hurtes & Allen, 2001) with seven dimensions viz. insight, independence, creativity, humour, initiative, relationships and value orientation. It is 6-point response scale. The scale indicates how attitudes and skills like value orientation, creativity, etc. help in an individual being resilient. Possessing these attitude and skills is understood as being resilient.

There are tools constructed to measure resilience in a context of academics like the Academic Resilience Scale (ARS) by Cassidy (2016) and Academic Resilience Scale by Kaur and Singh (2016). Academic Resilience (ARS) (Cassidy, 2016) is a 30 items scale. Academic Resilience is described as likelihood of educational success despite academic adversity. The scale focused on adaptive cognitive-affective and behavioural responses to adversity. The scale required the participants to imagine the adversity expressed through the vignette and then later respond to the 30 items (representing various reactions and responses to adversity) by rating them on a 5-point Likert scale.

Academic Resilience Scale (Kaur and Singh, 2016) had an initial item pool of the scale consisted of 93 items, which were given for pruning by experts. This reduced the number of items to 68. Further, this was pilot tested and item discrimination index was measured. The discriminative power of each of these 68 items was checked. The items having the discriminatory power values (DP values) between 0.20 to 0.90 were retained and the rest

were discarded. This brought the final count of items of the scale to 55, 40 positive items and 15 negative items. This is a 5-point Likert scale. Higher score reflected higher academic resilience. The scale was standardised by investigating the reliability (test-retest reliability) which is 0.70 and the concurrent validity assessed by expert evaluation. The tool measured five dimensions – personal accountability, positivity, self-reliance, persistence and problem solving ability. It indicated the positive characteristics possessed by the individual. However, it did not reflect specific academic related dimensions in its measurement.

Ego Resiliency scale (Block & Kreman, 1996) is a unidimensional scale that focuses on possessing novelty seeking behaviour, novelty thinking, curiosity, and flexibility to adapt to new and unusual situations. The scale indicates resilience as a personality trait and measures the personal characteristics to be present in one to be called as resilient. Possession of these personal traits is identified as resilience.

Resilience tools that followed a hybrid approach i.e. measuring resilience along with a co-construct is more a bane than a boon. Firstly, the chances of adulteration of resilience or the co-construct is high. Secondly, there would not be a pure measurement of resilience and the true spirit of measuring resilience would be compromised because of the presence of another construct. Thirdly, though resilience and the co-construct may be correlated, there may arise conceptual conflict while merging and measuring them. Lastly, even the hybrid approach did not include the measurement of adversity.

So far, each tool measuring resilience was individually reviewed. However, a phenomenal effort by Windle (2011) in conducting a methodological review of the existing tools measuring resilience calls for a special mention. From eight databases, 15 scales measuring resilience were critically reviewed on nine psychometric parameters, such as content validity, internal consistency, criterion validity, construct validity, agreement, reliability, responsiveness, floor and ceiling effect and interpretability. None of the resilience

tools could meet the ‘gold standard’ by scoring high on the parameters. All the measures had missing information regarding their psychometric properties. Only three tools, Connor Davidson Resilience Scale (Connor & Davidson, 2003), Resilience Scale for Adults (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005) and Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher, & Bernard, 2008) had best psychometric details. Out of 15 tools reviewed measuring resilience, only five tools were capable of measuring resilience on multiple levels that reflects conceptual adequacy.

These five tools are the Child and Youth Resilience Measure (Ungar & Liebenberg 2006), the Resilience Scale for Adults (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005), the Resilience Scale of the California Healthy Kids Survey (Sun & Stewart 2007), and the Resilience Scale for Adolescents (Hjemdal, Friborg, Stiles, Martinussen, and Rosenvinge, 2006) and the Youth Resiliency: Assessing Developmental Strengths (Donnon & Hammond, 2007).

Ackerman (2020) also described eight tools measuring resilience, out of which five tools (Ego Resilience Scale (Block and Kremen, 1996); Resilience Scale (Wagnild and Young, 1993); Brief Resilience Scale (Smith et al. (2008); Resilience Scale for Adults (RSA) Friborg et al. (2003) and Connor-Davidson Resilience Scale (CD-RISC) (Connor-Davidson (2003) are already covered by Windle (2011). The remaining tools viz. Scale of Protective Factors (Ponce-Garcia, Madwell, & Kennison, 2015), Predictive 6-Factors Resilience Scale (Roussouw & Roussouw, 2016), and Academic Resilience Scale (Cassidy, 2016) when reviewed, were found to have established good psychometric properties (high reliability and validity). However, they did not have a direct measurement of resilience.

None of the reviewed scales have the component of adversity, the very pre requisite of resilience. Adversity was asked to be imagined before responding to the scale. Thus, the

existing resilience scales function on the basis of assumed adversity instead of measured adversity. All these scales do not relate to whether the respondent experienced adversity or not. This leaves an open possibility that one may respond to it hypothetically. If so, the measurement will be at best of one's opinion or predisposition.

All these scales over emphasise on protective factors and external factors. Nevertheless, presence of such characteristics cannot be implied as presence of resilience, which is not consistent with Rutter's statement that protective factors are not resilience neither do they create resilience. On the contrary, the existing scales measure one's internal and external factors and that score is denoted as the resilience score obtained. Hence, the process of resilience is not adequately reflected in these scales. The outcome is seen in terms of adaptation and recovery, or possessing the internal and external resources.

After seeing the conceptual commentary and the critical methodological appraisal of the resilience tool, certain clear observation can be made. Firstly the conceptual definition of resilience is still debatable. Secondly, the conceptual understanding of resilience is not translated into measurement through tools. This indicates the glaring inconsistency between what resilience is (definition) and how resilience is measured.

Having observed the conceptual aspect of resilience, followed by the measurement aspect, now the last section of this review would be presenting the application aspect of resilience as a construct i.e. how the construct of resilience is handled by various researches.

Research studies in resilience

So far, the studies reviewed focused on how resilience was defined, operationalized, and the tools used to measure it. This section brings in the various approaches adopted in studying Resilience. This scrutinises the sample studied and the setting against which it is studied. Resilience as a construct has been investigated for more than four decades. The following section explains how resilience studies can be categorised on the basis of where is

the focal point of the research. It can be observed that some studies focus on factors having an effect on resilience, some other authors focus on the effect of resilience on other factors, some others focus on assessing and suggesting models to build resilience interventions. While yet others focus on measuring resilience as a construct, identifying resilience, and identifying the characteristics of resilients. The following section is organised on the basis of these four focal points

Factors affecting resilience

These factors affecting resilience play a role in terms of contributing, associating, maintaining, promoting, developing and predicting resilience. Gillispie et al. (2009) found that factors that contributed to resilience included personal characteristics like age, experience, and education. It was found that there was a moderate association between age, experience and resilience. Resilience was measured using Connor Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003) in terms of personal competence, change, control, appraisal, spiritual influence and trust in intuition. The study was conducted on 753 theatre nurses but there was no measurement of adversity.

Cameron and Brownie (2010) studied a sample of nine nurses in their professional settings. The authors measured resilience as a result of experience, complex skills and knowledge required to manage time, crisis situation, prioritise tasks and staff. This summed up to the understanding that resilience is the necessary competence to carry out professional goals especially at the time of crisis. Through their study it was found that both internal and external factors influence resilience. Using a phenomenological approach 150 responses were elicited, out of which eight themes were extracted. The factors found to enhance, foster and influence resilience viz. experience, support from colleagues, satisfaction in delivering skilful

care, sense of faith, ability to recognise stress and use suitable strategies to tackle them and managing work life balance.

Gu (2014) studied the factors that influence resilience. She explained resilience in teachers is measured as the ability they are able to sustain their capacity to continue to work for improvement and retain quality of education, despite the increase in teachers' accountability, emotional workload and work complexity. After interviewing 300 teachers, the factors that influenced resilience are quality of their relationship viz. between teacher – teacher, teacher – principal, and teacher – students. Highest stated factor was positive influence of collegial and collaborative support. It was also reinstated that resilience is influenced by multidimensional, multilayered and dynamic relationship present in their work and life. These three studies measured the stressful work environment in place of adversity.

While studying college students Campbell-Sills, Cohen, and Stein (2006) found the correlates or associates of resilience. Coping styles, personality traits, psychiatric symptoms and resilience were studied in the sample. It was found that the positive correlates of resilience were extraversion and conscientiousness. The negative correlates of resilience were neuroticism and emotion based coping. In addition to finding correlates, it was found that task oriented coping was a mediator between resilience and conscientiousness.

Similarly, while studying the same sample (adolescents) Annalakshmi and Abeer (2011) found that religious personality was a positive correlate of resilience. Persons with high religious personality manifested high resilience. However, by studying only Muslim adolescents, generalisation of findings is a question. While they found religious personality a positive correlate of resilience, Pinho de Oliveira, Machado, and Aranha (2017) had a contradicting finding. They found that demographic variables like religion, race, and gender

had no association with resilience. However, they found that age has a positive correlation with resilience and with progress of age resilience increases.

Collinshaw, Pickles, Messer, Rutter, Shearer and Maughan (2007) drew data from the famous Isle of Wright study (Rutter, Tizard, Yule, Graham, & Whitmore, 1976). The psychiatric history, personality and social functioning assessment, retrospective report of childhood sexual and physical abuse were considered. Factors associated with resilience were adolescent peer relationship, perceived parental care, quality of adult love relationship and personality style. The study defined resilience as absence of psychopathology.

In addition to factors that are associated and related to resilience, Beddoe, Davys, and Adamson (2011) found the factors that help in maintaining resilience. While studying resilience amidst social workers they found that factors like strong professional values, importance of self care, realistic professional expectation, awareness of the big picture and abiding by the personal and professional goals helped in maintaining resilience. In this study, stressful work setting was considered adversity.

Some studies were found to identify factors that promote and develop resilience. Olson, Kemper, and Maham (2015) found that mindfulness, emotional intelligence and self compassion promoted resilience. They were positively correlated with resilience and negatively correlated with burn out. The study involved the sample of students studying medicine.

Another factor promoting resilience is racial socialisation. Brown and Tylka (2011) while studying resilience in socially disadvantaged groups of African American students, found that resilience was positively correlated with racial socialisation. Racial socialisation not just promoted resilience but played the mediator role. To explain further, participants who

reported high levels of racial discrimination and those who received high racial socialisation inputs had high resilience.

De las Olas Palmer-Garcia, and Hombrados-Mendieta (2013) found factors involved in development of resilience. In this study, the authors intended to find how the personality factors play a role in developing resilience. Resilience was measured in terms of personal competence, acceptance of self and life and social support. The personality factors (optimism, conscientiousness, extraversion, agreeableness, neuroticism) predicted 25% variance in acceptance component of resilience. They also stated that enhancing personality traits (like optimism, conscientiousness, extraversion) and decreasing personality traits like neuroticism helped in development of resilience and thereby help them face adverse situations in their life.

Having seen the factors that contribute, correlate, associate, promote, develop and maintain resilience there are studies that observe factors that predict resilience. Kemper, Mo, Khayat (2015) studied the factors that predicted resilience, in health professionals. It was found that cognitive affective mindfulness, self compassion predicted resilience. The other factors studied along were physical and mental health and perceived stress. Among the two predictors viz. cognitive affective mindfulness and self compassion, self compassion revealed as a steady predictor. While adjusting physical and mental, mindfulness lost its effect on resilience whereas, self compassion was steady predictor of resilience with other factors adjusted.

Kinman and Grant (2011) found the factors that could predict resilience in trainee social workers. Factors such as emotional and social competencies like reflective ability, emotional intelligence and empathy predicted resilience. Among these predictors, it was found that emotional and social competencies predicted 47% of variance in resilience.

While studying Academic Resilience in school children, Martin and Marsh (2006) found certain predictors of Academic Resilience. The authors defined Academic Resilience as the "ability of the students to effectively deal with setbacks, challenges, adversity and pressure in academic settings". Though the authors mention adversity in the definition, there was no measurement of adversity. Pressure of examinations and scholastic performance and stress of studying curriculum were considered stressors in place of adversities. It was found that the factors that predicted resilience were confidence (self efficacy), coordination (planning), control and composure (low anxiety) and commitment (persistence).

William and Gardell (2012) while studying sexually abused adolescents stated the predictors of resilience. The authors followed a Bronfenbrenner's Process-Person Centred Time ecological model. This helped in finding what are the factors contributing to resilience. Results revealed that caregiver social support, school engagement, expectance and hope, level of education of the caregiver and socio-economic status predicted resilience. The study included only a single adversity – sexual abuse, wherein there is no observation of other related adversities for example poverty, loss of loved ones etc.

Similarly, Howell and Miller-Graff (2014) also studied young adults who faced violence. However, these authors included a variety of adversities which comprised of interpersonal aggression, sexual assault, child maltreatment and community violence. The authors also focused that the factors like spirituality, emotional intelligence and support from friends predicted resilience.

Factors affected by resilience

These studies focus on resilience affecting various factors, for instance resilience playing the role of predictor. Youssef and Luthans (2007) studied the impact of positive psychological factors like resilience, hope and optimism on desired work outcomes. Desired

work outcomes included performance, job satisfaction, work, happiness, work commitment and organisational commitment. They found that resilience and hope were predictors of work commitment. Resilience, hope and optimism together predicted 22% of variance in the performance, job satisfaction, work happiness, work commitment and organisation commitment.

Wren et al. (2011) studied the impact of resilience on chances of having a PTSD. The authors studied the out patients of primary medical care hospital. To measure their experience of adversity the Childhood Trauma Questionnaire and Trauma Events Inventory were administered. Resilience was measured using CD-RISC and the likelihood of PTSD was measured using PTSD Symptoms Scale. While childhood abuse and non-child abuse (abuse that is not faced during childhood) were associated with increase in likelihood of PTSD, resilience was associated with decrease in PTSD. Resilience was found as a predictor of likelihood of PTSD. The authors did not address plurality of adversity as they restricted only to adversity like trauma.

Tang (2019) while studying the intercorrelation between resilience, self compassion, academic performance and intolerance to uncertainty, found that resilience was the strongest predictor of intolerance of uncertainty.

In addition to resilience being studied as a predictor, resilience was observed as a protective factor. Arrebola (2014) studied heart patients. They investigated the affect of resilience on indicators of cardio vascular severity and underlying physiological mechanism. The authors found that after controlling factors like patient's age, sex, body mass index, smoking habits, diabetes, and dyslipidemia, resilience decreased the extent of myocardial infarction by having an effect on inflammatory response. Hence, the authors identified resilience as a protective factor against heart failure.

In addition to resilience being a predictor, protector, studies also recognised resilience as a moderator and a mediator. To understand this better, it is important to define moderator and mediator. Moderator can be defined as the third variable that affects the strength of the relationship between the two variables in correlation. Mediator can be defined as the variable that explains how and why of the relationship between two variables. It also explains that one variable can't have a direct influence on the other variable, instead the influence is through the mediator variable.

Sojo and Guarino (2011) studied resilience among unemployed adults. They aimed at evaluating mediated moderation vs. moderated mediation that could explain the relationship between resilience, coping style, depression, social functioning, and length of the unemployment, dispositional resilience, coping styles, depression and social functioning. Results of the study indicated that emotional coping was mediating between resilience and depression. Individuals with greater resilience used more detached coping when unemployment was for a longer duration. Individuals with poorer resilience used less avoidance coping in the same situation. Resilience behaved as a protective moderating factor between longer duration of unemployment and social functioning and mediated by detached coping. Amidst the stress due to length of unemployment, results explain a mediated moderation model. Wherein, resilience is a moderating factor and coping is a mediator.

In this particular study, unemployment was implied as an adversity. This makes the scope of adversity inadequate, because only a single adversity is considered. In fact, cascading adversity of unemployment like poverty, starvation, financial crisis are not considered.

In addition to this inadequacy, another gap was that resilience was measured using Life Orientation Test, Self Esteem Scale and Mastery Scale. The means across all the relevant items per scale were obtained. Higher scores indicated more presence of resilience.

Loh, Schutte, and Thorsteinsson (2013) investigated whether resilience was a mediator between affect characteristic and symptoms of depression. Resilience completely mediated the effect of affect on the difference in depression. Resilience partially mediated the effects of negative affect in difference in depression. Resilience scale was used to measure resilience. Stress is measured as a form of adversity.

The other type of research in the field of resilience focused on assessing resilience interventions and recommendations to build resilience interventions.

Appraising resilience interventions

One way of looking at resilience is resilience as a trainable construct. This gives an insight into, whether resilience is studied as a trainable construct, and if so how are interventions designed to present resilience as a trainable construct and in what contexts and types of sample resilience was trained. With such a pretext, the designed and functional resilience interventions and postulated recommendations to an effective intervention are critically appraised in this section.

Meredith and colleagues (2011) studied the U.S. personnel to assess their resilience program. Their ability to cope with stress of deployment for extended periods on a repeated basis was evaluated. When 23 such programs were assessed, it was found that it covered at least one phase of deployment. It included individual factors like behavioural control, positive coping; community factors like belongingness; work factors like teamwork and positive command climate and family factors in terms of support found less evidence. Though these factors promoting resilience were included, the study lacks the standard measurement of plural adversities, outcome, and resilience.

Reivich, Selgman, and McBride (2011) while designing a training program for the U.S. military took a different approach. They called it ‘train the trainer’ approach. It was based on the Penn Resilience Program by University of Pennsylvania. The training was

divided into four modules – resilience, building mental toughness, identifying character strength, strengthening relationship. Following this was training sustainment component and training enhancement component.

The resilience module focused on core competencies like self awareness, self regulation, optimism, connection and mental agility. The module of building mental toughness consisted of the ABC model of Cognitive Behaviour Therapy, awareness of thinking traps, icebergs, energy management, problem solving, and minimising catastrophic thinking and cultivating gratitude. The module of identifying character strength is based on the works of Peterson & Seligman (2004), wherein 24 character strengths are enlisted. After taking the Value in Action questionnaire the participants were respectively categorised. The module of strengthening relationships focused on the enhancing relationship among soldiers and their relationship with their families. This module taught three important skills, active constructive responding (Gable et al., 2004), effective praise (Kamins & Dweck, 1999) and communication styles (passive, aggressive and assertive). At the end of the training, the sustainment component focused on reinforcing resilience skills and applying them in military scenario. The enhancement component introduced the techniques introduced in sports psychology like attention control, building self confidence, goal setting and energy management.

Though both the studies covered internal and external factors influencing resilience, Reivich and colleagues (2011) built a resilience intervention which is holistic and complete since it did not stop with resilience building but included sustaining and enhancing the training.

Singh and Gupta (2015) while studying resilience in Indian military context proposed the model consisting of psychological preparedness, combat performance and resilience. The model stated that the individual's strength, level of combat constitute the outcome i.e. combat

performance. Individual strengths are categorised into three categories – cognitive level, emotional level and instrumental level. The level of combat is based on its intensity and duration. Based on these two factors four outcomes were enlisted – resilient integration, resilient regaining, adaptive resilient and post dysfunctional growth. This model has been more elaborate and detailed as it included the levels of individual strength, combat and outcome. This intervention can be identified as more dynamic as it includes how the outcome (resilience) varies with any variation in the level of individual strength and combat, thereby, capturing the dynamic nature of resilience.

McAllister and McKinnon (2009) postulated three recommendations to build resilience intervention in health professionals. These three recommendations were, concept of resilience to be introduced in all training settings, practitioners to reflect and learn from peers through their experience of being resilient and to demonstrate altruism, mentoring and motivating others so that an enhancing and generative health professional culture is constructed. The particular aspect of peer learning and motivation through their experience of being resilient, is a unique feature of the intervention because this makes resilience intervention more realistic and pragmatic.

The resilience intervention in two high-tension professions denotes the importance of resilience and the way it is trained in people.

Identifying resilience and characteristics of resilients

This category of resilience research focuses on the studies that attempted to measure resilience and the characteristics of resilient individuals. This section focuses on how the construct of resilience is measured or identified and what are the characteristics of resilient individuals.

McCann et al. (2013) while studying resilience in health professionals, especially psychologists and counselors, resilience is measured through coping, self care, self

compassion, wellbeing and psychological wellness. Importance of self care was treated as a buffer against burn out and a facilitator of psychological wellness. Also the culture of psychology wherein efforts were taken to encourage personal psychotherapy and share one's journey to psychological wellness and work-life balance (Barnett et al., 2007; Barnett & Cooper, 2009). It was found that experiences such as occupational stressors like work load, time pressures, emotional issues and multiple roles are considered instead of measuring adversity.

Gu and Day (2007) defined Teachers Resilience as their effectiveness, interactive impact of personal, professional and situational factors on teachers work life and sustain their professional commitment. They identified teaching profession highly demanding with changing government policies of education, constant work pressure, playing an emotional role in student's life and work towards increasing competence of students. In such a background the authors defined resilience in teachers as, the interaction between teachers, sense of efficacy, personal and professional identities and their competence to manage their three dimensions – professional, situational, and personal dimensions in their professional phases. Among the three scenarios – first scenario was where all the three dimensions are in balance with mild fluctuations. Second scenario was where one or two dimensions were distorted and the fluctuations may require short term management. Third scenario was where there were extreme fluctuations in all the three dimensions and the imbalance may or may not be able to manage. The scenarios of all the three resilient teachers reflected that they had tensions, pressure and challenges in all the three dimensions of professional, situational and personal. However, what was resilient in them was their ability to build favourable influences and positive opportunities in their professional and personal contexts, maintain positive emotions and a sense of vocation, and overcome emotional tensions.

It needs to be understood that the study intends to identify resilience but both resilience and adversity are misconstrued, inadequately and inaccurately defined. Resilience is misconstrued as professional competence and adversity is misconstrued as occupational stressors like government policies of education, constant work pressure, playing an emotional role in student's life and work towards increasing competence of students. This stated that constructs of resilience and adversity are diluted and mismeasured.

Karoly and Ruehlman (2006) studied resilience in people with chronic pain. They adopted a multi step procedure. The first step was to identify resilients and second step was to assess the psychological constructs in resilient and non-resilient groups of chronic pain sufferers. Participants who had scored high in Severity scale of the Profile of Chronic Pain and scored low in Interference and Emotional Burden scales were identified as resilient. An age and gender matched non-resilient group was the sub sample selected who scored high in Severity, Interference and Emotional Burden.

When both resilient and non-resilient were studied there was significant difference between them in terms of coping style, pain attitudes and beliefs, catastrophizing tendencies, positive and negative social responses to pain, and health care and medication utilization patterns. It was found that resilient respondents also reported relatively lower levels of pain-induced fear, belief in a medical cure for their pain problem, and self-ascribed disability. Resilient participants also reported more tangible (but not emotional) social support and significantly lower levels of social hindrance (in the form of insensitivity and impatience). Thus, resilients were identified as those who had least Interference and Emotional Burden despite chronic pain.

Hariharan, Karimi and Kishore (2014) studied resilience in persons with disability. People working with persons with disability were asked to identify resilient persons i.e. who performed well despite their adversity (disability). The resilient and the non-resilient were

tested on emotional environment and how they perceive their environment. Results indicated that the resilient participants were emotionally more intelligent and had positive perceptions of their environment than their vulnerable counterparts. The authors also suggested that such characteristics aid in performing better and excelling in life, thereby suggesting that they could promote resilience. The study identified resilients and characteristics of resilient individuals, but limited the adversity to physical disability.

Simeon (2007) intended to measure resilience and its association with trauma, temperament, attachment cortisol and cognitive performance in healthy adults. Resilience was measured using Defence Style Questionnaire (Bond, 1986). Defence Style Questionnaire denotes three defences. Mature defense includes suppression, humour, sublimination, rationalisation, and anticipation. Neurotic defense includes undoing, idealisation, reaction formation, and pseudo altruism. Immature defense included projection, passive aggression, acting out, displacement, autistic fantasy, somatisation, and displacement.

Mature defense was considered as Resilience Index. Resilience was positively correlated with reward dependence, urinary cortisol, superior performance and secure attachment. In terms of measuring adversity, childhood trauma was considered. This makes the measurement of adversity narrow and insufficient of other types of adversities. Though the purpose was to measure resilience, the approach taken was inaccurate. Tool chosen to measure resilience was inappropriate because mature defences include suppression anticipation, and rationalisation that is not even remotely concerned with resilience.

Hildon, Smith, Netuveli and Blane (2008) used a mixed method to find the relationship between adversity and resilience among older adults 70-80 years (N = 139). The participants were asked to record significant life events like change of residence and employment. Along with this diary, the quality of life was measured using the CASP-19

scale. Quality of life consisted of control, autonomy, self realisation and pleasure (Higg et al., 2003).

Resilience was identified as at least one reported adversity and high CASP-19 score. Using the life grids, interviews were taken to explore past and present experiences of adversity. It was found that participants with resilience extracted support from social and individual resources in the ace of adversity. They appraised past adversity in the current scenario, relied on tried and tested coping methods and support from ongoing close relationships. Participants with vulnerability outcome described adversity more severely and stated that resilience is dependent on degree of the adverse experience.

Among so many studies seen so far, this study appears different as the experience of adversity is neither assumed, misconstrued or limited. Instead the experience is elicited from participants. The participants were asked to record in the diary the severe significant events of their life which had an adverse impact and they were interviewed for eliciting the same. Quality of Life was measured using QoL consisting Control, Autonomy, Self Realisation and Pleasure scale (CASP-19) (Higgs et al. 2003).

Resilience was identified as at least one reported adversity and high score in CASP-19. Thus, resilience was understood and measured as having a high Quality of Life despite the experience of adversity. Based on this understanding the sample was categorised as participants with resilience and participants with vulnerability.

It was found that participants with resilience optimised support from internal (like coping methods) and external (like close relationships) resources to tackle adversity. This clearly denotes the role of interaction of protective (internal) and promotive (external) factors with adversity. However, the measurement of resilience in terms of Quality of Life despite adversity is only suggestive of resilience than a true mismeasurement of the construct of resilience.

After reviewing the resilience research, it is clear that resilience is measured inaccurately, conveniently and according to feasibility of the research. It is inferred by measuring another construct or it is operationally defined as a combination of wellbeing at the face of adverse condition. Adversity is either assumed or it has been measured in the form of stress, occupational stress etc. Resilience is understood and measured as professional competence and efficacy. Thereby the scope of mismeasurement pertains to adversity and resilience.

Having reviewed the literature on resilience in all four perspectives viz. conceptual, psychometric, interventional and applicative, it can be observed that there is a misconnect between what resilience is and how resilience is studied. Given the complexity, multidimensionality, and dynamism of resilience, the need of the hour is a holistic theory or model, which can capture resilience in its true essence.

Synergy Model of Resilience

Abreast of the nature of resilience and resilience research for the past four decades, Hariharan and Rana (2017) proposed a holistic resilience model and called it the Synergy Model of Resilience (depicted in Figure 2.1). They operationally defined resilience as “a unique function of adversity, operating factors, resistance across time continuum that brings and sustains positive reflections in the form of achievement and flourishing.

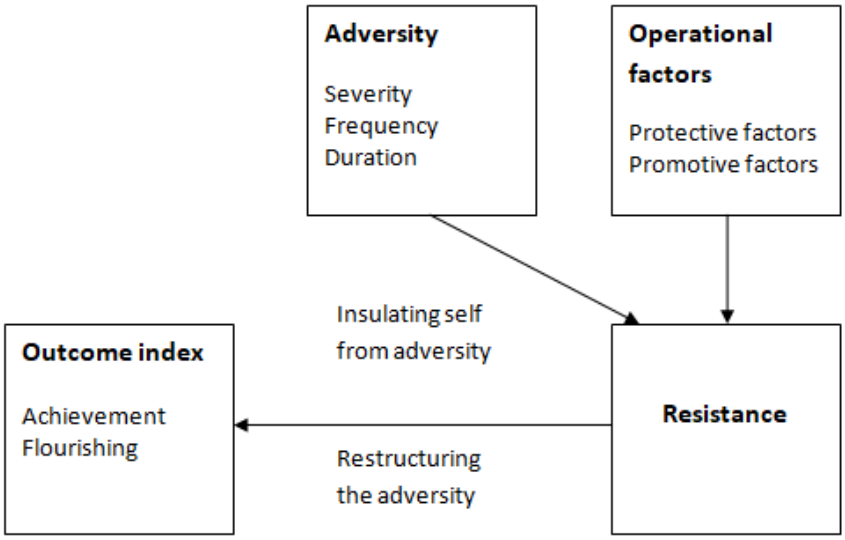


Figure 2.1 Synergy Model of Resilience (Hariharan & Rana, 2017)

Description of the model

Synergy Model of Resilience measures a wide variety of adversities that encompass innate, situational, self inflicted and adversities pertaining to significant others. It included severe adversities (death of loved ones) and mild adversities (frequently falling ill). The model includes the resources of the individual both internal and external that are functional in the individual. Resistance, which is the ability to use one's resources and resist the negative impact of adversity, is also part of the model. Outcome reflects in terms of tangible achievements and positive reflections in terms of flourishing. However, going beyond and using one's resources not just to resist but have an excellent outcome is recognised as resilience.

Uniqueness of Synergy Model of Resilience

The Synergy Model of Resilience captures resilience in its true essence i.e. its multidimensionality, dynamism, and complexity. Multidimensionality is captured by including the three dimensions of Adversity – severity, frequency, and duration, the two dimensions of Operating factors – one's Protective (internal) and Promotive (external) factors

and the two dimensions of Outcome factors include tangible achievements and positive reflections in terms of flourishing. Dynamism is captured by allowing and measuring the variations in all the three integral dimensions – Adversity, Operating factors, and Outcome factors. Complexity is captured by including inter-dimensional connection, thereby paving way for deriving the by product of resilience process – Resistance.

Rationale

After reviewing the conceptual aspect of resilience and attempt by researchers to define, operationalize and adopt methodologies to study it, it can be seen that the dynamic and multidimensional nature of the construct is the challenge. Due to the same reason resilience takes shape accordingly when studied by different schools of Psychology. When clinical psychologists study the construct, resilience is reduced to psychopathology, well being and meeting developmental yardsticks. When educational psychologists study it, scholastic achievement is recognised as resilience. When studied in disaster settings, recovery to status before adversity is assumed as resilience.

In such a scenario, resilience becomes a gullible construct. There comes the need to have a theoretical basis to understand resilience as a process. Once such a theory comes into place, delineating the components in the process would aid in operationalizing and measuring the construct, like the Synergy Model of Resilience (Hariharan & Rana, 2017).

Even the attempt of constructing psychometric tools for measuring resilience in the bereft of a theory is ineffective. During the psychometric evaluation of the tools measuring resilience, it can be seen that there were gaps. To enlist a few, adversity being an integral part of emergence of resilience, it is measured exclusively i.e. using Trauma Inventory and Childhood Adversity Scale etc. Adversity is measured unilaterally i.e. its presence or absence. The types, severity, frequency, duration of exposure to adversity are not considered.

Unless adversity is seen in the blend of the process of resilience, measuring it for its presence or absence alone comes out to be a reductionist approach. In some instances, the adversity is presented in the form of an assumption and resilient behaviour is inferred. Such an attempt can only assume resilience but not measure it. For instance, "When I'm in a difficult situation, I can usually find my way out – rated on 7 point scale of Disagree to Agree" is an item from Resilience Scale (Wagnild & Young, 1993) and "Tend to bounce back after illness or hardship" is an item from Connor Davidson Resilience Scale (2003).

Most of the psychometric tools are an excellent array of protective factors and scoring high in them is implied and interpreted as high in resilience. This contradicts the view of Rutter (1999) who stated that protective factors are not resilience. Another aspect of the tools are, protective and promotive factors need to be functional for it to be advantageous. To illustrate, one can use a protective or promotive factor to facilitate resilience only when one possesses it. Similarly, the outcome of resilience needs a balance of being superlative enough and at the same time relevant and relative to the person. Such a balance can be found when the individual himself/herself enlists and signifies one's achievement in a scientific framework (for the purpose of adequate measurement).

Even when resilience is seen in different settings, it can be identified of some gaps. Mostly resilience is studied in a target sample i.e. victims of a singular adversity like war victims of natural calamity (Tsunami) (Rajkumar et al. 2008), victims of racial discrimination (Brown & Tylka, 2011) and in persons with disability (Hariharan et al., 2014). In such a scenario wide range of adversities are not represented. For example, a participant may be a victim of Tsunami now but may have faced abuse as a child. In that case, plurality of adversities experienced does not get represented thereby not measured too. Also the

observation of measuring resilience using scales of Quality of Life, have the threat of corrupting the construct of resilience and brining about methodological issues.

Resilience literature from all the three perspectives – conceptual, measurement and application reveals that there is inconsistency between what resilience is and how it is studied. Conceptually, the definition and factors involved portray resilience as a multidimensional and dynamic construct. When it comes to measurement, this understanding of the construct fails to reflect through the tools thereby, leading to lack of accurate and suitable tools. This has a cascading effect on the way resilience is identified and measured in research studies.

This leads to inferring resilience by measuring a correlate construct like hardiness. Mismeasurement of adversity and resilience is vividly seen. Most of the resilience research ignore the measurement of adversity, or they assume the presence of adversity or it is measured singularly i.e. only one type of adversity is considered and resilience is measured and understood as possession of internal and external resources.

In this manner, the measurement and scope of resilience would be misconstrued and dwarfed. Thus, the need of the hour is a holistic model or theory. Such a model called as Synergy Model of Resilience proposed by Hariharan and Rana (2017) is capable of understanding the construct in its true essence of multidimensionality, dynamism and complexity.

The model is logical and appears holistic. However, it needs to be tested. The challenge lies in testing the feasibility of this model in providing a quantitative measurement for resilience. The present study is an attempt to measure resilience using Synergy Model of Resilience and validate the same.

The objectives of the study were to

1. To evolve a testing tool to measure the variables along the lines of Synergy Model of Resilience and validate the same
2. To evolve and apply a formula to derive a Resilience Index
3. To categorise participants based on their Resilience Index
4. Empirically test Hariharan-Rana Synergy Model of Resilience

METHOD

The purpose of the study was to test the Hariharan – Rana Synergy Model of Resilience (2017). Hence, it is relevant to give a brief description of the model. Synergy Model is applicable in identifying resilient persons from any population. This is unlike identifying resilient persons from homogeneous groups with specific adversity such as orphan children (parental deprivation), physically challenged persons, economically poor people etc. Here adversity is in one dimension. Synergy Model advocates that Resilience is a manifestation in the form of Achievement in the face of adversities, which is effectively handled by Operating factors (Protective and Promotive factors).

The model argues that the Protective and Promotive factors operate in a way to minimise the negative impact of adversity experiences. The way in which Protective and Promotive factors create a buffer against adversity is termed as Resistance. The amount of Resistance applied vis-a-vis the level of Achievement attained determines the degree of Resilience. If the Achievement level commensurate with Resistance applied, the individual is likely to show 'positive adaptation'. Here, the individual tries to insulate oneself from the negative impact of adversity. Here, the individual's Resistance to Adversity is to the extent of not getting the negative impact of adversity. In such cases, one may find an average performance in the individual despite the adverse life events. These individuals can be identified as 'Positive Adaptors'. Theoretically and logically, the life adversities are expected to negatively impact their performance and achievement and limit them to below average level. Contrary to that, they adapt successfully and show average achievement.

However, Synergy Model posts a pertinent question related to the level of performance and achievement in the face of adversity that qualifies one to be labelled as Resilient. According to Synergy Model, Resilience varies in degree based upon the level of

Achievement and the power of Resistance. According to the model when the level of Achievement and force of Resistance are equal the individual shows average Resilience, which is manifested by average performance through insulation from negative impact of adversity. On the other hand, when the level of achievement is higher than the Resistance, the degree of Resilience is higher. It is explained that the individual, applies the Protective and Promotive factors not only as buffers against adversities but also invests these positive factors for performance and achievements. These Operating factors, in such cases, are utilised towards restructuring the adversities to facilitate Achievements.

As explained the model had its own complexity. The component of adversity has the inherent characteristics of the severity of the adverse condition, frequency of the exposure, and duration of the experience. Hence, the construct of adversity should have all the three components integrated into it. Any tool attempting to measure this construct is expected to measure all the three integral components and yet give a single value. The components of Operating factors consists of two distinct sub components namely Protective factors and Promotive factors, acting as buffers to minimize the impact of Adversities on the individual. Protective factors are the positive internal characteristics that are helpful to encounter one's adversities. Promotive factors are positive environmental resources that promote a healthy encounter of the adverse situation.

The model demands that these two components will have to be measured independently in an individual (for the sake of respondent's convenience) but should give a single comprehensive value. The model also demands an independent measure of Achievement level as well as a measurement for Flourishing. Further, the model demands, derivation of a value to indicate the Resistance force/ power by taking into consideration the interaction between Adversities and Operating factors.

Testing the model calls for a systematic and organized process involving the following steps:

1. Development of different scales for the three main dimensions called, Adversity, Operating factors (Protective and Promotive factors) and Outcome factors (Achievement)

2. Pilot testing of the scales for testing the suitability and applicability in the field

3. Assigning the scores for each scale

4. Bringing in all the scales under a Resilience Test Battery (REST Battery)

5. Take a mathematical approach for evolving a formula, which includes the following two sub-steps:

a) Assigning weights to the constructs of the dimensions based on the scores in the data set

b) Evolving a mathematical formula by using the weights

6. Deriving the indices for the main dimensions namely Adversity, Operating factors and Outcome factors

7. Application of the formula to derive Resilience Index

The Method chapter elaborates on development of the tools using different sets of samples at different stages. It also explains the scales in the Resilience Test Battery. Further, this chapter describes the sampling technique and the demographic characteristics of the sample at different stages.

The stages in the evolution of the mathematical formula, its validation, and application are explained in the Results chapter.

Given the nature of this research work, the Method chapter takes a minor deviation from the norm and explains the development of the tools before the describing the sample. It

is necessary to reiterate here, that the sample was recruited right from the stage of developing the scales till final administration of the Resilience Test Battery for evolving the Resilience Index and validating it with a qualitative data. Thus, though sampling got integrated with tool development, for the sake of better explanation the sample description is given separately under the head of Sample. Hence, in places the description may be repetitive.

The entire study design under the heads of phase, objectives, task, and sample size is explained in Table 3.1. This grid framework would make the further sections of the Method more understandable.

Table 3.1.

The study design.

Phase	**Objectives**	**Task**	**Sample size (*n*)**
1	Evolving Resilience (REST) Test Battery	Scale Construction	100
2	Pilot testing	Administration of the Adversity scale, Protective factors scale, and Promotive factors scale on sample	1333
3	i) Testing the feasibility of three dimensions of the Adversity scale ii) Evolving the formula for measuring resilience	i) Feasibility check of multidimensionality of Adversity scale ii)Development of weights for each construct and dimensions iii) Validating by using parallel scales	200
4	Application of formula and reliability testing	i) Administration of REST Battery ii) Application of the formula using weightages developed in the previous phase	205
5	Validation of Resilience Index (RI)	i) Interviews with identified high scorers on RI ii) Administration of REST Battery and interview with persons, socially acclaimed as Resilients	5 (A sub sample from the sample of 205 sample) 5 (newly recruited sample outside the sample of 205)

Tools

The tools presented here viz. Adversity scale, Protective factors scale, Promotive factors scale, and Achievement scale have been constructed as part of the study to test the Hariharan – Rana Synergy Model of Resilience (2017). The four scales are constructed to measure and quantify the four constructs respectively. The Flourishing scale by Diener et al. (2009) is used in its original form. The items and the response format of each scale is explained in detail.

Each of the four scales is described separately. The description includes the steps involved in the process of constructing the scales, followed by description of the scale (nature of the items and response format).

1. Construction of Adversity scale

The process of constructing the Adversity scale includes the following steps:

1. a. Item pooling – The literature related to classic and contemporary resilience research was reviewed. All the different types of Adversity (innate, situational and inflicted) and the different methods of measuring adversity were carefully studied. It was also seen whether the related dimensions of Adversity were taken into consideration or not. All this was accomplished over a series of six scheduled brainstorming workshops with a group of 25 participants consisting of three psychologists and 22 students of Psychology pursuing Masters Degree. At the end of the workshops, the Adversity scale had a total of 106 items, representing different types of adversities.

1. b. Item writing – The shortlisted 106 items were written as statements following the standard guidelines of item writing. The standard guidelines included a) clearly defining what one wants to measure, b) avoiding long sentences, c) setting the reading difficulty of items to

moderate level, d) avoiding double barrelled items, e) being sensitive to cultural and ethnic differences, f) maintaining a balance of positively and negatively worded items, and g) keeping the items independent of each other (Kaplan & Saccuzzo, 2009; Crocker & Algina, 2008; Suen & McClelam, 2003).

1. c. Item reduction– The items were scrutinised by three experts for detecting bias and insensitivity. Then the items were modified and evaluated by the committee of subject experts in sync with procedural norms (La Duca, Downing, &Henzel, 1995).

Once the items were written in certain format, they were shortlisted on the basis of Non-Repetitiveness, Essentiality, Unambiguity, & Relevance to Indian Scenario (NEUR). After the three experts discarded some items on these four criteria, only those items that received the unanimity of the experts' approval after their independent scrutiny were retained. This left the Adversity scale with 49 items and with a scope of measuring the severity of the adversities.

1. d. Pilot testing – The 49 item scale had to be tested for its feasibility. The Adversity scale was administered on a sample of 1333 participants. The purpose of pilot testing the scale was to check if participants were able to understand and respond to the items of the scale. The pilot testing suggested that the sample was able to understand and respond to the items without any difficulty. Hence, all the items were retained.

1. e. Checking the feasibility of multidimensionality – Hariharan and Rana Synergy Model of Resilience required that adversity be measured on three dimensions. After ascertaining the item suitability on a single dimension of severity on a large sample of 1333 participants, the feasibility of eliciting three independent responses on three dimensions for the same set of adversities had to be examined. This step was carried out in the following manner.

In addition to the severity of the adversity, two new dimensions viz. frequency, and duration of adversity were added to the Adversity scale. The Adversity scale with three dimensions (severity, frequency and duration) was administered on a sample of 200 to check if the participants were able to respond to each of the 49 items on three different dimensions. None of the participants expressed any difficulty nor sought any clarification in responding to the scale with three dimensions to respond. It was clear that the participants understood and accepted the multidimensionality of the Adversity scale.

Description of the Adversity scale

The 49 items Adversity scale comprised of statements of situations of adversities ranging from severe life situations like 'facing a natural disaster' to moderate aberrations like 'frequent ill health'. They pertain to adversities incurred by self like 'being jailed' to adversities that are related to one's close environment such as 'one or more family members suffering from prolonged physical or mental illnesses'. The format of 49 items Adversity scale consisted of three columns. First column on the extreme left is a checklist to be filled by the participant; the second column consisted of the list of adversities. The participant is required to read every adversity and identify those, which he/ she experienced/ experiencing. The participant is required to tick in the left column, for those adversity items experienced or experiencing by him/her.

The three columns on the right of the list of adversity are for recording the rating of the adversity on the three dimensions. Once the participant ticked an adversity in the first column, he/ she is required to give ratings on a 10-point scale on the three dimensions, viz. severity, frequency, and duration and record against that item in their respective columns on the right side of the list. The 10-point scale on severity ranged from less severe to more severe; for frequency, less frequent to more frequent and for duration short duration to long

duration. While the objectivity is measured in terms of presence or absence of the adversity, frequency, and duration, the subjectivity was measured in terms of perceived severity. The scale is presented as part of Resilience Test Battery (REST) in appendix 3. The ratings for each column are summed up and the mean score is evolved. The Adversity scale consists of three mean scores, viz. severity, frequency and duration.

2. Construction of the Protective factors and Promotive factors scale

Operating factors included Protective and Promotive factors. Two separate scales were constructed for these two factors. In the following steps it is explained how the scale was evolved from the amassed pool of items, the process of identifying and labelling the Protective and Promotive factors to construct two different scales viz. Protective factors scale and Promotive factors scale.

2. a. Item pooling – Literature related to resilience research was reviewed. The various internal characteristics/ attributes and external resources of the individual that protected them or acted as a buffer from the negative impact of the adversity were pooled. The internal characteristics were inclusive of cognitive, affective, and conative nature. The external resources belonged to the family, significant others and community. This was carried out through a series of six scheduled brainstorming workshops with 25 participants consisting of expert psychologists and students of Masters in Psychology. After preliminary pruning, there was a total of 53 items, that comprised of internal and external factors i.e. Protective factors and Promotive factors.

2. b. Item writing – Following the standard item writing guidelines, the 53 items were written in statement format. They were evaluated for any bias and insensitivity by a committee of three subject experts.

2. c. **Item reduction and distinction** –The 53 items were shortlisted by the three experts to 38 items, following the criteria of Non-Repetitiveness, Essentiality, Unambiguity, & Relevance to Indian Scenario (NEUR). The next task was to classify them into Protective and Promotive factors. This was carried out by involving experts. A total of 18 judges were requested to read each item and mark it as 'essential' either as internal characteristic (Protective factors) or as external factor (Promotive factors) that helped the individual in encountering the adversity successfully. Any item not found as essential under either of the two categories were asked to be discarded. According to the procedure followed in conducting the Lawshe's content validity table, the critical values of content validity ratio for the panel size 18 is 0.44. All the items having a value of 0.44 or greater were retained. In this process out of the total of 38 items, the ones that procured the value of 0.44 or above were distinguished into Protective factors and Promotive factors. A total of 24 items were classified as Protective factors and 14 items as Promotive factors. Thus, the Protective factors scale had 24 items while the Promotive factors scale comprised of 14 items.

2. d. Pilot testing – Both the Protective factors scale and the Promotive factors scale were administered to a sample of 1333 participants to check the suitability of the scales in terms of language and relevance of the items. The pilot testing confirmed that the participants understood and responded to the scales comfortably. There was no difficulty expressed by any participant.

Description of the scales under Operating factors

i) Protective factors scale—This scale consisted of 24 internal characteristics that are helpful to one to encounter the adversity. They ranged from simple characteristics like 'having confidence in self' to complex characteristics like 'ability to mobilise resources to solve problems'. The first column was left blank to be ticked by the participants indicating the

presence of the characteristic in them. The second column consisted of the 24 items list. On the right of the 24 items, the participants were required to rate those items ticked by them on a 10-point scale on the perceived strength each characteristic holds for the person (1 being low strength and 10 being more strength).The ratings of the perceived strength are totalled and the mean score is calculated. This constitutes the score for Protective factors scale. The Protective factors scale is presented as part of Resilience Test (REST) Battery in appendix 3.

ii) Promotive factors scale—This 14 items scale consists of environmental resources (physical and social environment) that helped the respondent in coping with adverse situations. They ranged from family support like 'having a supportive husband/wife' to formal support like 'health care facilities within reach' and 'living in a neighbourhood that is supportive'. In line with other two scales, the participants were required to check the item present in one's environment in the left side column and then rate the perceived advantage of the situation/ resources to the person, on a 10-point scale (1 being low advantage and 10 being high advantage). The ratings on perceived advantage are totalled and the mean scores are derived. This constituted the score on Promotive factors. The Promotive factors scale is presented as part of Resilience Test Battery (REST) in appendix 3.

3. Construction of Achievement scale

A different method was adopted in constructing the Achievement scale. A sample of 100 participants between the age group of 15 years to 34 years were asked to share their significant achievements. This generated a total of 348 responses. These responses were read, re-read and coded. Then they were categorized under ten broad themes. These ten categories are achieving significant heights in 1. Scholastic, 2. Artistic, 3. Athletic, 4. Career, 5. Promotion, 6. Scholarships, 7. Being first generation doctorates, 8. Admission in apex institutes, 9. Awards and 10. Medals of the first category/ higher cadre.

Description of the Achievement scale

An open ended tool was used to elicit significant achievements and accolades of the participants despite their adversities. The responses were classified into ten themes indicating achievements related to scholastic, artistic, athletic, career, promotion, scholarships, first generation doctorates, admission in apex institutes, awards and medals of the first category/ higher cadre. After writing their achievements in the left column, the participants are required to indicate in the right column how significant that particular achievement is/ has been for him/ her on a 10-point scale where a rating of 1 indicates less significance while a rating of 10 indicates high significance. The ratings on the significance of achievement are totalled and the mean score is calculated. This constitutes the score on Achievement scale. The Achievement scale is presented as part of Resilience Test Battery (REST) in appendix 3.

4. Flourishing scale

Apart from the four constructed scales, Flourishing scale constructed and standardised by Diener and colleagues (2009) was included in the Resilience Test Battery (REST) in its original form. The Flourishing scale was constructed to measure psychological functioning, in terms of positive functioning, optimism, and engagement, thereby contributing to wellbeing. The components of the Flourishing scale are purpose/meaning, social contribution, competence, self -respect, optimism, and social relationship.

Description of Flourishing scale

Flourishing scale is an 8 item scale. The items are in a statement format and are presented in a positive direction. They are required to be rated on a 7-point scale, ranging from 1 denoting ‘strongly disagree’ and 7 denoting ‘strongly agree’. The ratings given to each of the eight items are totalled and mean score is derived. This constitutes the score on

the Flourishing scale. The Flourishing scale is presented as part of the REST Battery in appendix 3.

Resilience Test (REST) Battery

Resilience Test (REST) Battery comprised of a total of five scales and are presented below:

1. Adversity scale (49 items)

2. Protective Factors scale (24 items)

3. Promotive Factors scale (14 items)

4. Achievement scale (10 items)

5. Flourishing scale (8 items)

The REST Battery had general instructions orienting the respondent to provide responses to the five scales in addition to the specific instructions for each scale. Further, it consisted of 11 questions related to the demographic information of the participants. The response format for all four constructed scales (Adversity scale, Protective factors scale, Promotive factors scale and Achievement scale) followed the format of semantic differential scale. The purpose of using a semantic differential scale is to capture the meaning the participant would attach to variables like severity of adversity (less severe----more severe) (as part of Adversity scale), frequency of adversity (less frequent-----more frequent) and duration of adversity (shorter duration------longer duration). Similarly, in the Protective factors scale, it was intended to measure their perception of strength of their internal characteristics (lower strength------higher strength). In the Promotive factors scale, the intension was to measure their perceived advantage of the positive environment (lower advantage-------higher advantage). Further, the objective of Achievement scale is to measure their perceived

significance of the achievements they accomplished. Flourishing scale had its own original 7-point response scale.

Semi-structured Interview Schedule

The Semi-structured Interview Schedule was constructed to gather qualitative data related to resilience. The interview schedule comprised of six questions, related to the life adversities, coping with adversities, internal and external resources that helped them and their achievements despite adversities. These guiding questions were used to steer the interview. Thus, they were modified and flexibly used (without changing the essence of the question). In case, the participants themselves were comfortably expressive, then the questions were accordingly used. The interview schedule is appended in appendix 5.

Sample

This study developed and validated a test battery to measure resilience in a comprehensive manner in general population. Hence, it required sample from general adult population. Different samples were drawn at different stages of developing the scales for the test battery, evolving the formula, and standardising the battery. In order to fulfil this requirement the sample for the study was drawn from the urban population of Telangana and Tamil Nadu.

The total sample consisted of 1843 men and women from upper, middle, and lower socio-economic class. The sample was recruited at different phases of development of the tool and evolving the formula as measurement criteria. However, at every phase it followed a two-stage sampling technique. In the first phase, a group of participants were recruited following Purposive sampling. The subjects in this first stage of sampling were requested to provide reference from their contact, fulfilling the basic criteria of age, and willingness to

participate in the study. Then, Snowball technique was followed until the required number of participants was recruited.

The size and characteristics of sample recruited in different phases are described in the following paragraphs.

Phase 1: Scale construction

A sample of 100 participants were selected for evolving the Achievement Scale. The sample was drawn from the age group of 15 – 34 years. The mean age was 24.95 years. Out of this 54% were men and & 46% were women. The sample differed in their marital status. About half i.e. 51% were married, 48% unmarried and 1% was separated from their spouse. The sample varied in their educational qualifications. It was seen that 55% had a graduation degree while 16% held Postgraduate degree or above and 29% had higher secondary qualification. The sample belonged to different occupations. The sample consisted 43% of students, about one third i.e. 32% were employed while 10% were homemakers. It was observed that 7% were engaged in business and 8% were self-employed.

Phase 2: Pilot testing the tools

A sample consisting of 1333 participants were recruited in phase 2. The purpose of this phase was to pilot test the Adversity scale, Protective factors scale and Promotive factors scale and to test the feasibility and applicability of the scales.

The sample was drawn from the age group of 15 – 34 years. The mean age was 23.55 years. In the sample, 53.41% constituted men and 46.58% were women. Varied marital statuses were observed. The majority of 79% were unmarried and 20.4% were married. Participants who were divorced or separated, widowed constituted to a small number i.e. 0.30% and 0.07% respectively. There also existed 0.22% of participants who did not want to

disclose their marital status. Regarding educational qualifications of the sample, higher representation i.e. 35% were postgraduates and 32% graduates, and 27% belonged to higher secondary education and 6% did not want to disclose their educational qualifications. The sample belonged to different occupations. Students were in majority i.e. 41.71%. followed by 10.02% who were employed and 7.50% were homemakers. Less than one tenth of the sample i.e. 4.51% and 3.03% were engaged in business and self- employment. However, quite a large percentage i.e. 33.23% did not disclose their occupational details. This group was administered the Adversity scale with severity dimension, Protective factors scale and Promotive factors scale.

Phase 3: Checking feasibility of multidimensionality of Adversity scale and evolving the formula

A sample of 200 participants was recruited. There were two purposes of this phase. Firstly, to test the feasibility of eliciting responses on three dimensions for the 49 items related to Adversity scale. Secondly, to use the scores of the data set to derive weights for each of the seven construct (Severity, Frequency and Duration of Adversity, Protective factors, Promotive factors, Achievement, and Flourishing). This group is labelled as 'Model group' because this was used as a model for deriving the weights for the seven constructs.

The sample was drawn from the age group of 19 – 39 years and the mean age was 30.86. In this sample, the ratio of women was marginally higher than men, i.e. 53% were women and 47% were men. The married participants were more in number i.e. 58.5% than the unmarried participants which was 41.5%. While seeing the educational qualification, the sample comprised 42.5% graduates, followed by higher secondary education, which was 28.5%, and 22.5% post graduates. It was observed that 6% were illiterate. However, in this sample a very small percentage of participants i.e. 0.5% who did not want to disclose their

educational qualification. A major percentage of 71.5% of the sample were employed. Students were 10% of the sample. Self employed were 7.5%, homemakers counted up to 6.5%, and 3% of the sample were unemployed. Participants handling business contributed a low percentage of 1.5%. This group was administered the Adversity scale with severity, frequency and duration dimension, Protective factors scale, Promotive factors scale, Achievement scale and Flourishing scale.

Phase 4: Application of the formula

Phase 3 facilitated the derivation of weights leading to evolving mathematical formula to derive Resilience Index. In phase 4, a sample of 205 participants were recruited for administrating the REST Battery. The purpose of administrating this Battery on this sample was to derive Resilience Index for every participant by application of the formula. The weights derived from the model group were used for arriving Resilience Index. Since the formula was tested afresh on this group, the group is labelled as 'Testing Group'

The sample was drawn from the age group of 19 – 39 years. The mean age was 29.35 years. There were 50.7% women and 49.3% men. The proportion of married participants was 55.1% while 43.5% were unmarried participants. Small percentages i.e. 0.5% were divorced/separated, 0.5% were widowed and 0.4% did not disclose their marital status. Almost half the sample were graduated i.e. 49.3%, followed by 40.1% of postgraduates and above and one tenth of the sample i.e. 10.6% belonged to higher secondary category. Half of the sample i.e. 50.2% were employed, 28% were students, followed by 11.6% of homemakers. Participants who engaged in business were 2.4% and 7.2% were self- employed and 0.6% did not disclose their occupational status.

Phase 5: Qualitative Analysis

A total of ten participants were recruited for collecting qualitative data through semi-structured interviews. Out of the ten, five participants were a sub sample from 205 whose resilience index was more than 100. The other five participants were those who are socially recognised as Resilient. The participants age ranged from 23 years to 58 years. The mean age of the sample was 37.9.

Out of this sample of ten participants, 80% were women and 20% were men. 60% of them were unmarried and 30% were married and 10% i.e. one person was a widow. The educational qualification of this sample was post graduation and above and all of them were employed. This is understandable because this sub sample consisted of high resilient persons- those whose achievements were high despite adversities.

The purpose of this phase was to cross verify the high scores of the sub sample with a qualitative account of their life. Further, the purpose of these five participants socially labelled as Resilient was to cross verify their Resilience Index by administrating the REST Battery.

Procedure

The objectives of the study being scale construction and validation, the procedure relates to development of the REST Battery, its pilot testing, assignment of weights, evolving the mathematical formula and derivation of Resilience Index. Hence, most part of the procedure is embedded in tool construction, while evolution of the Resilience Index is explained in the Results section. However, a small part relating to the administration of the REST Battery is explained in this section.

After obtaining the approval by the Institutional Ethic Committee of University of Hyderabad, the data collection began. The approval letter by the committee is appended in appendix 1. The scales were administered on the participants individually. The participants were approached personally or through phone. They were explained the purpose of the study and those willing to participate were given the informed consent form (appended in appendix 2. Those who signed the informed consent form were recruited in the study. On an average it took 20 minutes for the participants to complete the REST Battery. On completion of the same they were debriefed.

The sub sample of the participants were identified and approached individually. Among the sub sample from a sample of 205, those with high Resilience Index were contacted and a suitable time was fixed for the personal interview. They also signed another informed consent form exclusively for interview (appended in appendix 4). They were personally interviewed on the pre-determined date, time, and place using the semi-structured interview schedule (appended in appendix 5). On an average, the interview took 30 minutes.

The sample of five socially recognised resilient persons were identified by following Snowball sampling technique. A total of 35 persons were contacted. Out of them, the five who agreed to participate by signing the informed consent form for REST Battery and informed consent form for interview (appended in appendix 4) were included in the study. These five members were contacted and they were met at their respective offices/residence. They were administered the REST Battery and they gave a personal interview too. The administration of the REST Battery and personal interview took around one hour.

Results

The main objective of the study was to construct and validate a resilience tool and to test it along the lines of the Synergy Model of Resilience (Hariharan & Rana, 2017) explained in the Review chapter. The Synergy Model of Resilience argued that the product of Resilience is the outcome of the Synergy among many factors. The Adversity and Operating factors lead to Resistance. The Resistance and Achievement determine the manifestation of Resilience. The Synergic operation has to be tested through a mathematical model. The mathematical model called for the evolution of the formula to derive Resilience Index, and establishing the psychometric properties of the Battery. Once the Battery was validated it was used to derive Resilience Index, the same index was used to categorise the levels of resilience classified as Resilients, Survivors, and Non-Resilients. Structural Equation Model was used to trace the pathway of Resilience and validate the Synergy Model. Further, REST Battery and Synergy Model of Resilience were corroborated with qualitative data for further validation.

The Method Chapter explained the development of the Resilience Test Battery. This chapter is explained under five heads – Evolution of the formula, Validation of the REST Battery, Categorising the sample on the levels of Resilience based on their Resilience Index, Testing the Synergy Model of Resilience through Structural Equation Modelling, and finally the Qualitative analysis.

1. Evolution of the formula

The formula was evolved using the model group in sample. The mathematical model was developed by deriving mean scores from the raw scores, identifying weights, computing weighted means and then identifying weights of the weighted means. The process is explained in detail in the following paragraphs.

Each of the five scales of the REST Battery viz. Adversity scale, Protective factors scale, Promotive factors scale, Achievement scale, and Flourishing scale, gave a raw mean score for every participant as explained in the Method chapter. These mean scores were used for evolving the mathematical formula, through which the Resilience Index is derived. The cascading process is explained under the following subsections. The first step is the use of raw scores to compute the mean scores, identify the weights then compute the weighted means. These scores were derived from the Model group (N = 200) recruited for this purpose. These derived weights were later on used on the Testing group (N = 205) to derive the Index values and finally the Resilience Index.

1.1.Computation of mean scores and weights

The **mean scores** for each participant of the Model group (N = 200) was calculated separately for Adversity scale for the three dimensions viz. severity, frequency, duration. Mean scores were also found for every participant for Protective factors, Promotive factors, Achievement and Flourishing scales. This gave a total of seven mean scores for each participant, table 4.1 depicts the Mean scores of the Severity, Frequency and Duration of Adversity Scale, Protective factors scale, Promotive factors scale, Achievement scale, and Flourishing scale for the sample of 200.

Table 4.1

Mean scores of Severity, Frequency and Duration of Adversity, Protective and Promotive factors of Operating factors, and Achievement and Flourishing of Outcome factors of the Model group (N = 200)

ID No.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
001	0.41	0.41	0.41	2.00	2.29	0.90	6.63
002	0.53	0.53	0.53	2.83	3.07	0.90	6.63
003	0.59	0.59	0.59	1.71	1.71	1.00	5.25
004	0.69	1.00	0.98	4.42	7.00	1.00	6.25
005	0.76	0.76	0.76	1.67	1.21	0.00	5.13
006	0.41	0.41	0.41	4.00	1.07	1.00	6.50
007	0.37	0.35	0.37	2.25	1.93	1.00	6.50
008	1.78	1.67	1.69	8.25	3.93	2.00	6.50
009	0.63	0.65	0.61	3.67	3.07	3.00	5.38
010	0.51	0.55	0.49	3.75	4.57	2.00	6.00
011	0.55	0.47	0.37	1.38	2.36	1.00	5.13
012	0.61	0.59	0.59	1.88	1.93	1.00	6.00
013	0.92	0.86	0.94	2.63	1.93	0.00	4.75
014	0.86	0.88	0.88	2.21	2.00	0.80	6.25
015	0.43	0.45	0.43	4.42	5.21	0.00	6.00
016	0.41	0.37	0.33	2.25	3.50	0.70	5.38
017	0.90	0.86	0.86	1.83	1.93	0.00	3.75
018	0.53	0.53	0.55	1.88	2.57	1.00	6.75
019	1.57	1.00	1.04	1.67	1.79	1.00	6.13
020	0.39	0.39	0.39	1.46	2.36	0.90	5.38
021	0.59	0.59	0.59	4.04	3.07	0.90	6.63
022	0.39	0.39	0.39	1.71	4.79	1.80	6.00
023	1.86	1.37	1.51	4.96	4.57	1.80	6.88
024	0.92	0.84	0.82	3.38	1.29	0.00	6.50
025	1.16	1.14	1.02	4.38	2.86	1.00	6.75
026	2.45	2.33	2.55	5.21	6.29	1.00	4.50
027	0.78	0.69	0.65	3.79	2.21	0.00	6.38
028	1.18	1.18	1.12	5.17	5.21	2.00	6.38
029	1.18	1.10	1.06	1.75	2.00	1.00	5.75
030	0.49	0.49	0.49	3.29	1.86	0.00	6.25
031	0.80	0.71	0.63	2.63	1.93	1.00	4.75
032	1.16	1.00	0.90	2.33	1.57	0.00	5.50
033	1.33	1.22	1.00	1.21	1.50	0.00	5.50
034	0.90	0.82	0.86	1.88	1.36	0.00	4.75
035	0.96	1.00	1.00	0.75	2.36	0.00	4.25
036	1.76	1.33	1.61	5.71	6.86	0.90	7.00

ID No.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
037	0.80	0.78	0.78	2.21	1.57	0.00	5.38
038	0.80	0.78	0.57	4.71	4.57	1.80	6.88
039	0.37	0.39	0.39	5.38	7.07	2.00	6.63
040	0.55	0.61	0.59	0.96	2.21	3.00	4.88
041	0.51	0.51	0.49	1.08	2.57	1.00	6.00
042	0.41	0.41	0.41	1.38	2.86	1.60	3.63
043	0.86	0.71	0.76	1.63	1.93	0.00	4.75
044	0.78	0.73	0.67	2.46	3.57	1.00	6.25
045	0.55	0.55	0.55	1.67	2.00	0.80	5.75
046	0.92	0.73	0.78	2.46	1.36	0.00	4.63
047	2.12	1.82	1.71	6.04	4.36	1.50	6.25
048	2.37	1.88	2.16	4.96	1.86	0.90	4.25
049	0.73	0.69	0.76	2.50	2.57	0.90	6.38
050	0.53	0.49	0.51	1.79	2.07	0.00	4.88
051	0.80	0.67	0.67	6.38	1.71	0.00	6.00
052	0.57	0.55	0.55	1.79	1.43	0.00	5.75
053	0.37	0.39	0.33	5.38	7.93	1.00	7.00
054	0.35	0.33	0.31	5.00	2.43	0.00	5.75
055	0.41	0.41	0.41	1.83	3.07	1.80	6.75
056	0.53	0.53	0.45	1.75	2.00	1.00	6.13
057	1.14	0.98	0.94	2.75	2.21	1.70	6.13
058	0.43	0.49	0.57	3.50	6.36	0.00	5.63
059	0.45	0.51	0.47	4.63	3.64	1.70	6.50
060	0.69	0.69	0.67	2.71	2.50	1.80	6.00
061	0.82	0.82	0.82	1.83	1.29	0.00	5.63
062	0.51	0.45	0.47	1.42	1.29	0.00	5.75
063	0.73	0.71	0.65	1.46	2.64	0.90	6.00
064	0.76	0.76	0.76	2.13	2.36	1.90	6.75
065	0.61	0.61	0.61	2.21	2.21	1.00	5.38
066	0.76	0.71	0.69	2.13	2.64	0.00	6.75
067	1.16	1.10	1.10	2.29	4.29	2.00	6.50
068	0.80	0.76	0.71	2.08	2.71	2.40	5.13
069	0.41	0.41	0.41	2.08	1.93	1.00	4.63
070	0.98	0.98	0.98	2.42	2.14	2.00	6.63
071	0.82	0.82	0.82	2.33	1.93	3.00	6.00
072	0.61	0.61	0.61	2.96	1.21	1.00	5.25
073	0.90	0.86	0.84	1.96	2.57	1.00	5.50
074	1.24	1.10	1.06	1.75	2.14	1.00	5.50
075	0.94	0.92	0.90	1.83	2.14	1.00	4.13
076	0.80	0.80	0.80	1.33	0.57	0.00	4.63
077	1.16	1.14	1.14	2.50	1.93	2.00	6.75
078	0.55	0.55	0.55	1.79	1.29	2.00	5.00

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
079	0.61	0.61	0.61	2.00	3.14	2.00	6.25
080	0.80	0.80	0.80	1.92	2.50	1.00	4.38
081	0.59	0.59	0.59	2.33	1.07	1.00	5.88
082	0.82	0.82	0.82	1.67	1.93	1.90	6.75
083	0.80	0.82	0.82	2.21	1.93	1.00	4.88
084	0.61	0.61	0.61	2.50	1.43	1.90	6.00
085	0.61	0.61	0.61	2.54	2.00	0.00	6.13
086	0.80	0.76	0.73	2.58	2.86	2.00	6.25
087	0.59	0.59	0.61	2.67	2.71	1.00	6.13
088	0.88	0.80	0.90	2.21	2.86	2.00	6.63
089	0.73	0.76	0.71	2.88	2.07	0.00	6.38
090	0.76	0.69	0.63	2.29	3.00	0.00	6.25
091	0.69	0.63	0.71	3.38	3.57	2.70	5.38
092	1.04	1.08	1.10	2.29	2.57	1.00	5.13
093	1.06	0.96	0.96	2.50	3.21	2.00	6.75
094	0.73	0.71	0.69	2.42	2.29	0.00	5.75
095	0.65	0.65	0.71	3.13	3.29	2.90	6.75
096	0.59	0.59	0.59	2.79	3.36	2.00	6.75
097	0.61	0.61	0.61	2.83	2.50	2.00	5.63
098	0.41	0.41	0.41	2.33	4.14	1.90	6.50
099	0.82	0.80	0.80	3.08	2.50	0.00	5.38
100	0.57	0.51	0.53	2.79	2.50	1.90	6.25
101	0.41	0.41	0.41	1.96	1.93	0.00	5.63
102	0.57	0.57	0.59	2.92	3.29	1.90	6.13
103	0.80	0.71	0.76	2.13	2.79	0.00	5.38
104	0.57	0.57	0.59	3.04	3.64	0.00	6.00
105	0.76	0.76	0.73	2.75	3.50	3.00	6.25
106	1.02	0.96	1.10	2.38	3.14	0.00	6.25
107	0.73	0.73	0.67	2.04	2.50	0.00	5.50
108	1.00	0.98	0.94	2.13	2.43	2.00	6.50
109	0.92	0.86	0.88	2.00	3.29	1.90	5.88
110	0.76	0.73	0.73	2.58	3.86	2.00	6.00
111	0.73	0.80	0.71	2.67	1.29	0.00	5.75
112	0.41	0.41	0.41	3.00	2.64	0.00	6.38
113	0.92	0.84	0.86	2.33	2.79	1.00	5.63
114	0.94	0.92	0.88	2.04	1.29	0.00	6.00
115	0.37	0.27	0.37	2.46	2.21	2.00	5.50
116	0.76	0.78	0.78	2.29	1.86	0.00	6.13
117	0.31	0.31	0.33	2.29	2.07	0.00	5.63
118	0.94	0.92	0.98	2.42	1.79	2.00	5.38
119	0.94	0.94	0.94	1.71	2.07	2.00	5.13
120	0.49	0.47	0.49	2.58	2.29	1.90	6.00

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
121	0.80	0.78	0.73	2.25	4.64	3.00	6.50
122	0.73	0.65	0.65	3.21	1.71	0.00	6.50
123	0.78	0.76	0.71	3.13	2.71	0.90	6.00
124	1.16	1.16	1.06	4.17	4.00	1.90	5.75
125	0.71	0.67	0.71	2.83	2.07	1.00	5.88
126	0.55	0.57	0.53	3.63	2.50	1.90	6.00
127	0.41	0.41	0.41	3.13	1.79	0.00	5.75
128	1.14	1.12	1.18	4.46	1.71	1.00	6.75
129	0.39	0.39	0.39	2.71	2.21	0.00	5.25
130	0.80	0.80	0.80	4.00	1.71	1.00	5.88
131	0.73	0.69	0.67	3.79	3.57	1.00	6.63
132	0.76	0.69	0.78	3.63	3.14	0.00	6.75
133	0.49	0.49	0.49	3.42	2.50	1.00	6.00
134	0.59	0.59	0.55	4.46	5.21	2.00	6.38
135	0.98	0.98	0.96	3.63	3.21	1.90	5.38
136	0.57	0.59	0.57	3.00	2.29	1.00	5.63
137	0.76	0.78	0.78	3.38	1.79	1.00	6.50
138	0.78	0.76	0.76	4.08	3.00	2.00	5.75
139	0.76	0.69	0.61	3.13	0.71	0.00	5.13
140	0.57	0.57	0.57	3.50	3.36	2.00	6.00
141	0.57	0.59	0.59	3.79	0.71	1.00	6.38
142	0.61	0.61	0.61	2.92	2.00	0.00	4.63
143	0.45	0.51	0.39	3.17	1.29	0.00	5.38
144	0.67	0.65	0.65	3.63	2.21	0.90	5.88
145	0.71	0.67	0.69	3.71	1.71	0.00	5.63
146	0.78	0.76	0.69	3.79	2.50	1.80	6.00
147	0.53	0.49	0.45	2.92	2.57	0.00	5.38
148	0.57	0.55	0.51	3.42	1.71	0.00	6.00
149	0.53	0.53	0.53	2.79	3.36	0.00	6.25
150	0.92	0.92	0.86	2.83	1.71	2.00	5.88
151	0.55	0.49	0.47	2.88	1.64	0.00	5.25
152	0.88	0.84	0.82	2.88	1.79	1.00	6.13
153	0.53	0.49	0.49	3.13	2.57	1.00	6.63
154	0.61	0.61	0.57	3.04	2.29	0.00	5.75
155	0.78	0.80	0.82	3.29	2.64	1.00	6.63
156	0.76	0.78	0.80	4.42	2.43	1.00	5.63
157	0.78	0.80	0.82	3.50	3.93	2.80	6.38
158	0.76	0.71	0.82	4.04	3.50	2.80	6.00
159	0.76	0.73	0.73	4.00	2.21	0.00	6.13
160	0.78	0.80	0.80	3.17	3.29	2.00	6.63
161	1.10	1.14	1.08	4.92	2.57	3.00	6.25
162	0.80	0.80	0.78	3.33	2.79	1.00	5.63

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
163	0.76	0.78	0.78	2.54	2.79	1.00	6.25
164	0.98	0.96	0.90	2.67	2.79	1.00	6.25
165	0.41	0.37	0.41	2.79	3.64	1.00	6.13
166	0.59	0.57	0.55	3.83	1.93	1.00	6.75
167	0.41	0.41	0.41	2.33	2.00	1.80	5.38
168	0.61	0.61	0.61	3.21	3.43	0.00	5.25
169	0.37	0.35	0.37	3.58	2.00	0.00	5.13
170	0.59	0.59	0.59	3.83	1.86	2.00	6.63
171	0.67	0.67	0.63	3.50	2.79	0.00	5.38
172	0.78	0.82	0.82	3.33	2.57	2.90	6.00
173	1.16	1.10	1.08	3.08	3.57	1.90	5.88
174	0.55	0.47	0.41	3.54	1.64	0.00	5.25
175	0.53	0.47	0.49	2.96	2.21	1.00	5.88
176	0.57	0.57	0.53	3.67	3.50	2.00	6.38
177	0.78	0.76	0.76	3.29	1.86	1.00	6.00
178	0.78	0.80	0.73	5.21	2.43	0.00	5.88
179	0.61	0.61	0.61	3.21	2.29	2.00	6.50
180	0.71	0.63	0.63	3.92	2.57	0.00	5.25
181	0.53	0.49	0.51	2.33	3.57	0.00	5.88
182	0.61	0.59	0.59	3.63	2.36	0.00	4.50
183	0.41	0.41	0.41	3.67	3.36	2.00	6.25
184	0.73	0.67	0.67	3.83	3.14	0.00	5.38
185	0.41	0.41	0.39	1.92	0.93	0.00	4.88
186	0.55	0.59	0.49	3.33	1.86	3.00	6.38
187	0.57	0.57	0.55	3.00	2.64	0.00	5.13
188	0.51	0.47	0.39	5.08	2.14	0.00	5.50
189	0.78	0.76	0.76	2.88	3.86	1.90	6.25
190	0.55	0.53	0.55	2.04	1.29	0.00	5.63
191	0.27	0.35	0.35	2.08	1.86	1.00	5.75
192	0.55	0.53	0.55	1.88	2.21	0.00	5.63
193	0.55	0.53	0.49	2.25	0.86	0.80	5.63
194	0.53	0.53	0.55	2.79	1.93	0.00	5.25
195	0.51	0.49	0.51	2.58	1.86	0.00	5.38
196	0.33	0.35	0.35	2.38	1.50	0.00	5.50
197	0.37	0.35	0.35	1.83	2.14	0.00	5.63
198	0.57	0.53	0.53	2.21	1.50	0.00	6.00
199	0.53	0.55	0.55	2.08	1.36	0.00	6.13
200	0.78	0.73	0.63	3.38	2.29	0.00	5.25

The weights for each construct was identified from their respective mean scores. The weight of the construct is the highest mean score of the construct in the data set. The

rationale behind taking the highest score is that Resilience is defined as high achievement amidst high adversity. Therefore, the highest scores in the data set is considered the ideal score. Hence, they are taken as weights. The weights for the seven constructs are presented in table 4.2

These weights would be used to calculate the weighted means for the same seven constructs.

Table 4.2

Weights of the seven constructs derived from the Model group

	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
Weights	2.45	2.33	2.55	8.25	7.93	3.00	7.00

1.2.Computation of weighted mean for the seven constructs

The mean score and the weights for each construct were used in deriving their weighted means. The weighted means were calculated for the seven constructs for every participant.

The Weighted Mean for all these above seven constructs (depicted in table 4.3) were calculated using the mean scores (table 4.1) and the weights (table 4.2). The following formula was used for calculating weighted mean.

$$\text{Weighted mean} = \frac{\text{Mean score of the construct}}{\text{Weight of the construct}} \times 100$$

Where,

Mean score of the construct = the mean score obtained by the individual for the construct

Weight of the construct = the highest mean score of the data set as presented in table 4.2

Note: The examples illustrated in the following sections contain numerical calculations. The values appearing in the thesis may be marginally different from the values appearing in the calculator (while manually checking). This difference is due to the decimal rounding off logic being different for computer software like Microsoft Excel (used in the present study) and a manual calculator.

For better understanding, the mean scores of Severity of Adversity of the ID No. 002 taken from table 4.1 and the weights taken from table 4.2 are used to calculate weighted mean of Severity of Adversity.

$$\text{Weighted mean of Severity of Adversity} = \frac{0.53}{2.45} \times 100 = 21.67$$

Table 4.3 presents the weighted means for all the 200 participants derived through the formula

Table 4.3

Weighted means of the seven constructs derived through the formula

ID No.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective**	**Promotive**	**Achievement**	**Flourishing**
001	16.67	17.54	16.00	24.24	28.83	30.00	94.64
002	**21.67**	22.81	20.80	34.34	38.74	30.00	94.64
003	24.17	25.44	23.20	20.71	21.62	33.33	75.00
004	28.33	42.98	38.40	53.54	88.29	33.33	89.29
005	30.83	32.46	29.60	20.20	15.32	0.00	73.21
006	16.67	17.54	16.00	48.48	13.51	33.33	92.86
007	15.00	14.91	14.40	27.27	24.32	33.33	92.86
008	72.50	71.93	66.40	100.00	49.55	66.67	92.86
009	25.83	28.07	24.00	44.44	38.74	100.00	76.79
010	20.83	23.68	19.20	45.45	57.66	66.67	85.71

	Adversity			Operating factors		Outcome factors	
ID no.	**Severity**	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
011	22.50	20.18	14.40	16.67	29.73	33.33	73.21
012	25.00	25.44	23.20	22.73	24.32	33.33	85.71
013	37.50	36.84	36.80	31.82	24.32	0.00	67.86
014	35.00	37.72	34.40	26.77	25.23	26.67	89.29
015	17.50	19.30	16.80	53.54	65.77	0.00	85.71
016	16.67	15.79	12.80	27.27	44.14	23.33	76.79
017	36.67	36.84	33.60	22.22	24.32	0.00	53.57
018	21.67	22.81	21.60	22.73	32.43	33.33	96.43
019	64.17	42.98	40.80	20.20	22.52	33.33	87.50
020	15.83	16.67	15.20	17.68	29.73	30.00	76.79
021	24.17	25.44	23.20	48.99	38.74	30.00	94.64
022	15.83	16.67	15.20	20.71	60.36	60.00	85.71
023	75.83	58.77	59.20	60.10	57.66	60.00	98.21
024	37.50	35.96	32.00	40.91	16.22	0.00	92.86
025	47.50	49.12	40.00	53.03	36.04	33.33	96.43
026	100.00	100.00	100.00	63.13	79.28	33.33	64.29
027	31.67	29.82	25.60	45.96	27.93	0.00	91.07
028	0.00	50.88	44.00	62.63	65.77	66.67	91.07
029	48.33	47.37	41.60	21.21	25.23	33.33	82.14
030	20.00	21.05	19.20	39.90	23.42	0.00	89.29
031	32.50	30.70	24.80	31.82	24.32	33.33	67.86
032	47.50	42.98	35.20	28.28	19.82	0.00	78.57
033	54.17	52.63	39.20	14.65	18.92	0.00	78.57
034	36.67	35.09	33.60	22.73	17.12	0.00	67.86
035	39.17	42.98	39.20	9.09	29.73	0.00	60.71
036	71.67	57.02	63.20	69.19	86.49	30.00	100.00
037	32.50	33.33	30.40	26.77	19.82	0.00	76.79
038	32.50	33.33	22.40	57.07	57.66	60.00	98.21
039	15.00	16.67	15.20	65.15	89.19	66.67	94.64
040	22.50	26.32	23.20	11.62	27.93	100.00	69.64
041	20.83	21.93	19.20	13.13	32.43	33.33	85.71
042	16.67	17.54	16.00	16.67	36.04	53.33	51.79
043	35.00	30.70	29.60	19.70	24.32	0.00	67.86
044	31.67	31.58	26.40	29.80	45.05	33.33	89.29
045	22.50	23.68	21.60	20.20	25.23	26.67	82.14
046	37.50	31.58	30.40	29.80	17.12	0.00	66.07
047	86.67	78.07	67.20	73.23	54.95	50.00	89.29
048	96.67	80.70	84.80	60.10	23.42	30.00	60.71
049	30.00	29.82	29.60	30.30	32.43	30.00	91.07
050	21.67	21.05	20.00	21.72	26.13	0.00	69.64
051	32.50	28.95	26.40	77.27	21.62	0.00	85.71
052	23.33	23.68	21.60	21.72	18.02	0.00	82.14

	Adversity			Operating factors		Outcome factors	
ID no.	**Severity**	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
053	15.00	16.67	12.80	65.15	100.00	33.33	100.00
054	14.17	14.04	12.00	60.61	30.63	0.00	82.14
055	16.67	17.54	16.00	22.22	38.74	60.00	96.43
056	21.67	22.81	17.60	21.21	25.23	33.33	87.50
057	46.67	42.11	36.80	33.33	27.93	56.67	87.50
058	17.50	21.05	22.40	42.42	80.18	0.00	80.36
059	18.33	21.93	18.40	56.06	45.95	56.67	92.86
060	28.33	29.82	26.40	32.83	31.53	60.00	85.71
061	33.33	35.09	32.00	22.22	16.22	0.00	80.36
062	20.83	19.30	18.40	17.17	16.22	0.00	82.14
063	30.00	30.70	25.60	17.68	33.33	30.00	85.71
064	30.83	32.46	29.60	25.76	29.73	63.33	96.43
065	25.00	26.32	24.00	26.77	27.93	33.33	76.79
066	30.83	30.70	27.20	25.76	33.33	0.00	96.43
067	47.50	47.37	43.20	27.78	54.05	66.67	92.86
068	32.50	32.46	28.00	25.25	34.23	80.00	73.21
069	16.67	17.54	16.00	25.25	24.32	33.33	66.07
070	40.00	42.11	38.40	29.29	27.03	66.67	94.64
071	33.33	35.09	32.00	28.28	24.32	100.00	85.71
072	25.00	26.32	24.00	35.86	15.32	33.33	75.00
073	36.67	36.84	32.80	23.74	32.43	33.33	78.57
074	50.83	47.37	41.60	21.21	27.03	33.33	78.57
075	38.33	39.47	35.20	22.22	27.03	33.33	58.93
076	32.50	34.21	31.20	16.16	7.21	0.00	66.07
077	47.50	49.12	44.80	30.30	24.32	66.67	96.43
078	22.50	23.68	21.60	21.72	16.22	66.67	71.43
079	25.00	26.32	24.00	24.24	39.64	66.67	89.29
080	32.50	34.21	31.20	23.23	31.53	33.33	62.50
081	24.17	25.44	23.20	28.28	13.51	33.33	83.93
082	33.33	35.09	32.00	20.20	24.32	63.33	96.43
083	32.50	35.09	32.00	26.77	24.32	33.33	69.64
084	25.00	26.32	24.00	30.30	18.02	63.33	85.71
085	25.00	26.32	24.00	30.81	25.23	0.00	87.50
086	32.50	32.46	28.80	31.31	36.04	66.67	89.29
087	24.17	25.44	24.00	32.32	34.23	33.33	87.50
088	35.83	34.21	35.20	26.77	36.04	66.67	94.64
089	30.00	32.46	28.00	34.85	26.13	0.00	91.07
090	30.83	29.82	24.80	27.78	37.84	0.00	89.29
091	28.33	27.19	28.00	40.91	45.05	90.00	76.79
092	42.50	46.49	43.20	27.78	32.43	33.33	73.21
093	43.33	41.23	37.60	30.30	40.54	66.67	96.43
094	30.00	30.70	27.20	29.29	28.83	0.00	82.14

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
095	26.67	28.07	28.00	37.88	41.44	96.67	96.43
096	24.17	25.44	23.20	33.84	42.34	66.67	96.43
097	25.00	26.32	24.00	34.34	31.53	66.67	80.36
098	16.67	17.54	16.00	28.28	52.25	63.33	92.86
099	33.33	34.21	31.20	37.37	31.53	0.00	76.79
100	23.33	21.93	20.80	33.84	31.53	63.33	89.29
101	16.67	17.54	16.00	23.74	24.32	0.00	80.36
102	23.33	24.56	23.20	35.35	41.44	63.33	87.50
103	32.50	30.70	29.60	25.76	35.14	0.00	76.79
104	23.33	24.56	23.20	36.87	45.95	0.00	85.71
105	30.83	32.46	28.80	33.33	44.14	100.00	89.29
106	41.67	41.23	43.20	28.79	39.64	0.00	89.29
107	30.00	31.58	26.40	24.75	31.53	0.00	78.57
108	40.83	42.11	36.80	25.76	30.63	66.67	92.86
109	37.50	36.84	34.40	24.24	41.44	63.33	83.93
110	30.83	31.58	28.80	31.31	48.65	66.67	85.71
111	30.00	34.21	28.00	32.32	16.22	0.00	82.14
112	16.67	17.54	16.00	36.36	33.33	0.00	91.07
113	37.50	35.96	33.60	28.28	35.14	33.33	80.36
114	38.33	39.47	34.40	24.75	16.22	0.00	85.71
115	15.00	11.40	14.40	29.80	27.93	66.67	78.57
116	30.83	33.33	30.40	27.78	23.42	0.00	87.50
117	12.50	13.16	12.80	27.78	26.13	0.00	80.36
118	38.33	39.47	38.40	29.29	22.52	66.67	76.79
119	38.33	40.35	36.80	20.71	26.13	66.67	73.21
120	20.00	20.18	19.20	31.31	28.83	63.33	85.71
121	32.50	33.33	28.80	27.27	58.56	100.00	92.86
122	30.00	28.07	25.60	38.89	21.62	0.00	92.86
123	31.67	32.46	28.00	37.88	34.23	30.00	85.71
124	47.50	50.00	41.60	50.51	50.45	63.33	82.14
125	29.17	28.95	28.00	34.34	26.13	33.33	83.93
126	22.50	24.56	20.80	43.94	31.53	63.33	85.71
127	16.67	17.54	16.00	37.88	22.52	0.00	82.14
128	46.67	48.25	46.40	54.04	21.62	33.33	96.43
129	15.83	16.67	15.20	32.83	27.93	0.00	75.00
130	32.50	34.21	31.20	48.48	21.62	33.33	83.93
131	30.00	29.82	26.40	45.96	45.05	33.33	94.64
132	30.83	29.82	30.40	43.94	39.64	0.00	96.43
133	20.00	21.05	19.20	41.41	31.53	33.33	85.71
134	24.17	25.44	21.60	54.04	65.77	66.67	91.07
135	40.00	42.11	37.60	43.94	40.54	63.33	76.79
136	23.33	25.44	22.40	36.36	28.83	33.33	80.36

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
137	30.83	33.33	30.40	40.91	22.52	33.33	92.86
138	31.67	32.46	29.60	49.49	37.84	66.67	82.14
139	30.83	29.82	24.00	37.88	9.01	0.00	73.21
140	23.33	24.56	22.40	42.42	42.34	66.67	85.71
141	23.33	25.44	23.20	45.96	9.01	33.33	91.07
142	25.00	26.32	24.00	35.35	25.23	0.00	66.07
143	18.33	21.93	15.20	38.38	16.22	0.00	76.79
144	27.50	28.07	25.60	43.94	27.93	30.00	83.93
145	29.17	28.95	27.20	44.95	21.62	0.00	80.36
146	31.67	32.46	27.20	45.96	31.53	60.00	85.71
147	21.67	21.05	17.60	35.35	32.43	0.00	76.79
148	23.33	23.68	20.00	41.41	21.62	0.00	85.71
149	21.67	22.81	20.80	33.84	42.34	0.00	89.29
150	37.50	39.47	33.60	34.34	21.62	66.67	83.93
151	22.50	21.05	18.40	34.85	20.72	0.00	75.00
152	35.83	35.96	32.00	34.85	22.52	33.33	87.50
153	21.67	21.05	19.20	37.88	32.43	33.33	94.64
154	25.00	26.32	22.40	36.87	28.83	0.00	82.14
155	31.67	34.21	32.00	39.90	33.33	33.33	94.64
156	30.83	33.33	31.20	53.54	30.63	33.33	80.36
157	31.67	34.21	32.00	42.42	49.55	93.33	91.07
158	30.83	30.70	32.00	48.99	44.14	93.33	85.71
159	30.83	31.58	28.80	48.48	27.93	0.00	87.50
160	31.67	34.21	31.20	38.38	41.44	66.67	94.64
161	45.00	49.12	42.40	59.60	32.43	100.00	89.29
162	32.50	34.21	30.40	40.40	35.14	33.33	80.36
163	30.83	33.33	30.40	30.81	35.14	33.33	89.29
164	40.00	41.23	35.20	32.32	35.14	33.33	89.29
165	16.67	15.79	16.00	33.84	45.95	33.33	87.50
166	24.17	24.56	21.60	46.46	24.32	33.33	96.43
167	16.67	17.54	16.00	28.28	25.23	60.00	76.79
168	25.00	26.32	24.00	38.89	43.24	0.00	75.00
169	15.00	14.91	14.40	43.43	25.23	0.00	73.21
170	24.17	25.44	23.20	46.46	23.42	66.67	94.64
171	27.50	28.95	24.80	42.42	35.14	0.00	76.79
172	31.67	35.09	32.00	40.40	32.43	96.67	85.71
173	47.50	47.37	42.40	37.37	45.05	63.33	83.93
174	22.50	20.18	16.00	42.93	20.72	0.00	75.00
175	21.67	20.18	19.20	35.86	27.93	33.33	83.93
176	23.33	24.56	20.80	44.44	44.14	66.67	91.07
177	31.67	32.46	29.60	39.90	23.42	33.33	85.71
178	31.67	34.21	28.80	63.13	30.63	0.00	83.93

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
179	25.00	26.32	24.00	38.89	28.83	66.67	92.86
180	29.17	27.19	24.80	47.47	32.43	0.00	75.00
181	21.67	21.05	20.00	28.28	45.05	0.00	83.93
182	25.00	25.44	23.20	43.94	29.73	0.00	64.29
183	16.67	17.54	16.00	44.44	42.34	66.67	89.29
184	30.00	28.95	26.40	46.46	39.64	0.00	76.79
185	16.67	17.54	15.20	23.23	11.71	0.00	69.64
186	22.50	25.44	19.20	40.40	23.42	100.00	91.07
187	23.33	24.56	21.60	36.36	33.33	0.00	73.21
188	20.83	20.18	15.20	61.62	27.03	0.00	78.57
189	31.67	32.46	29.60	34.85	48.65	63.33	89.29
190	22.50	22.81	21.60	24.75	16.22	0.00	80.36
191	10.83	14.91	13.60	25.25	23.42	33.33	82.14
192	22.50	22.81	21.60	22.73	27.93	0.00	80.36
193	22.50	22.81	19.20	27.27	10.81	26.67	80.36
194	21.67	22.81	21.60	33.84	24.32	0.00	75.00
195	20.83	21.05	20.00	31.31	23.42	0.00	76.79
196	13.33	14.91	13.60	28.79	18.92	0.00	78.57
197	15.00	14.91	13.60	22.22	27.03	0.00	80.36
198	23.33	22.81	20.80	26.77	18.92	0.00	85.71
199	21.67	23.68	21.60	25.25	17.12	0.00	87.50
200	31.67	31.58	24.80	40.91	28.83	0.00	75.00

1.3. Identification of weights from the Weighted means of the seven constructs

Out of the data set of the Model group of 200 participants, the highest Weighted mean for the seven constructs were identified. Uniformly, they were all 100 for all seven constructs. These weights are depicted in table 4.4. They would be used in the Testing group to calculate the index values.

Table 4.4

Weights of the Weighted means of Model group

	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
Weights	100	100	100	100	100	100	100

1.4. Application of the weights on the Testing group

The weights of the weighted means are used for deriving the indices required to compute the Resilience Index. For this purpose a separate yet homogenous sample was drawn.

An independent sample called the Testing group with 205 participants was recruited. This sample was checked for their homogeneity with Model group (N = 200) used for arriving at the weightages. Chi Square test of homogeneity was used to examine if the distribution of the demographic variables was similar in both the groups. The results of the Chi Square test of homogeneity are depicted in table 4.5. As observed from the table 4.5 the *p* values for the Chi Square values pertaining to all the demographic variables is not significant. This leads to accepting the null hypothesis. In other words, it states that the Model group and Testing group are homogenous on demographic variables like age, gender, marital status, educational status, and occupational status. Since, the two groups were found to be homogeneous, it is logical and correct to use the weights derived from the Model group on the Testing group.

Table 4.5

Results of Chi Square (χ^2) indicating the homogeneity of Model group and Testing group

Demographic variable	Chi Square value (df)	*p*
Age	372.27 (380)	0.60 NS
Gender	5.31 (2)	0.07 NS
Marital status	3.80 (4)	0.43 NS
Educational status	5.45 (8)	0.70 NS
Occupational status	25.61 (25)	0.42 NS

Note: NS = Not Significant

The 205 participants of testing group were administered the REST Battery. The raw scores of the five scales of REST Battery were used in the application of the formula. The weights derived from the Model group were used in the computation of formulae. Arriving at

Resilience Index consisted of three steps. In step one, separate indices were developed for Adversity, Operational factors and Outcome factors. In the second step, by using the indices of Adversity and Operational factors, the Resistance Index was derived. In the third step, the Resilience Index was arrived at by applying a formula using the Resistance Index and Outcome Index.

1.4.a. Calculating the mean scores of the seven constructs for the Testing group (N = 205)

The Testing group was administered the REST Battery. The mean scores for Severity, Frequency and Duration of Adversity, Protective factors and Promotive factors (constituting Operating factors), and Achievement and Flourishing (constituting to Outcome factors) were calculated. These scores are presented in table 4.6

Table 4.6

Mean scores of seven constructs for the Testing group

ID No.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective factors**	**Promotive factors**	**Achievement**	**Flourishing**
001	0.82	0.82	0.82	2.92	3.14	3.00	6.13
002	0.67	0.61	0.61	3.96	2.93	1.00	5.50
003	0.80	0.80	0.80	3.63	2.57	2.00	6.00
004	1.08	1.14	1.10	3.13	4.07	3.90	6.25
005	0.94	0.92	0.98	3.54	3.29	1.00	6.13
006	0.39	0.39	0.39	2.83	3.07	1.00	6.00
007	0.41	0.41	0.41	2.67	2.29	0.00	5.75
008	0.82	0.92	0.96	1.46	1.93	2.00	6.13
009	0.55	0.57	0.55	3.92	3.79	0.00	5.63
010	0.59	0.61	0.61	3.79	2.14	0.00	5.75
011	1.00	0.98	1.08	1.75	1.93	1.70	6.13
012	0.49	0.51	0.57	2.25	2.64	1.90	5.88
013	0.59	0.59	0.55	4.33	3.21	1.00	6.13
014	0.61	0.61	0.61	3.63	2.21	1.00	5.88
015	0.41	0.39	0.39	3.38	2.21	0.00	5.88
016	0.63	0.59	0.59	1.88	2.14	1.50	6.25
017	0.55	0.51	0.49	3.46	3.29	1.00	5.38

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	**Frequency**	**Duration**	**Protective**	**Promotive**	**Achievement**	**Flourishing**
018	0.57	0.59	0.61	3.63	3.00	1.00	6.13
019	0.71	0.63	0.67	2.29	3.21	2.80	5.75
020	0.61	0.61	0.61	3.67	2.21	0.00	5.75
021	0.76	0.80	0.76	1.83	1.93	2.80	5.88
022	0.80	0.80	0.80	4.71	2.79	1.00	5.75
023	0.51	0.49	0.51	3.46	2.43	0.00	5.88
024	0.47	0.69	0.78	2.00	1.29	0.00	5.88
025	0.39	0.41	0.41	3.96	1.86	1.00	6.13
026	0.41	0.41	0.41	3.58	2.29	0.00	6.25
027	0.59	0.63	0.76	2.67	2.93	2.00	5.63
028	0.59	0.57	0.55	3.63	1.71	1.00	6.00
029	0.80	0.78	0.80	2.13	4.57	3.00	6.38
030	0.41	0.51	0.51	3.00	2.79	0.00	5.88
031	0.59	0.57	0.55	3.54	1.64	1.00	6.00
032	0.69	0.67	0.69	4.13	1.79	0.00	5.00
033	0.61	0.61	0.59	3.33	2.21	0.00	5.50
034	0.55	0.61	0.61	2.75	1.93	0.00	4.88
035	0.57	0.59	0.59	2.96	3.07	1.90	5.00
036	0.59	0.59	0.65	2.38	2.00	0.00	5.63
037	0.61	0.61	0.61	3.88	2.86	2.00	6.63
038	0.71	0.76	0.76	3.54	2.00	0.00	5.38
039	0.57	0.57	0.59	4.25	2.93	1.00	5.88
040	0.61	0.61	0.61	3.21	3.00	1.00	5.75
041	0.69	0.69	0.73	2.75	3.50	0.00	5.88
042	0.73	0.76	0.73	3.29	2.57	1.90	5.75
043	0.82	0.82	0.82	3.46	2.29	1.00	5.88
044	0.73	0.67	0.67	2.88	3.14	0.00	5.75
045	0.82	0.80	0.82	3.54	2.21	1.00	6.38
046	0.67	0.63	0.55	3.79	2.93	0.00	6.38
047	1.04	0.94	0.92	3.50	2.14	0.00	5.13
048	0.94	0.71	0.73	3.08	1.57	0.00	5.00
049	0.82	0.78	0.78	3.38	1.86	1.00	5.88
050	0.76	0.88	0.90	3.38	1.57	0.00	4.88
051	0.61	0.61	0.61	3.71	2.93	2.00	6.25
052	0.51	0.51	0.59	2.54	2.79	0.00	5.75
053	0.55	0.55	0.57	4.29	2.00	1.00	6.50
054	0.71	0.67	0.65	2.71	2.14	3.00	5.75
055	0.59	0.57	0.57	3.29	3.43	1.30	6.38
056	0.53	0.53	0.55	3.29	2.57	0.90	6.13
057	0.59	0.59	0.59	2.67	1.64	0.00	6.00
058	0.59	0.71	0.69	2.25	3.29	1.80	6.00
059	0.51	0.55	0.55	3.46	2.07	1.00	5.38

	Adversity			Operating factors		Outcome factors	
ID no.	**Severity**	**Frequency**	**Duration**	**Protective**	**Promotive**	**Achievement**	**Flourishing**
060	0.41	0.41	0.41	3.38	1.86	0.00	5.13
061	0.59	0.59	0.59	3.33	1.79	0.90	6.25
062	0.57	0.55	0.59	4.42	1.86	0.90	5.75
063	0.71	0.71	0.65	2.21	3.64	1.00	5.50
064	0.61	0.61	0.61	3.38	2.86	1.00	6.25
065	0.59	0.61	0.61	4.04	2.00	1.00	6.00
066	0.55	0.53	0.57	2.92	1.64	0.00	6.63
067	0.73	0.76	0.78	3.71	2.79	0.70	5.38
068	0.61	0.61	0.61	3.75	2.86	1.00	5.75
069	0.78	0.76	0.80	3.75	2.71	2.00	6.00
070	0.53	0.53	0.53	3.08	2.07	0.00	5.13
071	0.39	0.41	0.41	3.71	2.36	1.00	5.63
072	0.39	0.39	0.39	3.42	2.00	0.00	5.63
073	0.59	0.59	0.59	4.33	3.07	1.00	6.25
074	0.86	0.96	1.00	2.96	3.93	2.00	5.88
075	0.39	0.39	0.39	3.33	3.00	0.00	6.00
076	0.76	0.78	0.78	4.08	2.57	2.00	5.75
077	0.82	0.78	0.59	4.13	2.14	2.00	6.13
078	0.37	0.37	0.33	3.21	1.43	0.00	6.13
079	0.61	0.61	0.61	3.67	1.86	2.00	6.13
080	0.88	0.94	0.98	3.50	2.29	1.00	5.88
081	0.82	0.82	0.94	4.50	2.14	1.00	5.75
082	0.33	0.35	0.35	3.38	1.57	0.00	6.13
083	0.57	0.61	0.61	4.08	1.71	0.00	5.75
084	0.61	0.61	0.61	3.08	1.50	0.00	5.50
085	0.73	0.71	0.69	4.21	1.93	1.00	5.50
086	0.59	0.57	0.57	3.33	1.64	1.00	6.13
087	0.59	0.84	0.78	2.46	1.79	0.00	5.38
088	0.59	0.61	0.59	4.42	2.50	0.90	5.88
089	0.57	0.55	0.59	3.08	2.50	0.00	6.00
090	0.37	0.41	0.41	2.96	2.93	1.00	5.38
091	0.39	0.35	0.37	3.54	3.36	0.90	5.88
092	0.41	0.41	0.41	4.04	3.07	1.00	6.50
093	0.59	0.57	0.61	2.42	2.57	3.90	6.38
094	0.59	0.59	0.61	2.58	2.57	1.00	6.25
095	0.53	0.55	0.57	4.13	2.50	0.00	5.25
096	0.61	0.61	0.61	1.46	2.00	3.00	5.75
097	0.41	0.41	0.41	2.33	1.93	1.00	5.63
098	0.61	0.61	0.61	2.42	3.21	0.00	5.13
099	0.37	0.39	0.37	4.33	3.21	0.00	6.38
100	0.61	0.59	0.61	2.79	2.43	1.00	6.25
101	0.59	0.57	0.59	3.25	2.64	1.00	6.00

	Adversity			Operating factors		Outcome factors	
ID no.	**Severity**	**Frequency**	**Duration**	**Protective**	**Promotive**	**Achievement**	**Flourishing**
102	0.57	0.53	0.49	1.88	1.71	0.00	5.63
103	0.53	0.55	0.57	3.21	2.00	0.00	5.63
104	0.41	0.41	0.41	1.50	2.50	2.90	5.50
105	0.59	0.59	0.59	1.63	1.93	2.00	6.63
106	0.41	0.41	0.41	2.88	2.36	1.00	6.25
107	0.39	0.41	0.41	4.25	2.57	0.90	5.38
108	0.59	0.53	0.57	4.13	1.86	0.00	5.75
109	0.57	0.57	0.53	1.38	2.64	1.00	5.88
110	0.41	0.41	0.41	3.42	3.14	1.00	5.38
111	0.57	0.59	0.61	4.21	2.93	0.00	5.63
112	0.59	0.55	0.55	3.38	1.71	0.00	5.50
113	0.59	0.61	0.61	3.75	2.36	0.00	5.63
114	0.69	0.69	0.65	2.58	1.71	1.00	5.38
115	2.18	2.18	2.18	3.42	4.14	3.00	6.25
116	0.84	0.92	0.86	1.58	4.43	4.60	6.00
117	0.61	0.57	0.51	2.96	5.71	3.90	6.50
118	0.78	0.78	0.78	2.25	5.07	1.00	5.38
119	0.82	0.67	0.71	2.13	3.00	2.00	5.25
120	0.67	0.67	0.59	2.92	3.57	2.00	6.00
121	0.86	0.76	1.10	2.63	2.86	2.70	6.50
122	0.86	0.82	0.69	2.42	4.50	3.90	6.63
123	1.00	0.67	0.82	2.25	3.71	1.00	4.25
124	0.88	0.71	0.82	2.67	4.07	3.30	5.88
125	1.06	1.00	1.12	3.25	3.21	2.70	6.13
126	0.69	0.69	0.67	4.04	5.79	1.60	5.13
127	0.92	0.61	0.90	4.96	4.86	2.50	4.88
128	0.41	0.41	0.41	1.92	3.36	1.00	4.75
129	0.47	0.53	0.51	2.83	2.93	2.00	4.50
130	1.37	1.04	1.39	2.63	3.79	1.90	5.63
131	0.51	0.47	0.47	2.29	3.57	0.00	5.63
132	0.73	0.76	0.78	2.42	3.14	0.00	4.75
133	0.80	0.80	0.78	2.38	2.57	0.00	5.50
134	0.53	0.39	0.59	2.63	1.71	0.40	4.50
135	0.82	0.76	0.80	2.42	3.64	2.00	6.13
136	0.71	0.61	0.59	3.25	4.93	3.00	6.00
137	0.45	0.45	0.47	2.50	2.43	0.00	5.25
138	0.55	0.53	0.59	2.42	3.43	0.00	5.63
139	0.57	0.57	0.59	3.08	2.21	0.00	4.88
140	0.80	0.45	0.82	2.46	2.43	2.00	5.13
141	0.82	0.63	0.82	2.96	3.43	1.00	6.13
142	0.69	0.35	0.73	2.21	3.86	1.90	6.00
143	0.82	0.80	0.73	2.83	3.36	1.00	5.38

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective	Promotive	Achievement	Flourishing
144	0.82	0.78	0.88	2.46	2.86	0.00	4.63
145	0.55	0.59	0.57	2.33	2.29	2.00	5.50
146	0.78	0.73	0.80	3.00	4.21	1.00	5.63
147	0.61	0.59	0.61	2.88	3.86	1.00	5.63
148	1.27	0.92	1.00	2.50	3.36	2.80	5.00
149	0.51	0.37	0.57	3.63	2.29	0.00	5.75
150	0.57	0.55	0.61	3.17	2.86	0.00	5.25
151	0.82	0.59	0.76	1.88	3.71	1.00	5.75
152	0.61	0.49	0.61	2.75	4.14	1.00	6.13
153	0.76	0.49	0.82	2.46	3.00	1.00	5.13
154	0.71	0.76	0.80	3.21	3.50	2.00	6.13
155	0.57	0.57	0.57	2.25	3.07	0.00	4.25
156	0.35	0.29	0.33	2.79	2.43	0.00	5.75
157	0.82	0.84	0.92	2.58	3.21	1.00	5.75
158	0.37	0.33	0.37	2.54	3.43	0.80	5.00
159	0.27	0.22	0.29	2.46	3.14	0.00	4.50
160	0.57	0.45	0.57	2.46	4.07	0.80	5.50
161	0.51	0.33	0.45	2.83	3.93	0.80	5.75
162	0.71	0.73	0.71	2.38	4.29	3.90	5.63
163	0.67	0.71	0.69	2.13	4.64	1.90	6.00
164	0.33	0.29	0.29	2.71	2.64	0.00	5.13
165	0.59	0.39	0.59	2.96	3.79	1.00	5.13
166	0.82	0.73	0.71	2.29	2.93	2.00	6.13
167	0.61	0.61	0.61	2.50	3.71	2.00	6.38
168	0.41	0.41	0.41	2.21	3.29	0.00	4.25
169	0.98	0.92	0.92	2.38	3.07	2.00	6.00
170	0.41	0.41	0.41	2.46	2.29	0.00	5.63
171	0.80	0.78	0.78	2.25	4.07	3.00	6.50
172	0.55	0.55	0.49	2.50	2.57	0.00	5.00
173	0.37	0.37	0.37	2.17	3.14	0.90	4.75
174	0.39	0.33	0.31	3.00	2.29	0.00	5.88
175	0.59	0.57	0.59	2.54	1.86	0.00	6.00
176	0.96	0.88	0.92	3.04	3.36	1.90	5.38
177	0.61	0.51	0.59	2.96	4.14	0.00	6.25
178	0.41	0.41	0.41	3.63	2.43	0.00	5.88
179	0.90	0.76	0.82	2.04	2.00	1.00	6.00
180	0.59	0.57	0.59	2.88	3.36	0.00	6.00
181	0.41	0.33	0.33	2.25	4.14	2.00	6.00
182	0.39	0.35	0.31	3.17	3.79	0.00	5.75
183	0.41	0.41	0.41	2.83	1.86	0.00	5.50
184	0.78	0.80	0.80	2.75	4.64	0.90	5.75
185	0.59	0.55	0.47	3.79	3.36	0.00	6.00

	Adversity			Operating factors		Outcome factors	
ID no.	**Severity**	**Frequency**	**Duration**	**Protective**	**Promotive**	**Achievement**	**Flourishing**
186	0.82	0.80	0.82	2.25	4.14	2.00	6.25
187	0.92	0.90	0.96	3.17	2.64	2.00	6.38
188	0.53	0.43	0.47	2.46	2.43	0.00	6.25
189	0.78	0.71	0.67	3.46	4.57	0.00	6.00
190	0.55	0.45	0.39	2.42	2.57	0.00	4.88
191	0.57	0.53	0.47	2.25	2.64	0.00	6.00
192	0.41	0.41	0.41	2.92	2.86	0.00	5.88
193	0.41	0.41	0.41	2.83	2.86	2.00	5.50
194	0.41	0.41	0.37	2.46	3.71	0.00	5.25
195	0.41	0.41	0.41	2.83	4.43	0.00	6.13
196	0.78	0.78	0.71	2.96	3.14	0.00	5.75
197	0.98	0.92	0.92	2.92	3.21	3.00	6.00
198	1.00	0.96	0.92	2.79	4.29	4.00	6.50
199	0.41	0.41	0.41	2.88	2.00	0.00	5.75
200	0.59	0.57	0.61	2.79	3.43	0.00	6.25
201	1.53	1.61	1.61	4.08	4.64	5.00	6.63
202	1.02	1.02	1.02	2.71	3.86	4.00	6.50
203	1.31	1.35	1.45	2.71	4.07	4.90	6.75
204	1.00	1.00	0.96	3.63	3.21	4.00	6.50
205	1.27	1.20	1.24	4.42	2.86	5.00	6.25

1.4.b. Computation of Weighted mean for the seven constructs for the Testing group

The Weighted mean for all these above seven constructs (depicted in table 4.7) were calculated using the mean scores (table 4.6) and the weights (table 4.2). The following formula was used for calculating weighted mean:

$$\text{Weighted mean} = \frac{\text{Mean score of the construct}}{\text{Weight of the construct}} \times 100$$

Where,

Mean score of the construct = the mean score obtained by the individual for the construct

Weight of the construct = the highest mean score of the data set. This is referred to the highest score among the Model group (N = 200) on that construct.

For better understanding, the mean scores of Frequency of Adversity of the ID No. 003 taken from table 4.6 and the weights taken from table 4.2 are used to calculate weighted mean of Frequency dimension of Adversity

$$\text{Weighted mean of Frequency of Adversity} = \frac{0.80}{2.33} \times 100 = 34.21$$

By following the same formula the weighted means were calculated for the three dimensions of Adversity, two dimensions of Operating Factors and two dimensions of Outcome Factors. The values are presented in table 4.7

Table 4.7

Weighted Mean values of the seven constructs for the Testing group

ID No.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
001	33.33	35.09	32.00	35.35	39.64	100.00	87.50
002	27.50	26.32	24.00	47.98	36.94	33.33	78.57
003	32.50	**34.21**	31.20	43.94	32.43	66.67	85.71
004	44.17	49.12	43.20	37.88	51.35	130.00	89.29
005	38.33	39.47	38.40	42.93	41.44	33.33	87.50
006	15.83	16.67	15.20	34.34	38.74	33.33	85.71
007	16.67	17.54	16.00	32.32	28.83	0.00	82.14
008	33.33	39.47	37.60	17.68	24.32	66.67	87.50
009	22.50	24.56	21.60	47.47	47.75	0.00	80.36
010	24.17	26.32	24.00	45.96	27.03	0.00	82.14
011	40.83	42.11	42.40	21.21	24.32	56.67	87.50
012	20.00	21.93	22.40	27.27	33.33	63.33	83.93
013	24.17	25.44	21.60	52.53	40.54	33.33	87.50
014	25.00	26.32	24.00	43.94	27.93	33.33	83.93
015	16.67	16.67	15.20	40.91	27.93	0.00	83.93
016	25.83	25.44	23.20	22.73	27.03	50.00	89.29
017	22.50	21.93	19.20	41.92	41.44	33.33	76.79
018	23.33	25.44	24.00	43.94	37.84	33.33	87.50

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective	Promotive	Achievement	Flourishing
019	29.17	27.19	26.40	27.78	40.54	93.33	82.14
020	25.00	26.32	24.00	44.44	27.93	0.00	82.14
021	30.83	34.21	29.60	22.22	24.32	93.33	83.93
022	32.50	34.21	31.20	57.07	35.14	33.33	82.14
023	20.83	21.05	20.00	41.92	30.63	0.00	83.93
024	19.17	29.82	30.40	24.24	16.22	0.00	83.93
025	15.83	17.54	16.00	47.98	23.42	33.33	87.50
026	16.67	17.54	16.00	43.43	28.83	0.00	89.29
027	24.17	27.19	29.60	32.32	36.94	66.67	80.36
028	24.17	24.56	21.60	43.94	21.62	33.33	85.71
029	32.50	33.33	31.20	25.76	57.66	100.00	91.07
030	16.67	21.93	20.00	36.36	35.14	0.00	83.93
031	24.17	24.56	21.60	42.93	20.72	33.33	85.71
032	28.33	28.95	27.20	50.00	22.52	0.00	71.43
033	25.00	26.32	23.20	40.40	27.93	0.00	78.57
034	22.50	26.32	24.00	33.33	24.32	0.00	69.64
035	23.33	25.44	23.20	35.86	38.74	63.33	71.43
036	24.17	25.44	25.60	28.79	25.23	0.00	80.36
037	25.00	26.32	24.00	46.97	36.04	66.67	94.64
038	29.17	32.46	29.60	42.93	25.23	0.00	76.79
039	23.33	24.56	23.20	51.52	36.94	33.33	83.93
040	25.00	26.32	24.00	38.89	37.84	33.33	82.14
041	28.33	29.82	28.80	33.33	44.14	0.00	83.93
042	30.00	32.46	28.80	39.90	32.43	63.33	82.14
043	33.33	35.09	32.00	41.92	28.83	33.33	83.93
044	30.00	28.95	26.40	34.85	39.64	0.00	82.14
045	33.33	34.21	32.00	42.93	27.93	33.33	91.07
046	27.50	27.19	21.60	45.96	36.94	0.00	91.07
047	42.50	40.35	36.00	42.42	27.03	0.00	73.21
048	38.33	30.70	28.80	37.37	19.82	0.00	71.43
049	33.33	33.33	30.40	40.91	23.42	33.33	83.93
050	30.83	37.72	35.20	40.91	19.82	0.00	69.64
051	25.00	26.32	24.00	44.95	36.94	66.67	89.29
052	20.83	21.93	23.20	30.81	35.14	0.00	82.14
053	22.50	23.68	22.40	52.02	25.23	33.33	92.86
054	29.17	28.95	25.60	32.83	27.03	100.00	82.14
055	24.17	24.56	22.40	39.90	43.24	43.33	91.07
056	21.67	22.81	21.60	39.90	32.43	30.00	87.50
057	24.17	25.44	23.20	32.32	20.72	0.00	85.71
058	24.17	30.70	27.20	27.27	41.44	60.00	85.71
059	20.83	23.68	21.60	41.92	26.13	33.33	76.79
060	16.67	17.54	16.00	40.91	23.42	0.00	73.21

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective	Promotive	Achievement	Flourishing
061	24.17	25.44	23.20	40.40	22.52	30.00	89.29
062	23.33	23.68	23.20	53.54	23.42	30.00	82.14
063	29.17	30.70	25.60	26.77	45.95	33.33	78.57
064	25.00	26.32	24.00	40.91	36.04	33.33	89.29
065	24.17	26.32	24.00	48.99	25.23	33.33	85.71
066	22.50	22.81	22.40	35.35	20.72	0.00	94.64
067	30.00	32.46	30.40	44.95	35.14	23.33	76.79
068	25.00	26.32	24.00	45.45	36.04	33.33	82.14
069	31.67	32.46	31.20	45.45	34.23	66.67	85.71
070	21.67	22.81	20.80	37.37	26.13	0.00	73.21
071	15.83	17.54	16.00	44.95	29.73	33.33	80.36
072	15.83	16.67	15.20	41.41	25.23	0.00	80.36
073	24.17	25.44	23.20	52.53	38.74	33.33	89.29
074	35.00	41.23	39.20	35.86	49.55	66.67	83.93
075	15.83	16.67	15.20	40.40	37.84	0.00	85.71
076	30.83	33.33	30.40	49.49	32.43	66.67	82.14
077	33.33	33.33	23.20	50.00	27.03	66.67	87.50
078	15.00	15.79	12.80	38.89	18.02	0.00	87.50
079	25.00	26.32	24.00	44.44	23.42	66.67	87.50
080	35.83	40.35	38.40	42.42	28.83	33.33	83.93
081	33.33	35.09	36.80	54.55	27.03	33.33	82.14
082	13.33	14.91	13.60	40.91	19.82	0.00	87.50
083	23.33	26.32	24.00	49.49	21.62	0.00	82.14
084	25.00	26.32	24.00	37.37	18.92	0.00	78.57
085	30.00	30.70	27.20	51.01	24.32	33.33	78.57
086	24.17	24.56	22.40	40.40	20.72	33.33	87.50
087	24.17	35.96	30.40	29.80	22.52	0.00	76.79
088	24.17	26.32	23.20	53.54	31.53	30.00	83.93
089	23.33	23.68	23.20	37.37	31.53	0.00	85.71
090	15.00	17.54	16.00	35.86	36.94	33.33	76.79
091	15.83	14.91	14.40	42.93	42.34	30.00	83.93
092	16.67	17.54	16.00	48.99	38.74	33.33	92.86
093	24.17	24.56	24.00	29.29	32.43	130.00	91.07
094	24.17	25.44	24.00	31.31	32.43	33.33	89.29
095	21.67	23.68	22.40	50.00	31.53	0.00	75.00
096	25.00	26.32	24.00	17.68	25.23	100.00	82.14
097	16.67	17.54	16.00	28.28	24.32	33.33	80.36
098	25.00	26.32	24.00	29.29	40.54	0.00	73.21
099	15.00	16.67	14.40	52.53	40.54	0.00	91.07
100	25.00	25.44	24.00	33.84	30.63	33.33	89.29
101	24.17	24.56	23.20	39.39	33.33	33.33	85.71
102	23.33	22.81	19.20	22.73	21.62	0.00	80.36

	Adversity			Operating factors		Outcome factors	
ID no.	**Severity**	**Frequency**	**Duration**	**Protective**	**Promotive**	**Achievement**	**Flourishing**
103	21.67	23.68	22.40	38.89	25.23	0.00	80.36
104	16.67	17.54	16.00	18.18	31.53	96.67	78.57
105	24.17	25.44	23.20	19.70	24.32	66.67	94.64
106	16.67	17.54	16.00	34.85	29.73	33.33	89.29
107	15.83	17.54	16.00	51.52	32.43	30.00	76.79
108	24.17	22.81	22.40	50.00	23.42	0.00	82.14
109	23.33	24.56	20.80	16.67	33.33	33.33	83.93
110	16.67	17.54	16.00	41.41	39.64	33.33	76.79
111	23.33	25.44	24.00	51.01	36.94	0.00	80.36
112	24.17	23.68	21.60	40.91	21.62	0.00	78.57
113	24.17	26.32	24.00	45.45	29.73	0.00	80.36
114	28.33	29.82	25.60	31.31	21.62	33.33	76.79
115	89.17	93.86	85.60	41.41	52.25	100.00	89.29
116	34.17	39.47	33.60	19.19	55.86	153.33	85.71
117	25.00	24.56	20.00	35.86	72.07	130.00	92.86
118	31.67	33.33	30.40	27.27	63.96	33.33	76.79
119	33.33	28.95	28.00	25.76	37.84	66.67	75.00
120	27.50	28.95	23.20	35.35	45.05	66.67	85.71
121	35.00	32.46	43.20	31.82	36.04	90.00	92.86
122	35.00	35.09	27.20	29.29	56.76	130.00	94.64
123	40.83	28.95	32.00	27.27	46.85	33.33	60.71
124	35.83	30.70	32.00	32.32	51.35	110.00	83.93
125	43.33	42.98	44.00	39.39	40.54	90.00	87.50
126	28.33	29.82	26.40	48.99	72.97	53.33	73.21
127	37.50	26.32	35.20	60.10	61.26	83.33	69.64
128	16.67	17.54	16.00	23.23	42.34	33.33	67.86
129	19.17	22.81	20.00	34.34	36.94	66.67	64.29
130	55.83	44.74	54.40	31.82	47.75	63.33	80.36
131	20.83	20.18	18.40	27.78	45.05	0.00	80.36
132	30.00	32.46	30.40	29.29	39.64	0.00	67.86
133	32.50	34.21	30.40	28.79	32.43	0.00	78.57
134	21.67	16.67	23.20	31.82	21.62	13.33	64.29
135	33.33	32.46	31.20	29.29	45.95	66.67	87.50
136	29.17	26.32	23.20	39.39	62.16	100.00	85.71
137	18.33	19.30	18.40	30.30	30.63	0.00	75.00
138	22.50	22.81	23.20	29.29	43.24	0.00	80.36
139	23.33	24.56	23.20	37.37	27.93	0.00	69.64
140	32.50	19.30	32.00	29.80	30.63	66.67	73.21
141	33.33	27.19	32.00	35.86	43.24	33.33	87.50
142	28.33	14.91	28.80	26.77	48.65	63.33	85.71
143	33.33	34.21	28.80	34.34	42.34	33.33	76.79
144	33.33	33.33	34.40	29.80	36.04	0.00	66.07

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective	Promotive	Achievement	Flourishing
145	22.50	25.44	22.40	28.28	28.83	66.67	78.57
146	31.67	31.58	31.20	36.36	53.15	33.33	80.36
147	25.00	25.44	24.00	34.85	48.65	33.33	80.36
148	51.67	39.47	39.20	30.30	42.34	93.33	71.43
149	20.83	15.79	22.40	43.94	28.83	0.00	82.14
150	23.33	23.68	24.00	38.38	36.04	0.00	75.00
151	33.33	25.44	29.60	22.73	46.85	33.33	82.14
152	25.00	21.05	24.00	33.33	52.25	33.33	87.50
153	30.83	21.05	32.00	29.80	37.84	33.33	73.21
154	29.17	32.46	31.20	38.89	44.14	66.67	87.50
155	23.33	24.56	22.40	27.27	38.74	0.00	60.71
156	14.17	12.28	12.80	33.84	30.63	0.00	82.14
157	33.33	35.96	36.00	31.31	40.54	33.33	82.14
158	15.00	14.04	14.40	30.81	43.24	26.67	71.43
159	10.83	9.65	11.20	29.80	39.64	0.00	64.29
160	23.33	19.30	22.40	29.80	51.35	26.67	78.57
161	20.83	14.04	17.60	34.34	49.55	26.67	82.14
162	29.17	31.58	28.00	28.79	54.05	130.00	80.36
163	27.50	30.70	27.20	25.76	58.56	63.33	85.71
164	13.33	12.28	11.20	32.83	33.33	0.00	73.21
165	24.17	16.67	23.20	35.86	47.75	33.33	73.21
166	33.33	31.58	28.00	27.78	36.94	66.67	87.50
167	25.00	26.32	24.00	30.30	46.85	66.67	91.07
168	16.67	17.54	16.00	26.77	41.44	0.00	60.71
169	40.00	39.47	36.00	28.79	38.74	66.67	85.71
170	16.67	17.54	16.00	29.80	28.83	0.00	80.36
171	32.50	33.33	30.40	27.27	51.35	100.00	92.86
172	22.50	23.68	19.20	30.30	32.43	0.00	71.43
173	15.00	15.79	14.40	26.26	39.64	30.00	67.86
174	15.83	14.04	12.00	36.36	28.83	0.00	83.93
175	24.17	24.56	23.20	30.81	23.42	0.00	85.71
176	39.17	37.72	36.00	36.87	42.34	63.33	76.79
177	25.00	21.93	23.20	35.86	52.25	0.00	89.29
178	16.67	17.54	16.00	43.94	30.63	0.00	83.93
179	36.67	32.46	32.00	24.75	25.23	33.33	85.71
180	24.17	24.56	23.20	34.85	42.34	0.00	85.71
181	16.67	14.04	12.80	27.27	52.25	66.67	85.71
182	15.83	14.91	12.00	38.38	47.75	0.00	82.14
183	16.67	17.54	16.00	34.34	23.42	0.00	78.57
184	31.67	34.21	31.20	33.33	58.56	30.00	82.14
185	24.17	23.68	18.40	45.96	42.34	0.00	85.71
186	33.33	34.21	32.00	27.27	52.25	66.67	89.29

ID no.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective	Promotive	Achievement	Flourishing
187	37.50	38.60	37.60	38.38	33.33	66.67	91.07
188	21.67	18.42	18.40	29.80	30.63	0.00	89.29
189	31.67	30.70	26.40	41.92	57.66	0.00	85.71
190	22.50	19.30	15.20	29.29	32.43	0.00	69.64
191	23.33	22.81	18.40	27.27	33.33	0.00	85.71
192	16.67	17.54	16.00	35.35	36.04	0.00	83.93
193	16.67	17.54	16.00	34.34	36.04	66.67	78.57
194	16.67	17.54	14.40	29.80	46.85	0.00	75.00
195	16.67	17.54	16.00	34.34	55.86	0.00	87.50
196	31.67	33.33	28.00	35.86	39.64	0.00	82.14
197	40.00	39.47	36.00	35.35	40.54	100.00	85.71
198	40.83	41.23	36.00	33.84	54.05	133.33	92.86
199	16.67	17.54	16.00	34.85	25.23	0.00	82.14
200	24.17	24.56	24.00	33.84	43.24	0.00	89.29
201	62.50	69.30	63.20	49.49	58.56	166.67	94.64
202	41.67	43.86	40.00	32.83	48.65	133.33	92.86
203	53.33	57.89	56.80	32.83	51.35	163.33	96.43
204	40.83	42.98	37.60	43.94	40.54	133.33	92.86
205	51.67	51.75	48.80	53.54	36.04	166.67	89.29

1.5. Calculation of Index values for the dimensions

The Synergy Model of Resilience advocates that resilience was measured by an interaction between Adversity and Operating factors. However, this interaction was not the aggregate score of Adversity and Operating factors. To explain such complex multidimensionality and cross dimensional interaction, there was a need for a composite score evolved from a suitable formula. The purpose of calculating an index was that it was a composite unit that measures the changes in a representative group of individual data points. It was a compound measure of multiple indicators. An index involved the score obtained from combined observations of the construct and the weight of the construct.

Thus, to calculate the indices of the major dimensions viz – Adversity Index, Operating factors Index and Outcome Index, the calculated Weighted means of the Testing group (reflecting in table 4.7) and the weights derived from the Model group (reflecting in table 4.4)

were used in a formula. Once these three index values were calculated, the subsequent index values like Resistance Index and Resilience Index were subsequently calculated. For instance, Resistance Index was the ratio of Adversity Index and Operating factors Index and finally Resilience Index was arrived at using Resistance Index and Outcome Index.

The detailed formula-based calculation of each of the five indices viz. Adversity Index (AI), Operating factors Index (OFI), Resistance Index (RSI), Outcome Index (OI) and Resilience Index (RI) are explained in the following sub-sections.

1.5.1. Adversity Index (AI) – The Adversity Index was a combination of severity, frequency and duration of the adversities experienced by the participants. This was calculated by using the following formula. As an example, the AI of participant with ID No: 005, was computed.

$$AI = \frac{(S_{wm} \times S_w) + (F_{wm} \times F_w) + (D_{wm} \times D_w)}{S_w + F_w + D_w}$$

Example of ID No. 005

$$AI = \frac{(38.33 \times 100) + (39.47 \times 100) + (38.40 \times 100)}{100 + 100 + 100}$$

$$AI = 38.74$$

Where,

AI = Adversity index
S_{wm} = Severity weighted mean of the individual
S_w =Weight of Severity
F_{wm} = Frequency weighted mean of the individual
F_w = Weight of frequency
D_{wm} = Duration weighted mean of the individual
D_w = Weight of Duration
Using the above formula, every participant had an Adversity Index

1.5.2. Operating Factors Index (OFI) – Operating Factors Index was a combination of Protective and Promotive factors. OFI was calculated for every participant using the following formula. For the purpose of demonstration, the Operating factors Index (OFI) is computed for the participant with ID no. 005.

$$OFI = \frac{(PR_{wm} \times PR_w) + (PM_{wm} \times PM_w)}{PR_w + PM_w}$$

Example of ID no. 005

$$OFI = \frac{(42.93 \times 100) + (41.44 \times 100)}{100 + 100}$$

$$OFI = 42.19$$

Where,

OFI = Operating Factors Index
PR_{wm} = Protective factors weighted mean
PR_w= Weight of Protective factors
PM_{wm} = Promotive factors weighted mean
PM_w = Weight of Promotive factors
By applying the above formula, every participant got a score of OFI.

1.5.3. Outcome Index (OI) – Outcome refers to the product of resilience measured in terms of accomplishments (measured in terms of Achievement) and satisfaction derived (measured in terms of Flourishing). The Outcome factors Index is calculated by using the weights and weighted mean scores of Achievement and Flourishing. The following formula was applied. For the purpose of demonstration the Outcome Index (OI) is computed for participant with ID no. 005.

$$OI = \frac{(ACH_{wm} \times ACH_w) + (FL_{wm} \times FL_w)}{ACH_w + FL_w}$$

Example of ID no. 005

$$OI = \frac{(33.33 \times 100) + (87.50 \times 100)}{100 + 100}$$

$$OI = 60.42$$

Where,
OI = Outcome Index
ACH_{wm} = Achievement weighted mean
ACH_w = Weight of Achievement
FL_{wm} = Flourishing weighted mean
FL_w = Weight of Flourishing

Using the so far calculated Adversity Index, Operating factors Index and Outcome Index, the subsequent indices like the Resistance Index and Resilience Index were further derived.

1.5.4. Resistance Index (RSI) – According to the Synergy Model of Resilience, Operating factors (Protective and Promotive factors) operate on the adversities as a buffer and they

function as a resisting force against the negative impact of the adversities. It is imperative to quantify this resistance force. This is done by using the values of Operating factors Index and Adversity Index. For the purpose of providing an example the Resistance Index is computed for the participants with ID no. 005.

$$RSI = \frac{OFI}{AI} \times 100$$

Example of ID no. 005

$$RSI = \frac{42.19}{38.74} \times 100$$

$$RSI = 108.91$$

Where,
RSI = Resistance Index
OFI = Operating Factors Index
AI = Adversity Index

1.5.5 Evolving Resilience Index (RI) – The Synergy Model of Resilience suggested resilience to be an outcome of the force or resistance applied on the adversity using the Operating Factors so as to manifest the same in the form of outcome. A translation of this aspect of the theory was found in the formula used to calculate Resilience. In order to evolve Resilience Index, two indices were used viz., Outcome Index and Resistance Index. Outcome Index was the manifestation of outcome in terms of achievement and flourishing. Resistance Index was the manifestation of the process of resisting Adversity using Operating factors.

The ratio between Outcome Index and Resistance index not only derived resilience but the variations in the ratio helped in determining the levels of resilience. If the Resistance was equal to the Outcome, the Resilience Index would be 100 indicating average level of resilience. This helped the individual in insulating oneself from the negative impact of adverse life conditions. These individuals were successful survivors of adversity (Positive Adapters). When the Outcome Index (measured in terms of Achievement and Flourishing) was more than the Resistance applied against adversities, the Resilience Index would be more

than 100, indicating that the individuals not only managed to survive the adversities but also went a step ahead by indicating excellence in life achievements and flourishing. They are called 'Resilients'.

The Resilience Index (RI) was computed by applying the following formula. For the purpose of demonstration Resilience Index was computed for the participant with ID no. 005

$$RI = \frac{OI}{RSI} \times 100$$

Where,

RI = Resilience Index
OI = Outcome Index
RSI = Resistance Index

Example ID no.005

$$RI = \frac{60.42}{108.91} \times 100$$

$$RI = 55.48$$

Using the formulae described so far, Adversity Index, Operating factors Index, Outcome Index, Resistance Index and Resilience Index were calculated for the Testing group (N = 205) and are presented in table 4.8.

Table 4.8

Index values for Adversity, Operating Factors, Outcome, Resistance, and Resilience

ID No.	Adversity Index (AI)	Operating factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index (RI)
001	33.47	37.50	93.75	112.02	83.69
002	25.94	42.46	55.95	163.69	34.18
003	32.64	38.19	76.19	117.00	65.12
004	45.50	44.62	109.64	98.06	111.81
005	**38.74**	**42.19**	**60.42**	**108.91**	**55.48**
006	15.90	36.54	59.52	229.82	25.90
007	16.74	30.58	41.07	182.69	22.48
008	36.80	21.00	77.08	57.06	135.08
009	22.89	47.61	40.18	208.03	19.31
010	24.83	36.49	41.07	146.99	27.94
011	41.78	22.77	72.08	54.50	132.27
012	21.44	30.30	73.63	141.32	52.10
013	23.74	46.53	60.42	196.05	30.82
014	25.11	35.93	58.63	143.13	40.96
015	16.18	34.42	41.96	212.75	19.72
016	24.82	24.88	69.64	100.21	69.49
017	21.21	41.68	55.06	196.51	28.02
018	24.26	40.89	60.42	168.56	35.84
019	27.59	34.16	87.74	123.83	70.86
020	25.11	36.19	41.07	144.14	28.49
021	31.55	23.27	88.63	73.77	120.14
022	32.64	46.10	57.74	141.26	40.87
023	20.63	36.27	41.96	175.85	23.86
024	26.46	20.23	41.96	76.44	54.90
025	16.46	35.70	60.42	216.91	27.85
026	16.74	36.13	44.64	215.88	20.68
027	26.99	34.63	73.51	128.32	57.29
028	23.44	32.78	59.52	139.83	42.57
029	32.34	41.71	95.54	128.95	74.09
030	19.53	35.75	41.96	183.03	22.93
031	23.44	31.83	59.52	135.76	43.85
032	28.16	36.26	35.71	128.77	27.74
033	24.84	34.17	39.29	137.55	28.56
034	24.27	28.83	34.82	118.77	29.32
035	23.99	37.30	67.38	155.47	43.34
036	25.07	27.01	40.18	107.73	37.30
037	25.11	41.50	80.65	165.32	48.79
038	30.41	34.08	38.39	112.07	34.26

ID No.	Adversity Index (AI)	Operating factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index (RI)
039	23.70	44.23	58.63	186.62	31.42
040	25.11	38.36	57.74	152.81	37.78
041	28.99	38.74	41.96	133.65	31.40
042	30.42	36.17	72.74	118.89	61.18
043	33.47	35.37	58.63	105.68	55.48
044	28.45	37.24	41.07	130.91	31.37
045	33.18	35.43	62.20	106.77	58.26
046	25.43	41.45	45.54	162.98	27.94
047	39.62	34.73	36.61	87.65	41.76
048	32.61	28.60	35.71	87.69	40.73
049	32.36	32.17	58.63	99.41	58.98
050	34.58	30.36	34.82	87.80	39.66
051	25.11	40.94	77.98	163.09	47.81
052	21.99	32.97	41.07	149.95	27.39
053	22.86	38.62	63.10	168.94	37.35
054	27.90	29.93	91.07	107.25	84.92
055	23.71	41.57	67.20	175.34	38.33
056	22.02	36.17	58.75	164.21	35.78
057	24.27	26.52	42.86	109.29	39.22
058	27.36	34.36	72.86	125.59	58.01
059	22.04	34.02	55.06	154.37	35.67
060	16.74	32.17	36.61	192.19	19.05
061	24.27	31.46	59.64	129.65	46.00
062	23.41	38.48	56.07	164.40	34.11
063	28.49	36.36	55.95	127.61	43.84
064	25.11	38.47	61.31	153.25	40.01
065	24.83	37.11	59.52	149.46	39.83
066	22.57	28.04	47.32	124.23	38.09
067	30.95	40.04	50.06	129.37	38.70
068	25.11	40.75	57.74	162.30	35.58
069	31.77	39.84	76.19	125.40	60.76
070	21.76	31.75	36.61	145.92	25.09
071	16.46	37.34	56.85	226.86	25.06
072	15.90	33.32	40.18	209.56	19.17
073	24.27	45.63	61.31	188.03	32.61
074	38.48	42.70	75.30	110.99	67.84
075	15.90	39.12	42.86	246.04	17.42
076	31.52	40.96	74.40	129.95	57.26
077	29.96	38.51	77.08	128.57	59.95
078	14.53	28.45	43.75	195.83	22.34
079	25.11	33.93	77.08	135.17	57.03

ID No.	Adversity Index (AI)	Operating factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index (RI)
080	38.19	35.63	58.63	93.28	62.86
081	35.07	40.79	57.74	116.29	49.65
082	13.95	30.36	43.75	217.69	20.10
083	24.55	35.56	41.07	144.84	28.36
084	25.11	28.15	39.29	112.11	35.04
085	29.30	37.67	55.95	128.55	43.52
086	23.71	30.56	60.42	128.90	46.87
087	30.18	26.16	38.39	86.69	44.29
088	24.56	42.53	56.96	173.18	32.89
089	23.41	34.45	42.86	147.20	29.12
090	16.18	36.40	55.06	224.94	24.48
091	15.05	42.64	56.96	283.32	20.11
092	16.74	43.86	63.10	262.08	24.07
093	24.24	30.86	110.54	127.31	86.83
094	24.54	31.87	61.31	129.91	47.19
095	22.58	40.77	37.50	180.51	20.77
096	25.11	21.45	91.07	85.44	106.59
097	16.74	26.30	56.85	157.16	36.17
098	25.11	34.92	36.61	139.08	26.32
099	15.36	46.53	45.54	303.04	15.03
100	24.81	32.23	61.31	129.91	47.19
101	23.98	36.36	59.52	151.67	39.25
102	21.78	22.17	40.18	101.81	39.46
103	22.58	32.06	40.18	141.95	28.31
104	16.74	24.86	87.62	148.51	59.00
105	24.27	22.01	80.65	90.70	88.93
106	16.74	32.29	61.31	192.92	31.78
107	16.46	41.97	53.39	255.02	20.94
108	23.12	36.71	41.07	158.76	25.87
109	22.90	25.00	58.63	109.18	53.70
110	16.74	40.53	55.06	242.14	22.74
111	24.26	43.97	40.18	181.28	22.16
112	23.15	31.27	39.29	135.05	29.09
113	24.83	37.59	40.18	151.41	26.54
114	27.92	26.47	55.06	94.80	58.08
115	89.54	46.83	94.64	52.30	180.95
116	35.75	37.52	119.52	104.97	113.86
117	23.19	53.97	111.43	232.74	47.88
118	31.80	45.62	55.06	143.45	38.38
119	30.09	31.80	70.83	105.66	67.04
120	26.55	40.20	76.19	151.41	50.32
121	36.89	33.93	91.43	91.98	99.40

ID No.	Adversity Index (AI)	Operating factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index (RI)
122	32.43	43.02	112.32	132.67	84.66
123	33.93	37.06	47.02	109.23	43.05
124	32.85	41.84	96.96	127.38	76.12
125	43.44	39.97	88.75	92.01	96.46
126	28.19	60.98	63.27	216.35	29.25
127	33.01	60.68	76.49	183.85	41.60
128	16.74	32.79	50.60	195.90	25.83
129	20.66	35.64	65.48	172.53	37.95
130	51.66	39.78	71.85	77.01	93.29
131	19.80	36.41	40.18	183.87	21.85
132	30.95	34.47	33.93	111.35	30.47
133	32.37	30.61	39.29	94.56	41.54
134	20.51	26.72	38.81	130.27	29.79
135	32.33	37.62	77.08	116.36	66.24
136	26.23	50.78	92.86	193.61	47.96
137	18.68	30.47	37.50	163.12	22.99
138	22.84	36.27	40.18	158.82	25.30
139	23.70	32.65	34.82	137.78	25.27
140	27.93	30.21	69.94	108.17	64.66
141	30.84	39.55	60.42	128.24	47.11
142	24.02	37.71	74.52	157.02	47.46
143	32.11	38.34	55.06	119.39	46.12
144	33.69	32.92	33.04	97.71	33.81
145	23.45	28.56	72.62	121.79	59.62
146	31.48	44.76	56.85	142.17	39.98
147	24.81	41.75	56.85	168.25	33.79
148	43.45	36.32	82.38	83.60	98.54
149	19.67	36.38	41.07	184.93	22.21
150	23.67	37.21	37.50	157.19	23.86
151	29.46	34.79	57.74	118.09	48.89
152	23.35	42.79	60.42	183.26	32.97
153	27.96	33.82	53.27	120.94	44.05
154	30.94	41.52	77.08	134.18	57.45
155	23.43	33.01	30.36	140.86	21.55
156	13.08	32.23	41.07	246.39	16.67
157	35.10	35.93	57.74	102.36	56.41
158	14.48	37.03	49.05	255.73	19.18
159	10.56	34.72	32.14	328.75	9.78
160	21.68	40.57	52.62	187.18	28.11
161	17.49	41.95	54.40	239.84	22.68
162	29.58	41.42	105.18	140.02	75.12
163	28.47	42.16	74.52	148.09	50.32

ID No.	Adversity Index (AI)	Operating factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index (RI)
164	12.27	33.08	36.61	269.58	13.58
165	21.34	41.80	53.27	195.85	27.20
166	30.97	32.36	77.08	104.48	73.78
167	25.11	38.57	78.87	153.65	51.33
168	16.74	34.10	30.36	203.77	14.90
169	38.49	33.76	76.19	87.72	86.86
170	16.74	29.31	40.18	175.14	22.94
171	32.08	39.31	96.43	122.55	78.68
172	21.79	31.37	35.71	143.92	24.81
173	15.06	32.95	48.93	218.75	22.37
174	13.96	32.60	41.96	233.56	17.97
175	23.98	27.12	42.86	113.10	37.89
176	37.63	39.61	70.06	105.25	66.56
177	23.38	44.06	44.64	188.46	23.69
178	16.74	37.29	41.96	222.77	18.84
179	33.71	24.99	59.52	74.13	80.30
180	23.98	38.60	42.86	160.98	26.62
181	14.50	39.76	76.19	274.21	27.79
182	14.25	43.07	41.07	302.25	13.59
183	16.74	28.88	39.29	172.57	22.76
184	32.36	45.95	56.07	141.99	39.49
185	22.08	44.15	42.86	199.93	21.44
186	33.18	39.76	77.98	119.83	65.07
187	37.90	35.86	78.87	94.62	83.36
188	19.50	30.21	44.64	154.98	28.81
189	29.59	49.79	42.86	168.26	25.47
190	19.00	30.86	34.82	162.44	21.44
191	21.51	30.30	42.86	140.86	30.43
192	16.74	35.69	41.96	213.27	19.68
193	16.74	35.19	72.62	210.25	34.54
194	16.20	38.32	37.50	236.51	15.86
195	16.74	45.10	43.75	269.46	16.24
196	31.00	37.75	41.07	121.77	33.73
197	38.49	37.95	92.86	98.59	94.19
198	39.35	43.95	113.10	111.67	101.28
199	16.74	30.04	41.07	179.47	22.89
200	24.24	38.54	44.64	158.98	28.08
201	65.00	54.03	130.65	83.12	157.19
202	41.84	40.74	113.10	97.36	116.16
203	56.01	42.09	129.88	75.15	172.83
204	40.47	42.24	113.10	104.37	108.36
205	50.74	44.79	127.98	88.26	144.99

Table 4.8 showed that the Resilience Index of the sample ranged between 180.95 to 9.78 and a total of 13 participants had an index value above 100. This section presented the results related to development and application of the mathematical model for measuring resilience. The next section presents the results related to validation of the REST Battery.

2. Validation of the REST Battery

The reliability and validity of the REST Battery were established.

2.1. Validity - An attempt was made to establish three types of validity viz. Convergent, Divergent & Concurrent validity. For this purpose, meeting the prerequisite of each type of validity, suitable scales were chosen. Convergent validity was established by choosing a construct positively correlated with the main construct (Resilience), i.e. General Self Efficacy Scale (Schwarzer & Jerusalem, 1995) was selected. Divergent validity was established by choosing a construct having no relationship with the main construct Resilience, accordingly Learned Helplessness was selected. To measure the same Learned Helplessness Scale (Quinless& Nelson, 1988) was selected. Concurrent validity was established by choosing a already established standardised scale of Resilience. Accordingly, another standardised Resilience Scale (Wagnild& Young, 2009) was selected. Following was the description of these parallel scale used for establishing the validity.

a) General Self Efficacy Scale (Schwarzer & Jerusalem, 1995) – It was a four point scale with 10 items. The responses ranged from 'Not at all true' (1) to 'Exactly true' (4). Score ranged from 10-40. Higher the score indicated higher the self-efficacy. The scale had established content validity & its reliability ranged from 0.76 to 0.90

b) Learned Helplessness Scale (Quinless& Nelson, 1988) – It was a four point scale with 20 items. The responses ranged from 'Strongly disagree' (1) to 'Strongly agree' (4). The total

score ranged between 20 and 80. Higher score indicated higher the helplessness in the individual. Reliability of the scale was reported as 0.85.

c) Resilience Scale (Wagnild& Young, 2009) – It was a seven point scale with 14 items. The responses ranged from 'Disagree' (1) to 'Agree' (7). Total score ranged from 7 to 88. Higher score indicated higher the Resilience. Content validity of the scale was established & its reliability was reported to be 0.93.

All the three scales along with REST Battery were administered to a sample of 200 participants. The total score of each of the three scales were correlated with Resilience Index obtained from the REST Battery. This was done using Pearson's Product Moment Correlation, its results are presented in table 4.9

Table 4.9

Results of Pearson's Correlation (r) between Resilience Index, General Self Efficacy, Learned Helplessness, Resilience Score

	General Self Efficacy	**Learned Helplessness**	**Resilience Score**
Resilience Index	0.52**	0.12 (NS)	0.57**

Note: ** = $p < 0.01$, NS = Not Significant

The results of table 4.9 stated that Resilience Index is significantly correlated with General Self Efficacy ($r = 0.52$, $p<0.01$) thereby establishing Convergent Validity. Resilience Index is not significantly correlated with scores of Learned Helplessness ($r = 0.12$, NS) thereby establishing Divergent Validity. Campbell and Fiske (1959) stated "that related constructs ought to correlate with each other significantly (indicating convergent validity) while unrelated constructs ought not to correlate with one another (indicating discriminant validity) thus, discriminating between dissimilar constructs". Finally, Resilience Index was significantly correlated with Resilience Score ($r = 0.57$, $p<0.01$) thereby establishing

Concurrent Validity. Thus, all the three types of validity – Convergent, Divergent & Concurrent validity of the REST Battery were established.

Apart from this, the content validity was verified on a sample of five participants socially acclaimed as resilients. Qualitative data was also collected from this group to register their coping with adversity and the achievements in their lives. This group was administered the REST Battery. The purpose of this was to test if the Resilience Index measured by using the REST Battery indicated their resilience in terms of scores. The RI scores of this group were presented in table 4.10.

Table 4.10

RI Scores of the persons Socially acclaimed as Resilients

S.No	ID No	RI Scores
1.	206	152.09
2.	207	186.93
3.	208	148.83
4.	209	155.41
5.	210	160.01

2.2. Reliability –Test-Retest reliability was used to check the reliability of REST Battery. Test-Retest reliability would be a suitable measure for multidimensional tools like REST Battery.

A sub-sample of 50 participants were randomly chosen from the sample of 205 participants. All the scales of the Battery – Adversity scale, Protective factors scale, Promotive factors scale, Achievement scale and Flourishing scale were administered on these 50 participants. They were administered the scales in the Battery again after a gap of two weeks. The two sets of scores of the Adversity scale (of the three dimensions), Protective factors scale, Promotive factors scale, Achievement scale, and Flourishing scale were

correlated using Pearson's Product Moment Correlation. Results were presented in table 4.11. The Adversity scale showed a high reliability on all the three dimensions, viz- Severity ($r = 0.92$, $p<0.01$), Frequency ($r = 0.88$, $p<0.01$) and Duration ($r = 0.94$, $p<0.01$). The reliability was high for Protective factors scale ($r = 0.75$, $p<0.01$) and Promotive factors scale ($r = 0.93$, $p<0.01$) that belonged to the Operating factors. The reliability was also found to be high for Achievement scale ($r = 0.92$, $p<0.01$) and Flourishing scale ($r = 0.86$, $p<0.01$).

Table 4.11

Results of Test-Retest Reliability for the Scales in REST Battery

	Adversity scale			**Operating factors**		**Outcome factors**	
	Severity	**Frequency**	**Duration**	**Protective factors scale**	**Promotive factors scale**	**Achievement scale**	**Flourishing scale**
R	0.92**	0.88**	0.94**	0.75**	0.93**	0.92**	0.86**

Note: ** = p<0.01

In this manner the psychometric properties – validity and reliability of the REST Battery were established. Firstly, having begun with the evolution of the formula, moving to the measurement of resilience and then validation of the REST Battery, finally when administered, REST Battery is capable of efficiently measuring resilience by giving a Resilience Index at the end. Secondly, with help of this derived Resilience Index it enables one to categorise the sample into levels of Resilience. This categorisation is described in the following section.

3. Categorising levels of Resilience

The weights derived from the Model group (N=200) were used in the formula to derive Resilience Index (RI) in the Testing group (N=205). Thus, after the application of the formula every participant of the Testing group got Resilience Index (RI). Based on their RI

they were categorised into different levels of Resilience. Before seeing how they are categorised, it is important to know why it is important to categorise the levels of Resilience.

Resilience was considered a latent variable in every individual, which is believed to surface when the individual faced with an adversity responds to it. The formula propounded that the RI is the ratio between the Outcome Factor and Resistance. Resistance was the function of the buffering force of the Operating Factors on Adversity. Resistance power depended on the Value of Operating Factors on Adversity. There were wide individual differences in the Protective factors, Promotive factors and the manner in which the individual uses them. This implied that there was an influence of individual differences which reflects innately different levels of Resilience. The purpose of categorising the Resilience was to find out the degree of their resilience. Some may be highly resilient, some may positively adapt while yet others may have low resilience. Those who positively adapt were the ones who can be trained in enhancing their protective and promotive factors to cope effectively with their adversities. Training modules can be developed for such groups to enhance the effective use of operating factors.

The Synergy Model of Resilience postulated the categorisation levels of Resilience based on the ratio of Outcome factors and Resistance, i.e., the Model stated that if the Resistance and Outcome were equal, Resilience would be 100 calling that category as Borderline Resilients. When the Outcome factors outweighed Resistance then Resilience would be more than 100. According to the Synergy Model of Resilience, these individuals, were Resilient. The Model proposed this categorisation theoretically considering the two crucial factors of Resistance & Outcome factors.

However, there was a need to statistically arrive at a cut off for different levels of Resistance, thereby empirically validating the cut off for categorisation. For this purpose the

Decile cut off were used to demarcate the categories of Resilience. We were interested to know high Resilience to Positively adapting people, distinguishing them from the low Resilients. This is feasible through decile cut off, because, the entire sample is divided into 10 groups. For the purpose of identifying the resilients only the high scoring groups i.e. the 8^{th} 9^{th}& 10^{th} decile groups were selected.

The procedure followed in decile cut off was explained by firstly dividing the sample of 205 into 10 groups. The mean, standard deviation & sample size of each group is calculated and the results are depicted in table 4.12. To determine the cut off of Survivors, the Mean scores of 8^{th} & 9^{th} decile group were taken to calculate the pooled mean. To determine the cut off for Resilients, the Mean scores of 9^{th}& 10^{th} decile group was taken to calculate the pooled mean.

Table 4.12

Summary of the Mean, N, and Standard Deviation of the decile groups

Decile group	**Mean**	**N**	**SD**
1	17.34	20	2.85
2	22.42	21	0.87
3	26.13	20	1.21
4	29.47	21	1.30
5	35.06	20	1.64
6	40.07	21	1.46
7	46.78	21	2.24
8	**57.11**	20	2.67
9	**73.68**	21	7.89
10	**117.96**	20	27.60

Calculation of pooled means to set the cut off for Survivors group using means of 8 and 9 decile groups:

$$\frac{(57.11 \times 20) + (73.68 \times 21)}{41} = 65.60$$

Calculation of pooled means to set the cut off for Resilient group using means of 9 and 10 decile groups:

$$\frac{(73.68 \times 21) + (117.96 \times 20)}{41} = 95.28$$

Based on these cut-off scores the Testing group of sample can be categorised as, Resilients, Survivors and Non-Resilients. Participants with Resilience Index above 95.28 were called Resilients, participants with Resilience Index between 65.61 to 95.27 were called Survivors and the participants with a Resilience Index below 65.60 were called Non-Resilients.

The number of participants in each of these categories –Resilients, Survivors and Non-Resilients were presented in table 4.13 It was found that **7.80% are Resilients, 10.24 % are Survivors and 81.95% are Non-Resilients.**

Table 4.13

Categories of Resilients, Survivors and Non-Resilients in the Testing group

Sno.	Resilient	Survivors	Non-Resilient
1.	96.46	66.24	9.78
2.	98.54	66.56	13.58
3.	99.40	67.04	13.59
4.	101.28	67.84	14.90
5.	106.59	69.49	15.03
6.	108.36	70.86	15.86
7.	111.81	73.78	16.24
8.	113.86	74.09	16.67
9.	116.16	75.12	17.42
10.	120.14	76.12	17.97
11.	132.27	78.68	18.84
12.	135.08	80.30	19.05
13.	144.99	83.36	19.17
14.	157.19	83.69	19.18
15.	172.83	84.66	19.31
16.	180.95	84.92	19.68
17.		86.83	19.72
18.		86.86	20.10
19.		88.93	20.11
20.		93.29	20.68
21.		94.19	20.77
22.			20.94
23.			21.44
24.			21.44
25.			21.55

Sno.	Resilient	Survivors	Non-Resilient
26.			21.85
27.			22.16
28.			22.21
29.			22.34
30.			22.37
31.			22.48
32.			22.68
33.			22.74
34.			22.76
35.			22.89
36.			22.93
37.			22.94
38.			22.99
39.			23.69
40.			23.86
41.			23.86
42.			24.07
43.			24.48
44.			24.81
45.			25.06
46.			25.09
47.			25.27
48.			25.30
49.			25.47
50.			25.83
51.			25.87
52.			25.90
53.			26.32
54.			26.54
55.			26.62
56.			27.20
57.			27.39
58.			27.74
59.			27.79
60.			27.85
61.			27.94
62.			27.94
63.			28.02
64.			28.08
65.			28.11
66.			28.31
67.			28.36
68.			28.49
69.			28.56
70.			28.81
71.			29.09
72.			29.12

Sno.	Resilient	Survivors	Non-Resilient
73.			29.25
74.			29.32
75.			29.79
76.			30.43
77.			30.47
78.			30.82
79.			31.37
80.			31.40
81.			31.42
82.			31.78
83.			32.61
84.			32.89
85.			32.97
86.			33.73
87.			33.79
88.			33.81
89.			34.11
90.			34.18
91.			34.26
92.			34.54
93.			35.04
94.			35.58
95.			35.67
96.			35.78
97.			35.84
98.			36.17
99.			37.30
100.			37.35
101.			37.78
102.			37.89
103.			37.95
104.			38.09
105.			38.33
106.			38.38
107.			38.70
108.			39.22
109.			39.25
110.			39.46
111.			39.49
112.			39.66
113.			39.83
114.			39.98
115.			40.01
116.			40.73
117.			40.87
118.			40.96
119.			41.54

Sno.	Resilient	Survivors	Non-Resilient
120.			41.60
121.			41.76
122.			42.57
123.			43.05
124.			43.34
125.			43.52
126.			43.84
127.			43.85
128.			44.05
129.			44.29
130.			46.00
131.			46.12
132.			46.87
133.			47.11
134.			47.19
135.			47.19
136.			47.46
137.			47.81
138.			47.88
139.			47.96
140.			48.79
141.			48.89
142.			49.65
143.			50.32
144.			50.32
145.			51.33
146.			52.10
147.			53.70
148.			54.90
149.			55.48
150.			55.48
151.			56.41
152.			57.03
153.			57.26
154.			57.29
155.			57.45
156.			58.01
157.			58.08
158.			58.26
159.			58.98
160.			59.00
161.			59.62
162.			59.95
163.			60.76
164.			61.18
165.			62.86
166.			64.66

Sno.	Resilient	Survivors	Non-Resilient
167.			65.07
168.			65.12

Note: RI Values for Resilients = >95.28; Survivors = 65.61 – 95.27; Non-Resilients = <65.60

As noticed in the table the total number of Resilients in the sample were 16 participants (**7.80**%), Survivors were around 21 participants (**10.24**%) and Non-Resilients were 168 participants (**81.95**%).

In addition, to validating the REST Battery, it was important to validate the Synergy Model of Resilience which is the theoretical basis for the REST Battery. This is presented in the following section.

4. Testing the Synergy Model of Resilience using Structural Equation Model (SEM)

The Synergy Model propounded a path between Operating factors to Resistance, Resistance to Adversity and Resistance to Outcome factors. It equated Outcome Factors to manifestation of Resilience. Structural Equation Model (SEM) was used to test the theoretical propositions postulated by the Synergy Model of Resilience (SMR) (Hariharan & Rana, 2017).

The model suggested that while testing the theoretical model through SEM, three predominant measures were obtained. Firstly, the Standard Regression Estimates were obtained. They showed the influence of one variable on another variable. While Standardised Regression weights denoted a unidirectional path seen between the variables (⟶), the covariances denote a bidirectional path/ relationship between the variables (⟷). Secondly, the Measures of Fit indicated how adequate or fit the model was and thirdly, Measures of Strength indicated the strength of the model. Thus, predictions can be made against data, thereby giving us an opportunity to see if the data revolved around the theoretical model or were there any other significant pathways emerging (through Path analysis). In other words,

it was intended to see if the path postulated by the Synergy Model of Resilience (SMR) is reflected by the study or were any other pathways emerging, thereby using SEM to validate the SMR.

Having given the purpose of using SEM and what were the significant measures that were derived of the analysis, we also understood the fitness and strength of the models as part of the SEM in pursuit of validating the SMR. As part of validating SMR, the composition of Resistance is verified empirically which is reflected in the last part of this section.

4.1. Path Analysis

The description of the results began with Path Analysis by presentation of significant ($p<0.01$) Standard Regression Estimates and Covariances found in each model, (depicted through the path diagram). This was followed by the Measures of Fit (denoted by Chi Square ,CMIN/df, NFI, CFI, GFI & RMSEA) and the Measures of Strength denoting the strength of the model i.e. how far the variance in the dependent variable is predicted by the model (denoted by Squared Multiple Correlation or SMC)

4.1.1. Model 1: In Model 1 all the seven constructs viz. Severity, Frequency and Duration of Adversity, Protective factors, Promotive factors, Achievement and Flourishing were included to see their path towards Resilience. Thus, the mean scores of all the seven constructs and Resilience Index were run in the computation.

The Standardised Regression Estimates (denoting unidirectional path) and Covariances (denoting bidirectional path) observed in Model 1 are presented in table 4.14 and in the figure 4.1 denoting the Path diagram. It was found that there is significant direct, unidirectional path from Achievement to Resilience (standardised estimate = 0.40, Critical Ratio (C.R.) = 5.66) and significant negative unidirectional path from Protective factors to

Resilience (standardised estimate = -0.25, C.R. = 4.74). This indicated that the Achievement and Protective Factors directly contribute to Resilience.

Ten bidirectional paths were observed from table 4.14 Bidirectional paths were observed between Severity of Adversity to Frequency of Adversity, Frequency of Adversity to Duration of Adversity and Severity of Adversity and Duration of Adversity. In other words, the path way was bidirectional between all the three sub components of Adversity dimension.

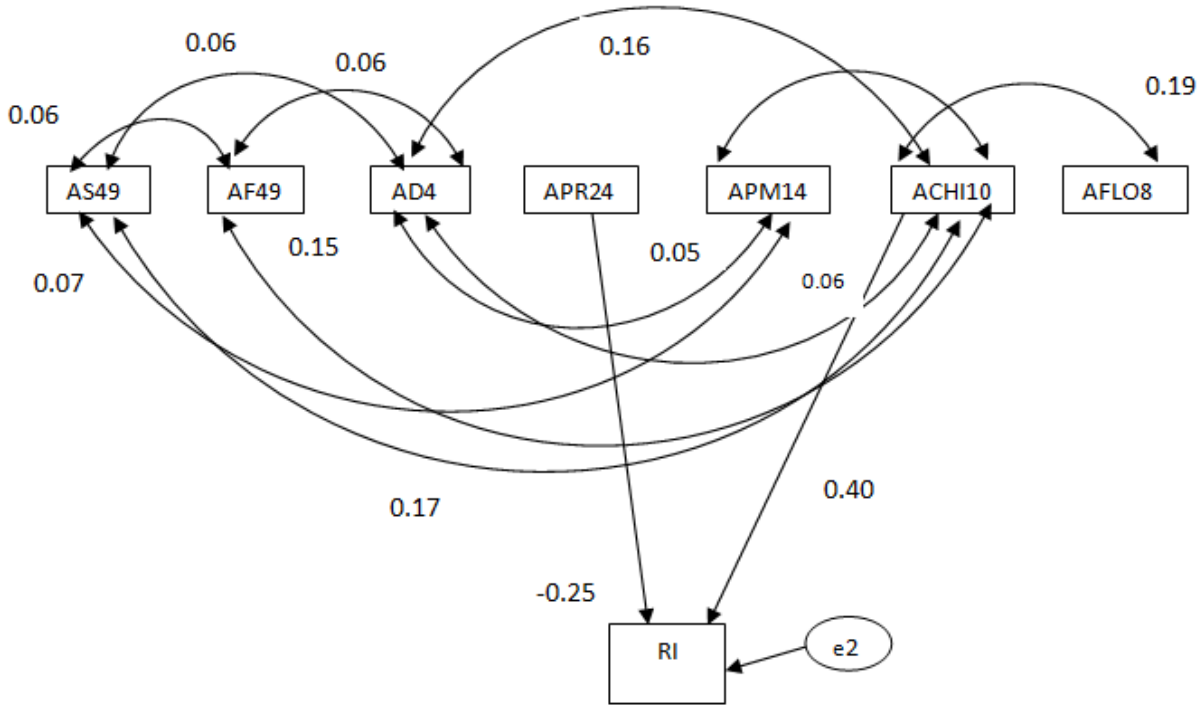
Bidirectional paths were also found between Severity of Adversity and Promotive factors; and Duration of Adversity and Promotive factors. There was bidirectional path between the two components of the Outcome dimension i.e. Achievement and Flourishing. Moreover, Achievement had a bidirectional path with all the 3 sub components of Adversity (Severity; Frequency; Duration) and with Promotive factors.

Table 4.14

Standard Regression Estimates & Covariances of variables denoting unidirectional and bidirectional pathways observed in Model 1

Model 1	**Standard Regression Estimates**	**Covariances**	**C.R.**	**P**
Unidirectional paths				
Achievement → Resilience	0.40		5.66	**
Promotive factors → Resilience	-0.25		4.74	**
Bidirectional paths				
Severity of Adversity ↔ Frequency of Adversity		0.06	9.84	**
Frequency of Adversity ↔ Duration of Adversity		0.06	9.87	**
Severity of Adversity ↔ Duration of Adversity		0.06	9.93	**
Severity of Adversity ↔ Promotive factors		0.07	4.09	**
Duration of Adversity ↔ Promotive facotrs		0.05	3.39	**
Achievement ↔ Flourishing		0.19	4.59	**
Achievement ↔ Severity of Adveristy		0.17	7.06	**
Achievement ↔ Frequency of Adversity		0.15	6.86	**
Achievement ↔ Duration of Adveristy		0.16	6.77	**
Achievement ↔ Promotive factors		0.42	5.49	**

Note: ** P<0.01



Note: 1. e denote error

2. ⟶ *Significant Standard Regression Estimates (Unidirectional)*
3. ⟷ *Significant Covariance Estimates (Bidirectional)*
4. *AS49 = Average of severity of adversity, AF49 = Average of frequency of adversity, AD49 = Average of duration of adversity, APR24 = Average of Protective factors, APM14 = Average of Promotive factors, ACHI10 = Average of Achievement, AFLO8 = Average of Flourishing, RI = Resilience Index*

Figure 4.1 Unidirectional and bidirectional paths followed by Severity, Frequency, Duration of Adversity, Protective factors, Promotive factors, Achievement and Flourishing towards Resilience, as part of Model 1.

4.1.2. Model 2: In Model 2, all the seven constructs viz. Severity, Frequency, Duration of Adversity, Protective factors, Promotive factors, Achievement and Flourishing and Resistance were included. The purpose of including Resistance into the Model 2 was to firstly see the path from Resistance to the seven constructs and secondly the path from Resistance to Resilience. Thirdly, the path from the seven constructs to Resilience through Resistance, to check if Resistance was mediating the between the seven constructs and Resilience. The mean scores of the seven constructs, Resistance Index and Resilience Index were run in the computation.

The Standardised Regression Estimates and the Covariance observed in the Model 2 were presented in table 4.15 and figure 4.2. It was seen that there is significant, unidirectional positive path from Protective factors to Resistance (standardised estimate = 0.26, C.R. = 3.91). There was a significant negative unidirectional path from Resistance to Resilience (standardised estimate = -0.66, C.R. = 22.18). There was a significant positive unidirectional path from Achievement to Resilience (standardised estimate = 0.51, C.R. = 16.22)

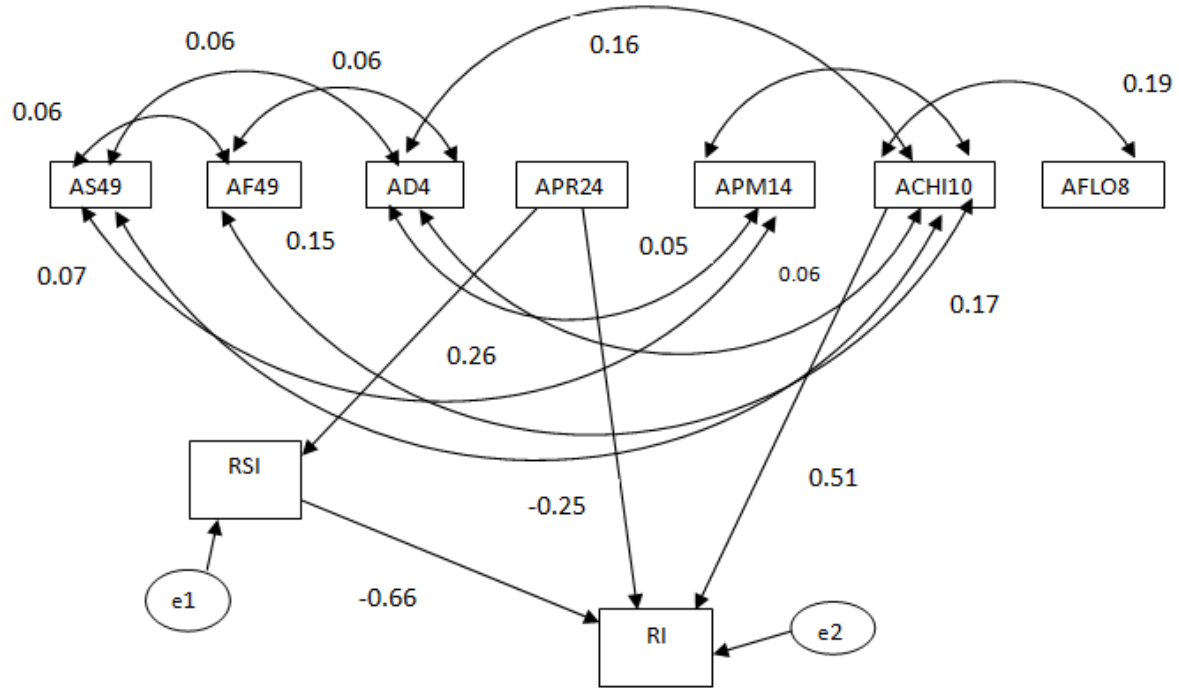
In addition, there are ten significant bidirectional paths. These paths of model 2 are similar to the ten significant bidirectional paths of Model 1.

Table 4.15

Standard Regression Estimates & Covariances of variables denoting unidirectional and bidirectional pathways observed in Model 2

Model 2	**Standard Regression Estimates**	**Covariances**	**C.R**	**P**
Unidirectional paths				
Protective factors → Resistance	0.26		3.91	**
Resistance → Resilience	-0.66		22.18	**
Achievement → Resilience	0.51		16.23	**
Bidirectional paths				
Severity of Adversity ↔ Frequency of Adversity		0.06	9.84	**
Frequency of Adversity ↔ Duration of Adversity		0.06	9.88	**
Severity of Adversity ↔ Duration of Adversity		0.06	9.93	**
Severity of Adversity ↔ Promotive factors		0.07	4.09	**
Duration of Adversity ↔ Promotive facotrs		0.05	3.39	**
Achievement ↔ Flourishing		0.19	4.59	**
Achievement ↔ Severity of Adveristy		0.17	7.06	**
Achievement ↔ Frequency of Adversity		0.15	6.86	**
Achievement ↔ Duration of Adveristy		0.16	6.79	**
Achievement ↔ Promotive factors		0.42	5.49	**

Note: ** P<0.01



Note: 1. e denote error

2. ⟶ *Significant Standard Regression Estimates (Unidirectional)*

3. ⟷ *Significant Covariance Estimates (Bidirectional)*

4. AS49 = Average of severity of adversity, AF49 = Average of frequency of adversity, AD49 = Average of duration of adversity, APR24 = Average of Protective factors, APM14 = Average of Promotive factors, ACHI10 = Average of Achievement, AFLO8 = Average of Flourishing, RSI = Resistance, RI = Resilience Index

Figure 4.2 Unidirectional and bidirectional paths followed by Severity, Frequency, Duration of Adversity, Protective factors, Promotive factors, Achievement and Flourishing and Resistance towards Resilience, as part of Model 2

4.1.3. Model 3: Model 3 selected only those variables that showed a significant path towards Resistance and Resilience directly. They were Resistance, Protective factors, Achievement & Resilience. This made the model more focussed and followed a deductive approach.

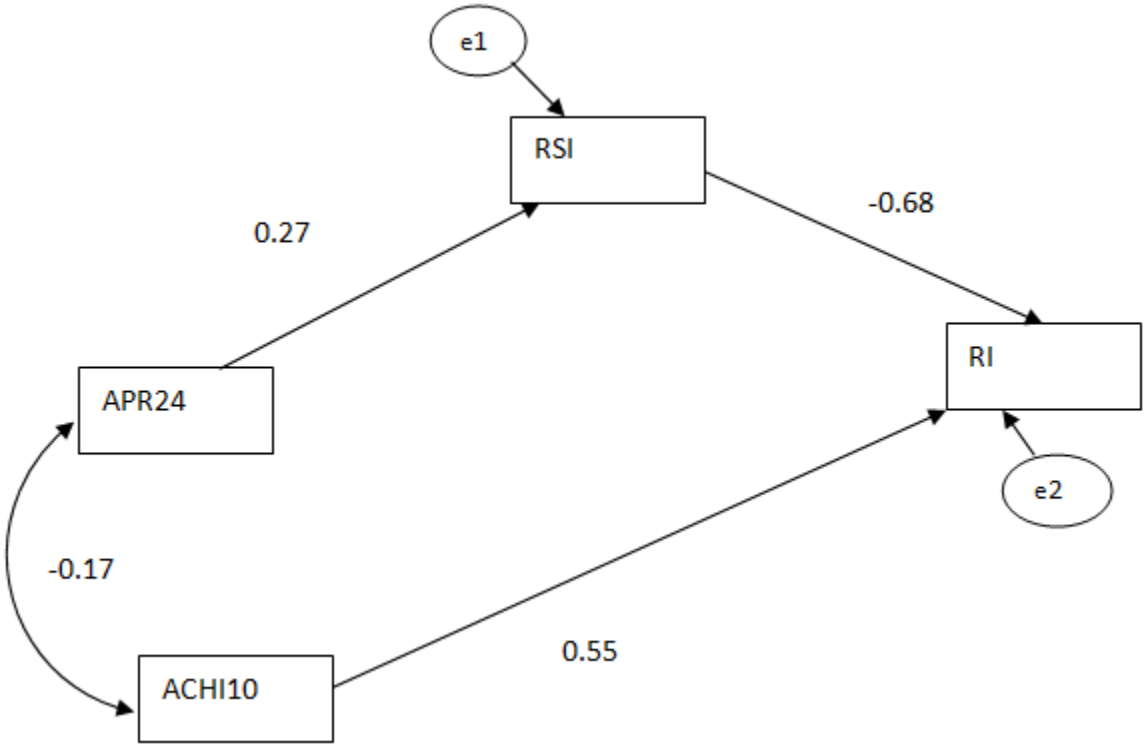
The standardised regression estimates (denoting unidirectional path) & covariance (denoting bidirectional path) observed in Model 3 are presented in table 4.16 & in the figure 4.3

Table 4.16

Standard Regression Estimates and Covariance of variables denoting unidirectional and bidirectional pathways observed in Model 3

Model 3	**Standard Regression Estimates**	**Covariances**	**C.R.**	**P**
Unidirectional paths				
Protective factors → Resistance	0.27		4.08	**
Resistance → Resilience	-0.68		22.35	**
Achievement → Resilience	0.54		17.81	**
Bidirectional paths				
Achievement ↔ Promotive factors		0.42	2.98	**

Note: ** P<0.01



Note: 1. e denote error

2. ⟶ *Significant Standard Regression Estimates (Unidirectional)*

3. ⟷ *Significant Covariance Estimates (Bidirectional)*

4. APR24 = Average of Protective factors, ACHI10 = Average of Achievement, RSI = Resistance, RI = Resilience Index

Figure 4.3 Unidirectional and bidirectional paths from Protective factor, Achievement & Resistance to Resilience, as part of Model 3

Similar to the Model 2, Model 3 also represented the same significant unidirectional paths i.e. from Protective factors to Resistance, from Resistance to Resilience and from Achievement to Resilience.

However, with the exclusion of the other variables & making the Model 3 more focused, there is a difference in the Standard Regression Estimates. It can be observed that the Standard Regression Estimates of Model 3 for the path from Protective factors to Resistance (standardised estimate = 0.27, C.R. = 4.08), from Resistance to Resilience (standardised estimate = -0.66, C.R. = 22.35) and from Achievement to Resilience

(standardised estimate = 0.54, C.R. = 17.81) is higher than the same corresponding paths in Model 2. In Model 3, a single bidirectional path was also found i.e., the path between Protective factors and Achievement as depicted in table 4.16

4.1.4. Model 4: Retaining the same variable of Model 3 viz. Protective factors, Achievement, Resistance and Resilience, a new path was included i.e. the path from Protective factors to Resilience.

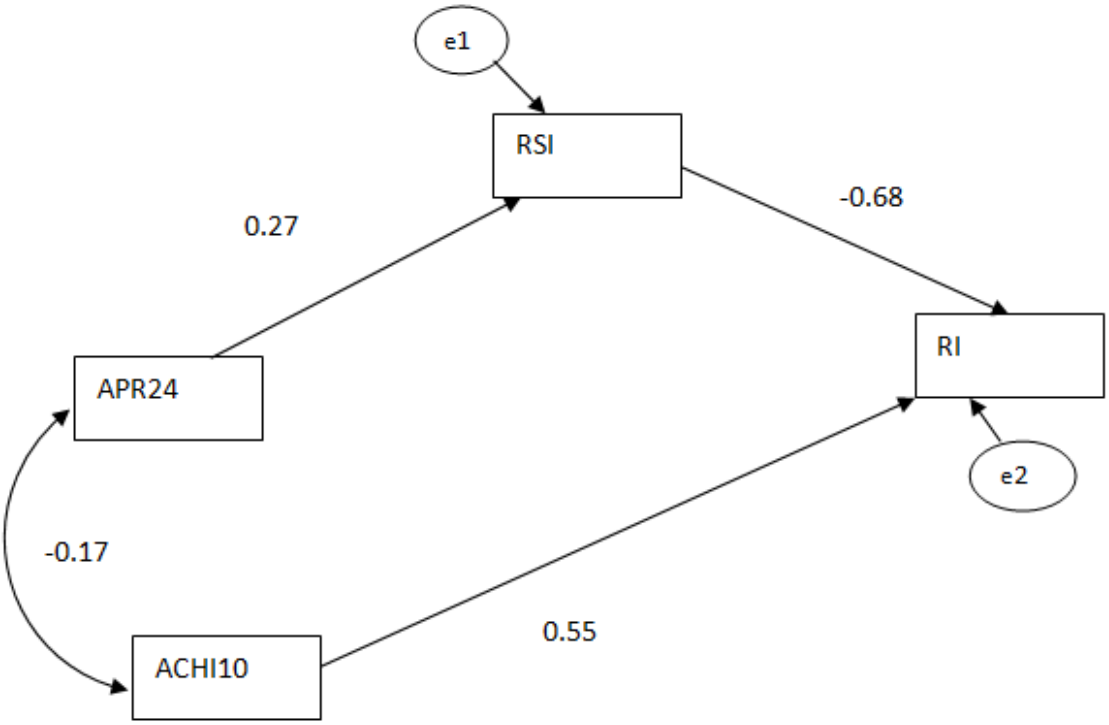
The Standardised Regression Estimates (denoting unidirectional path) and Covariances (denoting bidirectional path) of the Model 4 are presented in table 4.17 and figure 4.4

It was found that though the similar unidirectional & bidirectional path of Model 3 remained there was observed a slight dip. The Standard Regression Estimate for the significant unidirectional path from Protective Factors to Resistance (standardised estimate = 0.27, C.R. = 4.08) & the significant bidirectional path between Achievement and Protective Factors (standardised estimate = 0.17, C.R. = 2.98) remained unchanged. However, the Standard Regression Estimate for the significant unidirectional paths (depicted in table 4.17) i.e. from Resistance to Resilience (standardised estimate = -0.67, C.R = 21.22) and from Achievement to Resilience (standardised estimate = 0.53, C.R. = 17.21) decreased when compared to the same Standard Regression Estimates of the paths of Model 3.

Table 4.17

Standard Regression Estimates & Covariance of variables denoting unidirectional and bidirectional pathways observed in Model 4

Model 4	**Standard Regression Estimates**	**Covariances**	**C.R.**	**P**
Unidirectional paths				
Protective factors → Resistance	0.27		4.08	**
Resistance → Resilience	-0.67		21.22	**
Achievement → Resilience	0.53		17.21	**
Bidirectional paths				
Achievement ↔ Promotive factors		0.17	2.98	**



Note: 1. e denote error

2. → *Significant Standard Regression Estimates (Unidirectional)*

3. ↔ *Significant Covariance Estimates (Bidirectional)*

4. APR24 = Average of Protective factors, ACHI10 = Average of Achievement, RSI = Resistance, RI = Resilience Index

Figure 4.4 Unidirectional and bidirectional paths followed by Protective factors, Achievement & Resistance towards Resilience, as part of Model 4

The influence of one variable on another or the path from one variable to another, in all the 4 models was seen through the Standard Regression Estimates, Covariances and the Path Diagram. The next part of the analysis is presenting the Measure of Fit viz CMIN/df, NFI, CFI, GFI & RMSEA to observe the adequacy or fit of each of the 4 models.

4. 2. Measures of Fit and Measures of Strength

Measures of fit can be categorised into two – Incremental and Absolute. Incremental fit measures which included CFI, CMIN/df, and NFI whereas, Absolute fit measures included RMSEA and GFI. Incremental fit measures placed the researcher's model on a continuum, where on one end is a worst model (independence model) and other the best possible model (saturated model). Absolute fit measures indicated how far the model is fit. Unlike the incremental fit, these Absolute fit measures did not rely on comparison with best model or worst model. Instead, they measured how well is the model on its own without a comparison (Joreskeg & Serbon, 1993). The reason for including the two categories viz Incremental fit measures and Absolute fit was to observe the fitness of the model more perceptively.

The Measures of Fit followed a cut off value, thereby indicating the adequacy and fit of the model. The respective cut off values of the measures of fit viz. X^2, CMIN/df, NFI, TLI, GFI & RMSEA, to accept a model fit, adequate or good are presented in table 4.18.

Table 4.18

Cut off values of the Measures of Fit

Measures of Fit	**Cut off value or Indication to denote model fitness**
X^2 Chi Square	Chi square value 0 indicates good fit
CMIN/df (Normed Chi Square)	Value close to 1 not exceeding 3
NFI (Normed Fit Index)	Value close to 1 indicates good fit
CFI(Comparative Fit Index)	Value close to 1 indicates good fit
GFI (Goodness of Fit Index	Value close to 1 indicates good fit
RMSEA (Root Mean Square Error of Approximation)	< 0.05 is close fit of model. Value of 0.0 indicates exact fit

Along with goodness of fit of the models, strength of each model (indicated by Squared Multiple Correlation (SMC)) was also observed. Thus, the Measures of Fit and the Measure of Strength of the model for all the four models are depicted in table 4.19.

Model 1 comprised of all the seven constructs viz. Severity, Frequency, and Duration of Adversity, Protective factors and Promotive factors belonging to Operating factors and Achievement and Flourishing of Outcome factors to see their path towards Resilience

The Model 1 yield (CF1 = 1.00 & NFI = 1.00) thereby indicated the model to be a perfect fit when compared to the Independence model & Saturated model. As far as the Absolute fit measures were analysed, the Model 1 fits the data very well as indicated by the values CMIN/df = 0, RMSEA = 0.48 and GFI = 1.00. The Model 1 consisted of seven constructs viz. Severity, Frequency, Duration of Adversity, Protective and Promotive factors, Achievement and Flourishing which contributed to 48% of variance in Resilience, which was indicated by SMC = 0.48.

In Model 2 along with the seven constructs, Resistance was included, to see the role of Resistance towards Resilience. Another important aspect observed was that all the seven constructs are mean scores derived from the raw scores but Resistance is a formula derived Index (which is a ratio of Adversity & Operating Factors). The purpose of including Resistance in Model 2 was to see if a formula derived Index would bring about any change worth observing. The Incremental fit measures for Model 2 i.e., CFI and NFI both accounted a value of 0.99, thereby indicating the Model 2 to be a good fit model. Similarly the values of CMIN/df, RMSEA and GFI (are 2.29 0.08 and 0.98 respectively are) indicated the adequacy of Model 2 is good. Model 2 after the inclusion of Resistance, contributed 82% of variance in Resilience as represented by SMC = 0.82

In Model 3, only Resistance, Protective factors, Achievement and Resilience were retained. The reason of retaining these variables was to focus on variables that showed a significant path towards Resilience (as observed by Path Analysis) thereby making Model 3 more focused and deductive. The Incremental fit measures of Model 3 as indicated in table 4.19 are CFI = 0.99 & NFI = 0.99 indicated Model 3 to be a good fit model to the data.

The Absolute Fit measures for the Model 3 are CMIN/df = 2.28, RMSEA = 0.08 & GFI = 0.99. These Absolute Fit measures also indicate the goodness of fit of Model 3. While observing the strength of the Model 3, it can be seen that the chance of Model 3 contributing towards Resilience has reduced by 1% i.e. from 82% (SMC = 0.82) (Model 2) to 81% (SMC = 0.81) (Model 3). However, the contribution of Resistance, Protective factors Achievement (Model 3) towards variance in Resilience was still as high as 81%.

Model 4 (the final model) retained the same variables of Model 3 viz. Protective factors, Achievement, Resistance and Resilience and included a path from Protective factors to Resilience. The Incremental fit measure of Model 4, as depicted in table 4.19 are CFI = 1 & NFI = 0.99, indicated Model 4 to be good fit model. The Absolute fit measures for Model 4 are CMIN/df=0.38, RMSEA = 0.00 & GFI=0.99, which indicate that the Model 4 is good fitting model especially the value of RMSEA = 0.00 is indicative perfect model.

Table 4.19

Values of Measures of Fit and the Measures of Strength for all the four models

	Measures of Fit					**Measures of Strength**
	Incremental Fit		**Absolute Fit**			
	CFI	NFI	CMIN/df	RMSEA	GFI	SMC
Model 1	1.00	1.00	0	0.48	1.00	0.48
Model 2	0.99	0.99	2.29	0.08	0.98	0.82
Model 3	0.99	0.99	2.28	0.08	0.99	0.81
Model 4	1.00	0.99	0.38	0.00	0.99	0.81

CFI = Comparative Fit Index, NFI = Normed Fit Index, CMIN/df = Normed Chi Square, RMSEA = Root Mean Square Error of Approximation, GFI = Goodness Fit Index and SMC = Squared Multiple Correlations

The adequacy of Model 4 was very good & Model 4 accounted for 81% variance in Resilience (SMC = 0.81). All the four Models were representing the dimensions of the Synergy Model of Resilience (Hariharan & Rana, 2017).

Therefore, using the Structural Equation Model for testing the Synergy Model of Resilience was fulfilled. As part of SEM, Path Analysis, Measures of Fit and Measures of Strength, all the 4 Models & the path of the variables towards Resilience resembled the route of the dimensions Adversity, Operating factors and Outcome factors towards Resilience.

All the Models significantly contributed up to 82% of variances in Resilience. However, the Path Analysis added a new aspect to the Synergy Model of Resilience. In other words, the Synergy Model of Resilience stopped at Outcome Factors, but while testing the model using SEM it was found that the model extends to Resilience as a final product. Thus, the revised Synergy Model of Resilience is presented in Figure 4.5

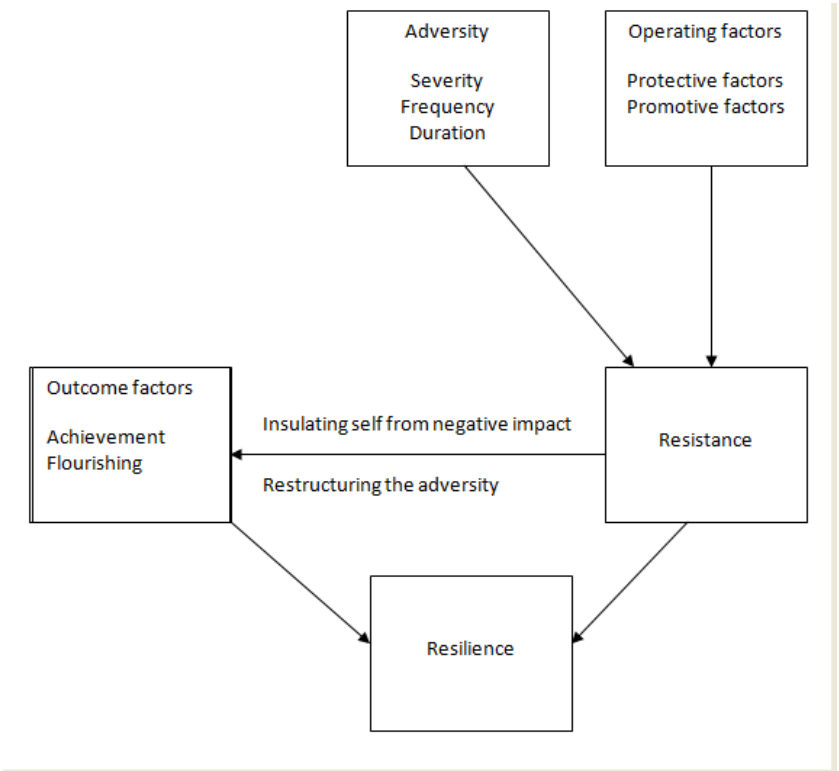


Figure 4.5 Revised Synergy Model of Resilience

The Revised SMR depicts that Adversity (along with its three sub dimensions of Severity, Frequency, and Duration) interacts with Operating factors which are inclusive of Protective (internal) and Promotive (external) factors to produce Resistance. This Resistance was the power thrusted to alleviate the negative impact of Adversity, using one's internal & external resources. In the face of Adversity, how the Protective and Promotive factors act as a buffer to alleviate or fight negative impact of adversity, is denoted as Resistance.

It was observed from Path Analysis, that Protective factors had a significant route to Resistance and Promotive factors got discarded for not having significant path estimates. In addition, inclusion of Resistance in the Model 2, 3, 4 increased the contribution to variance in Resilience up to 82%. Thus, it can be comprehended by the results of SEM that Resilience is a product of complex interactions between multi dimensions like Adversity, Operating factors, Outcome factors and Resistance. A significant contribution is that Resistance played a crucial mediating role in measuring Resilience, as proposed and postulated in Synergy Model Resilience (SMR). Hence, the data successfully validated the SMR using the SEM modelling.

4.3. Empirically verifying the composition of Resistance

The role of Resistance in the product of Resilience was validated through SEM, but there is a need to validate Resistance itself because Resistance as proposed by the SMR is the buffer that an individual uses (in the face of adversity) to reduce the negative impact of the adversity while using one's internal (Protective) & external (Promotive) resources. In the formula too, the Resistance is calculated as a ratio between Adversity and Operating factors. This is required to be validated if the data also predicted Resistance in this manner. For this purpose, Hierarchical Regression Analysis was used. The results are presented in table 4.20. From the table, it can be seen that there are two Models viz. Model 1, consisted of Adversity

(with its 3 sub dimensions) and in Model 2 consisted of Adversity and Operating factors (with Protective & Promotive factor)

The Model 1 with the predictor of Adversity was significant F (1,208) = 225.80; p<0.01 and explained 52% of variance in Resistance. In Model 2, in addition to Adversity, Operating factors was entered. Model 2 was significant F (2, 207) = 442.90; p <0.01 and explained additional 29% of significant variance (ΔR^2 = 0.29, p<0.01) amounting to a total of 81% of variance in Resistance. Thus Adversity (β=0.91, p<0.01) & Operating factors (β = 0.57, p<0.01) together in Model 2 are significant predictors of Resistance.

Table 4.20

Hierarchical Regression Analyses for Adversity and Operating factors predicting Resistance.

Model & Predictor variables	R	R^2	ΔR^2	β	t
Model 1	0.72**	0.52**			
(C = 247.86, F = 225.80)**					
Adversity				-0.72	-15.03
Model 2	0.90**	0.81**	0.29		
(C = 117.49, F = 442.90)**					
Adversity				0.91	-28.43
Operating factors				0.57	17.80

*C = Constant, F = ANOVA, ΔR^2 = R^2 change, β = Standardised Beta Coefficient, ** = p<0.01*

Results presented till now described the quantitative and statistical method of validating of the Synergy Model of Resilience and REST Battery. The following section would be describing the qualitative method taken to validate the Synergy Model of Resilience and REST Battery.

5. Qualitative Analysis

Using the method of semi structural interview, qualitative data was collected from a sample of 10 participants with a help of an interview schedule. Out of the ten participants, five participants were a sub sample drawn from the Testing group (N = 205), who had a

Resilience Index (RI) more than 100 (the theoretical cut off proposed by Synergy Model of Resilience). The other five participants were those who were socially acclaimed resilients.

The purpose of including this group was to cross verify if the high scores on RI are corroborated with a qualitative narration of their life. The process of qualitative analysis of the information collected through semi-structured interviews is described under the following heads.

5.1. Inter-rater Thematic Analysis

The purpose of checking the inter-rater verification was to minimise the researcher's bias. The following procedure was adopted.

The audio recorded interviews were hand written into transcripts, read & re read. The researcher identified the protective factors and the promotive factors mentioned by the participant in the interview. These factors were coded accordingly by specifically naming the protective and promotive factor. The transcripts were then given to an independent researcher who also read and re-read the contents and analysed the same.

The thematic analysis of both the investigators (main researcher and supporting investigator) were compared to identify the points of disagreement. Wherever possible the points of disagreements were discussed and resolved table 4.21 depicts the themes and content coding and the agreements and disagreements between the two independent researchers.

Table 4.21

Themes and codes of the Contents of Interview of ten participants, inter-rater agreement (✓) and Disagreement (X)

Sno.	Themes	Cases									
		1	2	3	4	5	6	7	8	9	10
	Protective factor										
1.	Clarity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Patience	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Positive thinking	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Healthy expression of emotions	✓	✓	✓	✓	✓	✓	X	✓	✓	✓
5	Sense of Humour	✓	✓	X	✓	✓	✓	✓	✓	✓	✓
6	Apply knowledge	✓	✓	✓	✓	✓	✓	X	✓	✓	✓
7	Self confidence	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Accepting strengths and weaknesses	✓	X	✓	✓	✓	✓	✓	✓	✓	✓
9	Hopeful	✓	✓	✓	X	✓	✓	X	✓	✓	✓
10	Enterprising	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11	Self efficacy	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
12	Value driven	X	✓	✓	✓	✓	X	✓	✓	✓	✓
13	Optimistic	✓	X	✓	✓	✓	✓	X	✓	✓	✓
14	Better communication	X	✓	✓	✓	✓	X	✓	✓	✓	✓
15	Faith in Supernatural	✓	X	✓	✓	✓	X	✓	✓	✓	✓
16	Creative problem solving	✓	X	✓	✓	✓	✓	✓	✓	✓	✓
17	Energetic	X	✓	✓	✓	✓	X	X	X	X	X
18	Perception of others' emotions	✓	✓	✓	X	✓	✓	✓	X	✓	✓
19	Having a purpose in life	✓	✓	✓	✓	X	✓	X	X	X	✓
20	Disciplined	X	X	✓	✓	✓	✓	X	X	X	✓
21	Self awareness of one's emotions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22	Enjoy a work	✓	✓	✓	✓	X	✓	X	✓	✓	✓
23	Appropriateness of thinking and behaviour	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Promotive factors										
1	Health care accessibility	✓	X	X	X	✓	X	✓	✓	✓	✓
2	Family togetherness	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Outside family support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Friends support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Financial ease	✓	✓	✓	✓	✓	X	✓	X	✓	✓
6	Democratic parents	✓	✓	✓	✓	✓	✓	X	✓	✓	✓
7	Parental support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
8	Accessibility to emergency services	X	X	X	X	✓	✓	✓	✓	✓	✓
9	Spousal support	✓	✓	✓	✓	✓	✓	X	✓	✓	✓
10	Disciplining parents	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
11	Community support	✓	✓	X	✓	✓	X	✓	✓	✓	✓
12	Neighbourhood support	✓	✓	✓	✓	✓	X	✓	✓	✓	✓
13	Institutional affiliation	✓	✓	X	X	✓	✓	X	✓	✓	✓
14	Having a role model	✓	✓	✓	✓	✓	✓	X	✓	✓	✓

As noticed in table 4.21 a total of 37 codes indicating specific contents emerged. There are 23 codes under Protective Factors and 14 under Promotive Factors. Inter rater 100% agreement was observed in 11 codes (across cases) out of 37 codes while disagreement was there in 26 cases.

5.2 Case Summaries

Consolidated case summaries were prepared after thorough reading and understanding of the transcripts of the interviews. Some case summaries gave an insight into the process of resilience by observing the narration of their life experiences. While presenting the cases pseudonyms were given to participants to maintain confidentiality. Following are the case summaries of ten participants that give a comprehensive and concise descriptions of their life experiences.

Case summary 1: Ms. P.

She is 39 years old. She was a State Level Cricket Champion, until she met with an accident that left her paralysed neck below (quadriplegic) after having a severe spinal cord injury. She faced subsequent adversities after that too, which included the death of her father and a critical surgery of her mother. These adversities occurred within a year's span of her spinal cord injury. She said the frequent and severe adversities left her completely dejected. However, she stated that it is her grit and determination to shape her own future that helped her beat all odds. She also recognised her mother as her source of inspiration and support, on whom she is completely dependent even for her basic needs (feeding and emptying her bowels). Despite facing and continuing to face adverse physiological problems (due to her quadriplegia), dependency, and social discrimination, she completed her Master's Degree and is pursuing her PhD. In addition to these endeavours, she runs an NGO for people suffering spinal cord injury. She is supporting more than 500 people with spinal cord injury with a

monthly stipend program and distribution of wheel chair and essentials. She stated that she started working for people like her because ‘we too deserve a dignified life’. She is recipient of a number of awards from State (Kalpana Chawla Award by Tamil Nadu Govt.) and various other philanthropic societies like Lion’s Club and Femina. Her Resilience Index score was 152.09.

*Case Summary 2:*Mr. J

He is 36 years old. A fatal accident left him quadriplegic (neck down paralysed). He was facing dejection, frustration of being dependent for even basic needs. However, he stated that his parents and wife were of immense support for him to battle dejection and live a life of dignity and happiness. His resolve to focus on the positive helped him think of solutions instead of problems. This made him focus on muscles that support him rather than muscles that did not support. In this way, he strengthened them and with the help of professional coaching of three years, he qualified himself in Paralympics and won National Silver medal in swimming for India. While pursuing his passion, he was also serving as Director of a multinational company in Chennai. He strongly believed that despite any type of severe adversities is the innate nature of the human being is to fight it and excel in whatever one is good at. He also stated in so many words that his adverse condition created an opportunity for him to excel. This is a good example of coping by using the strategy of Positive Reappraisal. His score on Resilience Index was 186.93

*Case Summary 3:*Mr. A

He is 39 years old. He is a survivor of communal (caste) clash that happened when he was 13 years old. In the same clash his family was brutally attacked to death. He had to flee the violent scene to protect his life. He states that he was left with nothing but his life. It was at this moment that one of the government school teachers fostered him. He regarded this

teacher as his father figure, mentor, and role model. After facing such a trauma in his adolescence, Mr. A says he has no inclination to live. However, it was his teacher who played a pivotal role in making him rise and excel. With such a motivation he started preparing for UPSC exams and cracked it in the first attempt. Mr. A stated that even then the caste card played against him in humiliating him. He state that his determination, diligence, perseverance, and his teacher's support made him ready to fight his traumatic past and turbulent present. Despite facing such ordeal, he now has crafted his excellence and is serving as a District Collector (I.A.S.) of one of the prominent districts of Tamil Nadu. He scored 155.41 on Resilience Index

*Case Summary 4:*Ms. K.

She is 42 years old. Ms. K had a very rough childhood. Her mother was one of the sex workers. She grew up in the brothel house along with other children of sex workers after the death of her mother. She was then rescued and rehabilitated by one of the Christian Missionaries and given a life of dignity. During her adolescence, she understood what it is to be born to a sex worker. She developed suicidal ideation because of disgust and shame. It was at this juncture that her teacher supported her and helped her see beyond her past. She encouraged Ms. K to study and restructure her present with her hard work. All her humiliation, feeling of anguish, disgust, and shame, she channelized into preparing for UPSC exams. She relentlessly persevered her ambition and qualified I.R.S. and is serving as a Revenue Officer in Karnataka. She stated that the care, affection, and warmth that she received from her teacher compensated for the loss of love and respect. She states that it is her hard work, patience, and gratitude that helped her restructure her identity and earn herself a dignified life and made her a person of love and care. Her score on Resilience Index was 148.33.

Case Summary 5: Ms. Y.

She is 58 years old. She narrated that she had a very wonderful and happy childhood with her most beloved parents and three brothers. However, through her growing years, in her adolescence, she realises that her three brothers were suffering a fatal ailment called 'Thalassemia'. She understood that their life span was very short. She says she put efforts to cheer every day of theirs' but the impending death was traumatising. In a span of three years, she lost her three brothers. She was the only child left for her parents. She overcame grief by consoling and being a support for her parents. She stated that this huge loss developed in her a disinterest in everything, until one day when she converted all that angst into academics. She emphasised that with her determination she resisted the grief and indulged in academics, and topped the University and completed her PhD and worked her way to become the Principal of one of the leading chains of International schools in Telangana. However, another adversity struck her – she was diagnosed with Cancer. She found a great support in her husband who stood by her like a pillar in her journey of Cancer treatment. She completely restructured every thought, word and action into strong optimism. She endured the painful ordeal with her positivity, strength and spousal support. After two years of battle she is Cancer free and back to being the dynamic principal and a recipient of various awards sponsored by the State and other agencies. Her Resilience Index was 160.01.

Case Summary 6: Ms. S

She is 39 years old. She belonged to a family of nine siblings who were all taken care of single handled by their mother. Since the time she lost her father when she was eight years old, she has seen her mother struggle and this impacted her. The family faced poverty and starvation on a daily basis. Abject poverty made the family suffer malnourishment. Living in such circumstances as a child she wished a better life with basic needs and respect. With

focus, goal oriented behaviour and determination to succeed she excelled in academics and completed her PhD. Through this ordeal, she was supported by her mother, whom she calls her role model. She also received support and guidance from teachers through her academic journey. Surviving poverty and starvation since childhood, her patience and perseverance and her mother's support helped her excel in life and secure a future for her family. She was able to excel, and is now working as a Professor in Australia. Her mother and brothers are running a business of import and export of spices. According to her, the ability to focus, application of knowledge, sustained efforts, vicarious learning and having a role model mother has helped her not just overcome but excel in the face of adversities. She scored 144.99 on Resilience Index.

*Case Summary 7:*Ms. PR

She is 39 years old home maker. She described herself as a very cheerful girl since her childhood and had very caring and supportive parents. During her early childhood, she met with a fatal accident that resulted in a very severe head injury and damage to the body. Her recovery from that condition took about 8-10 months. After this incident it was time to write her final degree exam. The accident followed by the series of surgeries led to a lot of body shape issues, social criticism, low self esteem and paving a path for a disinterest in life. However, she drew all her strength from her ability to manage her emotions, from her supportive parents and friends. Amidst such pain and discrimination she prepared for her final degree exam and secured the Gold medal in the University. Overcoming that adversity did not end her plight. The diagnosis that she was infertile initially shattered her. But her husband was a great support and convinced her for adopting a child. According to her understanding the importance of life and appreciating life helps her break social stigma and be grateful for the support she receives from her people in her life. Her Resilience Index was 116.16.

*Case Summary 8:*Ms. B

She is 26 years old. She narrated her childhood as a very sad and lonely one. Her parents had severe marital conflicts and she was a witness of it since her childhood. Her mother's alcoholic behaviour worsened the condition and she was completely neglected by her parents. She was put in a residential school, which made her completely sad and she started seeing herself as a failure. During her stay in the residential school, she found a very good friend who made her life cheerful. She recollected that her friend helped her find her passion, i.e. swimming. What they started as leisure became Ms. B's passion. With constant support of her friend, her perseverance, and goal oriented behaviour helped her achieve heights in swimming. The anger and sadness that she experienced in her childhood, was diverted to her swimming activity in the pool. With this she spiked to the level of State and National level swimming champion. From seeing herself as a failure, she has risen herself to a level where she is an inspiration to others. Her score of Resilience Index was 108.36

Case Summary 9: Ms. SH

She is 39 years old. She lost her husband at a very young age and had to take care of her two daughters single handedly. One of her daughter's was mentally challenged. Taking care of two children with a meagre income, with no social support, pursuing her twin Masters degrees, and a job was a daily struggle. She felt that compared to this daily struggle what was unbearable was the death of her daughter who was mentally challenged. She was in complete distress after losing her daughter. She felt that she had to live for her other daughter. Amidst such adversities, she embraced a spiritual path. This helped her to be emotionally strong and courageous helped her achieve a distinction in both her Master's degree and get a good job with handsome salary. According to her facing adversities like the death of her close ones,

financial and emotional crisis and other stress, her spiritual strength and her values brought her happiness, success and courage. For her the Resilience Index was 157.19.

*Case Summary 10:*Ms. H

She is 23 years old. She had a very tough childhood, being brought up by a single parent (mother). The death of her father and sibling made her completely dejected. Such a loss made her sad, lonely, and lifeless. Further, when she experienced an unsuccessful relationship it left her even more dejected leading to suicidal ideation. It was during these tough times that her spiritual teachings, support and care from her mother and friends helped her cope with her negative emotions and channelize them towards academics and artistic capabilities. This made her achieve laurels in both fields at State level. According to her the ability to creatively solve problems made her insightful about achieving even when adversities surface. She scored a Resilience Index of 172.83

The case summaries reflect the unique journey of Resilience of each of the participants. The five participants who are socially acclaimed as Resilient (Case summaries 1 to 5) and the five participants (Resilience Index >= 106.82) from the Testing group (Case summaries 6 to 10) all of them reflected the interplay of the internal and external factors (Protective and Promotive factors – Operating factors). The common denominator in these cases indicate that though the operating factors were present in the individual and the environment, they did not result in any achievement until the person identified, developed/ nurtured and worked on these factors. This points at the Resistance factor.

Further it is of importance to notice that in all the cases of socially acclaimed resilients the RI score indicated high resilience. Similarly, in those cases of participants constituting the subsample selected because of high RI score, the narration of their life and success also indicated the presence of significant adversities, and use of operating factors to

become successful. This is one strong indication validating the REST Battery and Hariharan-Rana Synergy Model of Resilience

.

DISCUSSION

The objectives of the study were to

1. To evolve a testing tool to measure the variables along the lines of Synergy Model of Resilience and validate the same
2. To evolve and apply a formula to derive a Resilience Index
3. To categorise participants based on their Resilience Index
4. Empirically test Hariharan-Rana Synergy Model of Resilience

The trajectory from evolving the testing tool to testing the model involved several steps. This included, carefully filled knowledge gaps, adherence to methodological framework, conforming to logical sequence in evolving mathematical model, matching the process and the product with the Synergy Model of Resilience at various stages, using the scores in classifying the sample and finally supplementing the quantitative data with that of qualitative for double-checking the validation process. The study finally was successful in validating the Resilience Test (REST) Battery and revising Hariharan-Rana Synergy Model of Resilience by adding one more step to the original model. Discussion in the following paragraphs brings into focus all the above.

Nowhere in the literature a comprehensive measurement of Resilience could be found. Resilience studies approached the problem from specific contexts of adversities. The studies projected adversities in the context of physical deformity/handicap (Hariharan, Karimi, & Kishore, 2014), childhood adversity, deprivation and threat (McLaughlin, Sheridan, & Lambert, 2014), illness (Ghanei Gheshlagh, Sayehmiri, Ebadi, Dalvandi, Dalvand, & Nourozi Tabrizi, 2016), social discrimination (Brown & Tylka, 2011), poverty (Barua, Katyaini, Mili, & Gooch, 2014), exposure to specific trauma such as terror attacks/natural calamity (De Sousa & Shrivastava, 2015), exposure to violence (Tsirigotis, & Łuczak, 2018).), childhood

abuse (Yule, Houston, & Grych, 2019), parental mental illness (Fraser & Pakenham, 2009), and parental alcoholism (Chassin, Carle, Nissim-Sabat, & Kumpfer, 2004).

However, the major gap in these studies was that while identifying resilience as achievement despite the specific adversity, the possible accompanying adversities were ignored. It is highly possible that among the children of alcoholic parents some faced additional adversity of economic deprivation, nutritional deprivation while some other encountered regular conflicts between the parents and yet others were subjected to domestic violence or sexual exploitation. Thus, research that focused on a single adversity could have missed out on the accompanying stressful events that significantly contribute to the outcome.

This major gap was filled by the comprehensive approach to the measurement of adversity that this study adopted. Further, this study significantly contributed in another way. By adopting a contextual approach the past studies have been successful in identifying resilient individuals from among certain specific categories of deprived population. Resilience is assumed to be present in some degree in every individual (Mejia-Downs, 2017) depending upon the ratio between the adversities and performance. Going by this, there should be a means of measuring the degree of resilience in every individual. This study opened up a scope for this. One unique contrast between the present study and some of the past research is the format of the measurement tools used in the test battery. Some of the existing standardised tools like Connor Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003), Resilience Scale for Adults (Friborg et al., 2003), Devereux Adult Resilience Survey (DARS) (Mackrain, 2007), and Southern Kennebec Healthy Start Resilience Questionnaire, (Rains & McClinn, 2013) are found to have hypothetical statements as items to which the participants have to respond. These responses are scored for measuring resilience. One major shortcoming of such tools is the possibility of response to every item irrespective of whether one faced such situations in real life, in other words the

tools consist of hypothetical and assumed items. For example the items like, “I tend to bounce back after illness, injury, or hardship” and “I can deal with whatever comes my way” (from Connor Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003), “I know I will succeed if I carryon”(from Resilience Scale for Adults (Friborg et al., 2003), “I try many different ways to solve a problem” (from Devereux Adult Resilience Survey (DARS) Mackrain, 2007) and items like “I believe my father loved me when I was little” (from Southern Kennebec Healthy Start Resilience Questionnaire, Rains & McClinn, 2013). This puts the validity of the tool in question.

Contrarily, the tools used in the present study requires the participants to identify those items that are relevant to one’s experience in real life and respond in terms of the duration and frequency of the exposure and respond with a subjective rating of its seriousness/severity. Similarly, the Protective factor scale and the Promotive factor scale requires the participant to identify those factors present in oneself or one’s environment and rate their significance. This takes out the hypothetical nature of the items and takes into account only those factors in the participant’s repertoire. Apart from these measures, the validity was put to further test by comparing the resilience index of a sub-sample with the qualitative data. The high scorers were interviewed about their life adversities and the manner in which they circumvented those. The narratives clearly pointed at the presence of certain protective and promotive factors which facilitated their achievements. Another method adopted to verify the validity of the measurement battery was to administer the REST battery on a small sample of persons who were identified as resilient individuals for their accomplishments even in the face of adversities. The REST battery indicated high Resilience Index for these persons. Having stood these rigorous evaluation, the REST Battery, perhaps can be claimed to be one of the measurement tools that enjoys high validity.

The validity and reliability of the REST battery are put to vigorous testing by complying with all methodological requirements. The Resilience Index derived from the formula was correlated with the scores of three standardised scales to test the convergent, divergent and concurrent validity. The results indicated satisfactory values confirming the validity of the scale. Review of literature on resilience tools suggested that many studies that measured resilience did not provide the psychometric properties of the tools used (Windle, Bennett , Noyes, 2011; Sharifi, 2016; Salisu & Hashim, 2017; Jongen, Langham, Bainbridge, & McCalman, 2019).

Windle, Bennett and Noyes (2011) in their review found that out of the nineteen scales only three i.e. only 15% qualified for establishing psychometric properties. Sharifi (2016) after reviewing 36 tools measuring community resilience on six criteria of assessing multiple dimensions of resilience, accounting for cross scale relationship, addressing uncertainties, capturing temporal dynamism, developing action plans, and participatory approaches. It was found that the tools failed to adequately reflect the dynamic nature of resilience, heavily neglected the cross scale relationship, and were not potent enough to deal with future uncertainties. Salisu and Hashim (2017) after their review found Connor Davidson Resilience Scale, Connor Davidson Resilience Scale 10 to have better psychometric properties. Jongen et al. (2019) through their review of 20 scales measuring constructs of resilience found that only 75% - 80% of the scales attempted to establish reliability and validity. Such major criticism of the methodological research in the field of resilience makes measurement of resilience even more bleak.

The present study has successfully filled this major gap by adopting robust methods for establishing the validity and also the reliability of the REST Battery. The test-re-test method adopted to examine the reliability of the battery gave a statistically significant value. This completed satisfactory evaluation of the psychometric properties of the REST battery used to

measure the resilience. Based on this it may be concluded that the study met the objective of evolving a scientific and comprehensive measurement tool to quantify resilience in individuals.

After developing and validating a suitable tool to measure resilience, method to culminate all the measured factors and calculate the Resilience Index was evolved. Ever since the conceptualization, the construct of Resilience suffered an identity crisis for want of a standard set of variables that explain and measure the construct in its totality. However, various studies were able to measure resilience specific to different contexts. This would be like measuring Intelligence, Emotional Intelligence or Development in a manner that befits only in a context. Therefore, there was a need to visualize measuring resilience as a 'context free' phenomenon. Majority of past research considered the context as adversity of a specific nature (Ex: Being orphaned or suffering a physical handicap) and resilience was construed as surviving the adversity.

There are also other researchers who included stress experience (Ex: subjected to humiliation/ violence, having to starve, facing financial problems). Individuals who manifested good performance amidst these adversities were identified as resilient. This opened a wide scope for including persons with average performance under average adversities into the realm of resilience, those who faced humiliation on specific occasions, those subjected to starvation or financial crisis on one or two occasions lasting for a short while. All these scenarios were recorded as the presence of adverse experience or stress.

Since adversities are common to every human being in some form or the other at some point in life or other, there is a need to identify adversities encountered by resilient individuals as distinct from that of the others. The first step was to exclude the daily hassles and include those adversities that have the characteristic of a significant stress event in life.

This took care of excluding those individuals who have not encountered an adversity in terms of a life event. Excluding the normal developmental hitches from the studies of resilience is endorsed by Rutter (2013). He was of the opinion that reasonable risks at different stages of life is part of development. The question of resilience or its absence arises only in the context of encountering major obstacles, stress or threats from the environment. Luthar et al (2000) referred to it as 'significant adversity'.

The next challenge was that the impact of adversities varies depending upon the individual's appraisal of the stress or adversity, the duration of exposure and the frequency of their occurrence in life. While duration and frequency are objective measures of the individual's appraisal, degree or severity, though subjective was thought to be an equally important phenomenon. This subjective factor depends upon the individual's pre-disposition to respond to the adversity. The significance of this subjective factor was supported by Boxer and Sloan-Power (2013), in the context of resilience among children. They argued that appraisal of the stressful event not only determines the coping with the stress event but also the performance in the aftermath of their encounter with the stress. According to them, it is the appraisal that determines positive or negative forms of coping response. Positive form of coping contributes in protecting the individual from the harmful impact of the adversity while negative form of coping may cast an adverse impact by worsening the situation and creating additional stress. They also emphasised on the duration of exposure to stress to be taken into account. Thus, it is the individual's pre-disposition (which is an internal factor) that is assumed to influence the perception of the external adversities, determining the coping behaviour.

The appraisal process may also involve identification of unused resources in the external environment (which could be material resources, social support or an opening of an opportunity) that may contribute to positive coping. Thus, the presence of positive factors not

only within the individuals but also external to the individuals. Ungar (2013) described resilience as an opportunity provided to the individual by the environment. It implies that not everyone has the predisposition to identify the opportunities. It takes certain internal characteristics to identify, endorse and utilise the presence of positive aspects in an environment dominated with adversities.

Ungar (2015) in the context of resilience among the youth referred to their use of 'own resources, informal services and formal services' in three stages of coping with adversities. While own resources are internal characteristics the other two, viz use of informal and formal services refer to positive external factors that aid in the individual's coping. The present study identified these two types of positive factors as Protective Factors and Promotive Factors combined into Operating Factors. As implied in Ungar's observation, the two factors are mutually complementing. The protective factors or the predisposition of the individual help the individual appraise the external adverse environment along with the positive aspects or opportunities present in the adversity itself. This enables the individual to cope effectively with the adversities and have a productive outcome.

Boxer and Sloan-Power (2013) referred to positive coping as an outcome of the appraisal of the stress. Barnová & Gabrhelová (2017) talked about effective coping among resilient persons because of 'cumulative effect' of a good balancing between the risk and protective factors. The Synergy Model referred to the possible interaction between the adversities and the Operating Factors. Richardson, Neiger, Jensen, & Kumpfer (1990) discussed the possible buffering effect caused by the protective factors by interacting with the adversities. Many researchers (Constanine, Benard, & Diaz, 1999; Smokowski, Reynolds, & Bezruczko, 1999; Baruth & Caroll 2002; Afifi & MacMilan, 2011; Muller, Dodd, & Fiala, 2014; Dias & Cadime, 2017) used the term 'protective factors' to refer to both internal characteristics and environmental protectors.

This study gave separate identity to the internal and external factors for the convenience of the respondents and then used them in combination while quantifying. While Richardson visualised the interaction between the adversities and the protective factors, there have been other studies suggesting interaction between the genes and the environment. (Cicchetti & Rogosch, 2012; Bowes & Jaffee (2013). While genetic and environmental interaction needs to be probed more intensely through multidisciplinary research, it is also important to focus on individual – environment interaction from psychological perspective. Luthar et al. (2000) stated that resilience is the result of interaction between individual and environment. In the present study, the 'individual represents the protective factors and the environment refers to the 'adversities'. There are other researchers who were suggestive about the interaction between the adversities and the protective factors.

The present study expanded on the idea of the model proposed by Richardson (2002) viz. The Metatheory of Resilience and Resiliency where the internal factors interacted with the adversities and created a buffer. Hariharan-Rana Synergy model combined this concept with that of Rutter (1999) who proposed the operation of resistance. The Synergy Model postulated that resistance is a by-product of the interaction between the operating factors and the adversities playing a significant role in determining the resilience of the individuals. This demanded a mathematical formula in place.

One of the significant contributions of this study is the evolution of mathematical model in measuring resilience. If the construct of resilience is complex and involves adversities, protective factors and promotive factors as the basic factors with their interactive operation, and the outcome of this interaction is resistance, which enables the individual's high achievement and flourishing in life, then it is the ratio between the resistance and achievement that determines resilience. Structuring this logical sequence into a mathematical model was the next task in the study. The model was applied in evolving the indices for every

participant. In order to culminate the scores from all these individual scales, a complex mathematical formula driven approach was used. This not only calculated the individual's obtained score but relatively saw it in tandem with the ideal score of a given sample (denoted as 'weights' in the current study). The formula requires a precursor study (modelling study) for calculating the weights followed by the main study (testing study). Wherein the weights from the precursor study are used in the main study. Weights are required to be sensitive and representative of the demographics of the sample studied. So that when they are used in the main study sample, the demographics of both the study are homogenous, and the results calculated are cohesive and reliable. This was one way of effectively handling demographic variations that may occur when different samples are studied in future.

The trajectory of the model followed the chronology of using the scores of the seven variables in the REST Battery, identifying the weightages for every variable from the data set, deriving the Resistance Index, using with the Outcome Index (A combination of Achievement and Flourishing) to arrive at the Resilience Index. The development and application of mathematical model in measuring Resilience is one of the unique contributions of this study. By applying the mathematical model the Resilience Index could be derived as a composite score. Resilience Index took into account the life adversities (with their three essential dimensions), presence and operation of positive factors within the individual and out in the environment, the achievements of the individual despite the presence of adversities and the extent of flourishing the individual could enjoy despite the adversities/life stress. The fact that the mathematical model could put them together numerically, following logical sequencing indicates that the study could meet the objective of evolving and applying a formula to arrive at Resilience Index.

The developed REST Battery and the mathematical model to derive Resilience Index were used in sample. The study recruited participants from the general population. The REST

battery was administered on adults from some of the major cities in India. The sample was not from any category of population suffering from any typical deprivation or disadvantage. They were the sample who possibly encountered various adversities in their lives. This enabled the tool to measure resilience in normal population. The results showed a wide variation in resilience index of the sample, confirming the presence of resilience in various degrees among the population.

One of the significant findings of this study is to use the resilience index for classifying the participants into categories. If the past researchers endorsed the presence of resilience in varying degrees among the population depending upon the adversities encountered and the achievements accomplished by using the protective and promotive factors, it should be possible to place them on a continuum. Levels of resilience was endorsed by Hunter (1995), who conceptualised resilience on a continuum between two poles. On one hand, there was less optimum resilience and on the other hand, there was optimum resilience. Less optimum resilience denoted survival tactics, sometimes even maladaptive behaviours like social and emotional withdrawal. Optimum resilience denoted achievement, growth, and wellbeing.

Theoretically, researchers in the past did refer to the levels of resilience (Richardson, 2002; Siebert, 2006). However, there has not been evidence of empirical measurement of any classification. The present study could successfully classify the sample based on their resilience index that was further treated with decile cut off points. By categorising the sample into ‘non-resilients, survivors, and resilients it has created a scope for planning interventions suitable to each group. Non-Resilients are those who score very low on resilience index. A major proportion of participants come under this category, which is a reflection of their existence in the population. The percentage of sample under the Survivor and Resilient category also almost reflects their proportion in the population.

There are other studies which have seen the prevalence of resilience in a population as well. Hariharan (1990) in her study found the prevalence of resilients as 3% in a given population while studying resilience in disadvantaged children. Koen, Eeden, and Wissing (2011) studied the prevalence of resilience in professional nurses using the Resilience Scale (Wagnild & Young 1993). Prevalence of resilience was 43%, which was found by the method of normalising the mean scores of the instruments—resilience scale, mental health continuum, coping self efficacy scale, sense of coherence scale, adult dispositional hope scale, life orientation test, and general health questionnaire. Then the total value of normalised mean scores was expressed as a fraction between 0-1. The cut off 0.6 indicated resilience. Thabet, Tawahina, Punamaki, and Vostanis (2015) studied the prevalence of resilience in children. Results revealed that prevalence of resilience is 25% among children. Mekhaemer (2002) studied resilience, and measured it using Resilience Attitude Scale. Resilients were identified by constructing a cross tabulation of trauma and symptoms of PTSD. The group having high level trauma and absence of PTSD were identified as resilients, which comprised of 25%.

This suggests that the present study has been successful in using the derived Resilience Index in identifying and categorising the sample into three groups. Thus, it meets the objective of classifying the people on the basis of resilience scores.

Transition from a theory or model to empirical enhances the value of the theory/ model. However, such transitions are rarely found in resilience research. In the current study, the Synergy Model of Resilience is tested with empirical evidence gathered by REST Battery. Synergy Model of Resilience described resilience in a holistic manner however; the understanding was on a theoretical basis. To test this theoretical base, REST Battery was developed to obtain empirical evidence. This was analysed using the Structural Equation

Model (SEM), which is one of the major statistical techniques used to test theories and theoretical prepositions.

In the process of testing the Synergy Model of Resilience, with the help of SEM and path analysis, four models evolved. All the four models found that there was a bidirectional path among the dimensions of the factors. For instance, the bidirectional path seen among the three dimensions (severity, frequency, duration) of adversity, and between the two dimensions (achievement and flourishing) of outcome factor. This indicated that the dimensions (severity, frequency, duration, achievement and flourishing) are consistent and belong to their main factor which is adversity and outcome factor respectively.

However, there is an interesting finding, the dimensions viz. Protective factors and Promotive factors of the Operating factors did not have a bidirectional path. This clearly explained that though one's internal (protective) and external (promotive) factors operate together with the intention to help the individual, each of them have an independent and orthogonal nature of their own.

Among the bidirectional pathways, there was a bidirectional path found between the dimensions of Adversity and the Protective and Promotive factors. This endorsed the Buffering Model of Resilience which stated that one's internal and external resources interact with one's adversities and risks.

In its attempt to empirically test Hariharan-Rana Synergy Model, the study identified one minor gap in the model. The results of SEM paved way for revising the model. Previously, the Synergy Model of Resilience stopped at the outcome factors, whereas now it extended to the end-product of Resilience. Thereby, denoting that all the integral factors culminate and deduce to give the end-product i.e. Resilience. This is elaborated in the following paragraph.

The Synergy model depicted the Resistance to be the by-product of adversities and operating factors leading to achievement and flourishing (Outcome variables) which was treated equivalent to resilience. When it was put to empirical testing the results proved that resilience is the product of resistance and the outcome and it is not the same as the outcome variable (achievement and flourishing) itself. Thus, the present study could contribute towards revision of Hariharan-Rana Synergy Model. It implies that the model now explains both the process and the product of resilience.

Another addition that the study suggested to the model is in determining the cut off point for classifying people on resilience levels. The original model suggested the score of 100 as the cut off point as a theoretical determinant. However, the present study by introducing the decile cut off has suggested an empirical method of determining the cut off for categorisation. Though the difference in the cut off value is not huge, the scientific approach could replace the theoretical cut off. Thus, so far as the testing the Synergy model proposed by Hariharan and Rana, the present study is successful in meeting this objective following an objective approach.

Based on the above it may be stated that the study has been successful in meeting all the objectives drafted before its initiation.

The large sample size, methodological compliance in constructing the measurement tools, logical steps in evolving the mathematical formula, use of two sets of samples for identifying weightages and application of formula, the methodological adherence in establishing the psychometric properties, statistical method applied in determining the cut off point for categorization, and finally testing the model by application of Structural Equation Model to verify the pathway indicates the scientific rigour followed throughout the whole process of the study. It is this factor that awards the present study a unique place in resilience

research that was often criticised for absence of comprehensive measure, psychometric properties, generalisability and conceptual confusion. The present study suggests that where the demography of the samples match, the same weightages can be used. Since the sample consists of men and women between the age group of 19-39 years from middle class families from major cities like Hyderabad, Chennai, and Bengaluru, of South India, the weightages can be used for samples with similar demography.

Thus, the study has opened the path for a new method to approach the problem of measuring resilience.

Implications: The study has opened a major opportunity for training individuals to enhance their resilience, particularly for those whose scores are on the borderline. Researchers' focus has to mainly concentrate on the survivors. They are the persons who could manage to survive the adversity with average performance while resilient group has those participants whose performance spiked beyond the average levels. Such classification has opened the avenue for in-depth study and examination of the differences between these two groups in terms of operating factors. If the results indicate any specific aspects, designing interventions along those lines would be highly appropriate. This calls for comparing and contrasting the scores of the two groups intensely to identify the leverage spots to target the intervention. It could be certain protective factors or promotive factors. In case of the emergence of internal factors as the points of difference, the intervention should be designed in enhancing or inculcating those factors. The interventions may vary appropriate to different age groups. On the other hand, if the promotive factors emerge as points of contrast, policy measures need to be taken for facilitating the environment with such promotive factors as part of welfare measures at State level.

Limitation: The major limitation of this study is the sample. The entire study was conducted on a sample that had homogeneity in its demographic characteristic. Hence, the weightages used for the sample cannot be applied to a sample from any other socio-cultural set up. Researchers desirous of replicating the study in a culturally different population may have to develop their own weightages by administering the REST Battery. However, rather than viewing it as a limitation, the other perspective is to accept the new methodology to approach the study of resilience and undertake replication on multinational sample to evolve country specific weightages, or universal weightages for clusters of countries until one universal value is derived. The study in fact opens up new challenges for deeper exploration by the team consisting of Psychologists, statisticians and computer scientists.

References

Ackerman, C. E. (2020). How to Measure Resilience with these 8 Resilience Scales. Retrieved from https://positivepsychology.com/3-resilience-scales/

Abrams, Madeleine. (2001). Resilience in Ambiguous Loss. *American Journal of Psychotherapy*, 55, 283-91.doi: 10.1176/appi.psychotherapy.2001.55.2.283.

Agaibi, C. E., & Wilson, J. P. (2005). Trauma, PTSD, and resilience: A review of the literature. *Trauma, Violence and Abuse*, 6, 195–216. doi: 10.1177/1524838005277438

American Psychological Association.(2014). The Road to Resilience. *Washington DC: American Psychological Association*. Retrieved from http://www.apa.org/helpcenter/road-resilience.aspx

Annalakshmi, N. & Abeer, M. (2011).Islamic worldview, religious personality and resilience among Muslim adolescent students in India. *Europe's Journal of Psychology*, 7, doi: 10.5964/ejop.v7i4.161

Anthony EJ (1974). Introduction: The syndrome of the psychologically vulnerable child. In: Anthony EJ, Koupernik C, editors. *The child in his family: Children at Psychiatric Risk.*Vol. 3. Wiley; New York: pp. 3–10

Antonovsky, A. (1984). The Sense of Coherence as a Determinant in Health. In: Matarazzo, J.D., Ed., *Behavioral Health: A Handbook of Health Enhancement and Disease Prevention*, John Wiley, New York, 114-129.

Arrebola-Moreno, A.L., Garcia-Retamero, R., Catena, A., Marfil-Álvarez, R., Melgares-Moreno, R., &Ramírez-Hernández, J.A. (2014).On the protective effect of resilience in patients with acute coronary syndrome.doi: 10.1016/S1697-2600(14)70044-4

Barnett, J., & Cooper, N. (2009).Creating a Culture of Self-Care.*Clinical Psychology: Science and Practice*, 16, 16-20. doi: 10.1111/j.1468-2850.2009.01138.x.

Barnett, J., Baker, E., Elman, N. & Schoener, G. (2007). In Pursuit of Wellness: The Self-Care Imperative. *Professional Psychology: Research and Practice*, 38, 603-612. doi: 10.1037/0735-7028.38.6.603.

Beddoe, L., Davys, A. M., & Adamson, C. (2014). 'Never trust anybody who says "I don't need supervision"': *Practitioners' beliefs about social worker resilience.* Practice, 26(2), 113-130. doi: 10.1080/09503153.2014.896888

Benard, B. (1997). Turning it around for all youth: From risk to resilience. *Launceston, Tasmania; Resiliency Associates and Global Learning Communities.*

Block, J. &Kreman, A. M. (1996). IQ and Ego-Resiliency: Conceptual and Empirical Connections and Separateness. *Journal of Personality and Social Psychology*, 70(2), 349-361.

Block, J. H., & Block, J, (1980). The role of ego-control and ego resiliency in the organization of behaviour. In W. A. Collins (Ed.), *Minnesota Symposia on Child Psychology* (Vol. 13, pp. 39-101). Hillsdale, NJ: Erlbaum.

Bogar, C. B., &Hulse-Killacky, D. (2006). Resiliency Determinants and Resiliency Processes Among Female Adult Survivors of Childhood Sexual Abuse. *Journal of Counseling & Development*, 84(3), 318–327. doi: 10.1002/j.1556-6678.2006.tb00411.x

Bonanno, G. A. (2004). Loss, trauma, and human resilience: have we underestimated the human capacity to thrive after extremely aversive events? *The American Psychologist*, 59(1), 20-8.doi: 10.1037/0003-066X.59.1.20

Bond, M., (1986).Defense Style Questionnaire. In: Vaillant, G.E. (Ed.), *Empirical Studies of Ego Mechanisms of Defense*. American Psychiatric Press Inc., New York, pp. 146–152.

Brennan, M. A. (2008). Conceptualizing resiliency: An interactional perspective for community and youth development. *Child Care in Practice*, 14, 55–64. doi: 10.1080/

Brown, D. &Tylka, T. (2011). Racial Discrimination and Resilience in African American Young Adults: Examining Racial Socialization as a Moderator. *Journal of Black Psychology*, 37, 259-285. doi: 10.1177/0095798410390689.

Bulut, S., Doğan, U., &Altundağ, Y. (2013). Adolescent Psychological Resilience Scale: Validity and reliability study. *Suvremenapsihologija*, 16 (1), 21-32

Cameron, F., & Brownie, S. (2010).Enhancing resilience in registered aged care nurses.*Australasian Journal on Ageing*, 29(2), 66-71. doi: 10.1111/j.1741-6612.2009.00416.x

Campbell-Sills L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor-Davidson Resilience Scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress*, 20(6), 1019-28. doi: 10.1002/jts.20271

Campbell-Sills, L., Cohan, S. L., Stein, M. B. (2006).Relationship of resilience to personality, coping, and psychiatric symptoms in young adults. *Behaviour Research Therapy*, 2006, 44(4), 585-99.

Caspi, A., Sugden, K., Moffitt, T. E., Taylor, A., Craig, I. W., Harrington, H., McClay, J., Mill, J., Martin, J., Braithwaite, A., Poulton, R. (2003). Influence of life stress on depression: moderation by a polymorphism in the 5-HTT gene. *Science*, 301(5631), 386-9.doi: 10.1126/science.1083968

Cassidy, S. (2016). The Academic Resilience Scale (ARS-30): A New Multidimensional Construct Measure. *Frontiers in Psychology, 7*. doi: 10.3389/fpsyg.2016.01787

Collishaw, S., Pickles, A., Messer, J., Rutter, M., Shearer, C., & Maughan, B. (2007). Resilience to adult psychopathology following childhood maltreatment: evidence from a community sample. *Child abuse & neglect*, 31(3), 211–229. Retrieved from https://doi.org/10.1016/j.chiabu.2007.02.004

Connor, K. M. and Davidson, J. R. T. (2003).Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 18(2): 76–82.

Curtis, W. J., & Cicchetti, D. (2003). Moving research on resilience into the 21st century: Theoretical and methodological considerations in examining the biological contributors to resilience. *Development and Psychopathology*, 15(3), 773–810. doi.org/10.1017/S0954579403000373

Dash, A. S. &Nayak, R. (1998).When life becomes tough: The psychology of living. *Bhuvaneshwar.Panchajanya*.

Davis, M. C., Luecken, L., &Lemery-Chalfant, K. (2009). Resilience in common life: Introduction to the special issue. *Journal of Personality*, 77(6), 1637–1644. doi: 10.1111/j.1467-6494.2009.00595.x

Davydov, D., Stewart, R., Ritchie, K., &Chaudieu, I. (2010).Resilience and mental health.Clinical Psychology Review, 30, 479-95.doi: 10.1016/j.cpr.2010.03.003.

De las Olas Palma-García, M., &Hombrados-Mendieta, I. (2014).The development of resilience in social work students and professionals. *Journal of Social Work*, 14(4), 380–397. doi: 10.1177/1468017313478290

Denz-Penhey, H., & Murdoch, J. C. (2008). Personal resiliency: Serious diagnosis and prognosis with unexpected quality outcomes. *Qualitative Health Research*, 18, 391–404. doi: 10.1177/1049732307313431

Donnon, T., & Hammond, W. (2007). A Psychometric Assessment of the Self-Reported Youth Resiliency: Assessing Developmental Strengths Questionnaire. *Psychological Reports*, 100(3), 963–978. doi: 10.2466/pr0.100.3.963-978

Dubow, E. F., Edwards, S., & Ippolito, M. F. (1997). Life stressors, neighbourhood disadvantage, and resources: A focus on inner-city children's adjustment. *Journal of Clinical Child Psychology*, 26(2), 130-144. doi: 10.1207/s15374424jccp2602_2

Dunn, L. B., Iglewicz, A., & Moutier, C. (2008). A conceptual model of medical student well-being: Promoting resilience and preventing burnout. *Academic Psychiatry*, 32, 44–53. doi: 10.1176/appi.ap.32.1.44

Elder, G. (1998).The Life Course as Developmental Theory. *Child Development*,69(1), 1-12. doi:10.2307/1132065

Felner, R.D., Brand, S., DuBois, D.L., Adan, A.M., Mulhall, P.F., & Evans, E.G. (1995). Socioeconomic disadvantage, proximal environmental experiences, and socioemotional and academic adjustment in early adolescence: investigation of a mediated effects model. *Child development*, 66 3, 774-92.

Fleming J, Ledogar RJ. (2008). Resilience, an Evolving Concept: A Review of Literature Relevant to Aboriginal Research. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health*;6(2):7–23.

Fletcher, D., & Sarkar, M. (2012).A grounded theory of psychological resilience in Olympic champions. *Psychology of Sport and Exercise*, 13, 669–678. doi: 10.1016/j.psychsport.2012.04.007

Friborg, O., Barlaug, D., Martinussen, M., Rosenvinge, J. H., & Hjemdal, O. (2005).Resilience in relation to personality and intelligence.*International journal of methods in psychiatric research*,14(1), 29–42. Retrieved from https://doi.org/10.1002/mpr.15

Gable, S. L., Reis, H. T., Impett, E. A., & Asher, E. R. (2004). What do you do when things go right? The intrapersonal and interpersonal benefits of sharing positive events.*Journal of Personality and Social Psychology*, 87,228–245. doi:10.1037/0022-3514.87.2.228

Galli, N., & Vealey, R. S. (2008). ‘‘Bouncing back’’ from adversity: Athletes’ experiences of resilience. *The Sport Psychologist*, 22, 316–335. Retrieved from http://journals.humankinetics.com/tsp

Garmezy N, Masten AS, &Tellegen A. (1984). The study of stress and competence in children: A building block for developmental psychopathology. *Child Development*, 55, 97–111.

Garmezy, N. (1991). Resilience and vulnerability to adverse developmental outcomes associated with poverty. *American Behavioral Scientist*, 34(4), 416–430. doi: 10.1177/0002764291034004003

Garmezy, N. (1993). Vulnerability and resilience. In D. C. Funder, R. D. Parke, C. Tomlinson-Keasey, & K. Widaman (Eds.), APA science Vols. Studying lives through time: Personality and development (p. 377–398). *American Psychological Association*. Retrieved from https://doi.org/10.1037/10127-032

Gillespie, B. M., Chaboyer, M., Wallis, M., & Grimbeek, P.(2007). Resilience in the operating room: Developing and testing of a resilience model. *Journal of Advanced Nursing*, 59, 427–438. doi: 10.1111/j.1365-2648.2007.04340.x

Gillespie, C. F., Phifer, J., Bradley, B., & Ressler, K. J. (2009). Risk and resilience: genetic and environmental influences on development of the stress response. *Depression and anxiety*,26(11), 984-992.

Gordon, K. A. (1996). Resilient Hispanic Youths' Self-Concept and Motivational Patterns. *Hispanic Journal of Behavioural Sciences*, 18(1), 63-73. Retrieved from https://doi.org/10.1177/07399863960181007

Greenberg, M. T., Lengua, L. J., Coie, J. D., & Pinderhughes, E. E. (1999). Predicting developmental outcomes at school entry using a multiple-risk model: four American communities. The Conduct Problems Prevention Research Group.*Developmental Psychology*, 35(2), 403-17.doi: 10.1037//0012-1649.35.2.403

Gu, Q. (2014). The role of relational resilience in teachers' career-long commitment and effectiveness. *Teachers and Teaching*, 20(5), 502-529. doi: 10.1080/13540602.2014.937961

Gu, Q., & Day, C. (2007). Teachers resilience: A necessary condition for effectiveness. *Teaching and Teacher Education*, 23(8), 1302–1316. doi: 10.1016/j.tate.2006.06.006

Haase, J. E. (2004). The adolescent resilience model as a guide to interventions. *Journal of Pediatric Oncology Nursing,* 21, 289–299. doi: 10.1177/1043454204267922

Hariharan, M & Rana, S. (2017). Conceptual complexity of resilience. In U. Kumar (Ed.). *The Routledge International Handbook of Psychological Resilience* (pp. 24-45) London: Routledge

Hariharan, M. (1990). Invulnerable children: Some studies on disadvantaged children's competence and coping styles (Unpublished doctoral thesis). Utkal University, Odisa, India.

Hariharan, M., Karimi, M. & Kishore, T. (2014).Resilience in persons with Physical Disabilities; Role of Perceived Environment and Emotional Intelligence. *Journal of the Indian Academy of Applied Psychology*, 40.97-102.

Hemenover, S. H. (2003). The good, the bad, and the healthy: impacts of emotional disclosure of trauma on resilient self-concept and psychological distress. *Personality & social psychology bulletin*,29(10), 1236–1244. doi: 10.1177/0146167203255228

Henry, D. L. (1999). Resilience in maltreated children: Implications for special needs adoption. *Child Welfare: Journal of Policy, Practice, and Program*, 78(5), 519–540.

Higgins, G. O. (1994). Resilient adults: Overcoming a cruel past. *Jossey-Bass*. Retrieved from https://psycnet.apa.org/record/1994-98410-000

Higgs, P., Hyde, M., Wiggin, R. & Blane, D. (2003).Researching quality of life in early old age: The importance of the sociological dimension.*Social Policy & Administration,* 37, 239-252

Hildon, Z., Smith, G., Netuveli, G., & Blane, D. (2008).Understanding adversity and resilience at older ages. *Sociology of health & illness*, 30(5), 726-740.doi: 10.1111/j.1467-9566.2008.01087.x

Hjemdal, O.,Friborg, O., Stiles, T., Martinussen, M., & Rosenvinge, J. (2006). A New Scale for Adolescent Resilience: Grasping the Central Protective Resources Behind Healthy Development. *Measurement and Evaluation in Counseling and Development*, 39, 84-96. doi:10.1080/07481756.2006.11909791.

Holmes, T. H. &Rahe, R. H. (1967). The Social Readjustment Rating Scale, *Journal Psychosomatic Research,* 11, 213-18.

Howell, K. H., & Miller-Graff, L. E. (2014). Protective factors associated with resilient functioning in young adulthood after childhood exposure to violence. *Child abuse & neglect*, 38(12), 1985–1994.doi: 10.1016/j.chiabu.2014.10.010

Hunter, A. J., & Chandler, G. E. (1999).Adolescent resilience.*IMAGE: Journal of Nursing Scholarship*, 31(3), 243–247. https://doi.org/10.1111/j.1547-5069.1999.tb00488.x

Hurtes, K. & Allen, L. (2001).Measuring Resiliency in Youth: The Resiliency Attitudes and Skills Profile. *Therapeutic Recreation Journal*, 35(4), 333-347.

Introduction and Discussion

Jackson, D., Firtko, A., & Edenborough, M. (2007). Personal resilience as a strategy for surviving and thriving in the face of workplace adversity: A literature review. *Journal of Advanced Nursing*, 60, 1-9. doi:10.1111/j.1365-2648.2007.04412.x.

Kamins, M. L., & Dweck, C. S. (1999). Person versus process praise and criticism: Implications for contingent self-worth and coping. *Developmental Psychology*, 35(3), 835–847. doi: 10.1037/0012-1649.35.3.835

Karoly, P., &Ruehlman, L. S. (2006). Psychological "resilience" and its correlates in chronic pain: findings from a national community sample. *Pain*, 123(1-2), 90–97. doi: 10.1016/j.pain.2006.02.014

Kaur, K., & Singh, D. (2016). Construction and standardization of academic resilience scale.*International Education And Research Journal*, 2(2). Retrieved from http://ierj.in/journal/index.php/ierj/article/view/137

Kemper, K. J., Mo, X., &Khayat, R. (2015). Are Mindfulness and Self-Compassion Associated with Sleep and Resilience in Health Professionals? *Journal of alternative and complementary medicine* (New York, N.Y.), 21(8), 496–503.doi: 10.1089/acm.2014.0281

Kidd, S., & Shahar, G. (2008). Resilience in homeless youth: The key role of self-esteem. *American Journal of Orthopsychiatry*, 78(2), 163–172. doi: 10.1037/0002-9432.78.2.163

Kim-Cohen, J., Moffitt, T., Caspi, A., & Taylor, A. (2004).Genetic and Environmental Processes in Young Children's Resilience and Vulnerability to Socioeconomic

Deprivation. *Child Development*,75(3), 651-668. Retrieved from www.jstor.org/stable/3696586

Kinman, G. and Grant, L. (2011). Exploring Stress Resilience in Trainee Social Workers: The Role of Emotional and Social Competencies, *The British Journal of Social Work*, 41(2), 261–275. doi: 10.1093/bjsw/bcq088

Klein, K. &Zedeck, S. (2004). Introduction to the Special Section on Theoretical Models and Conceptual Analyses: Theory in Applied Psychology: Lessons (Re) Learned. *Journal of Applied Psychology*, 89, 931-933. doi: 10.1037/0021-9010.89.6.931.

Kobasa, C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology*, 37, 1-11.

Kobasa, S.C. (1982) The Hardy Personality: Toward a Social Psychology of Stress and Health. In: Sanders, G.S. and Suls, J., Eds., *Social Psychology of Health and Illness, Lawrence Erlbaum Assoc.*, Hillsdale, 1-25.

Lee, H. H. & Cranford, J. A. (2008).Does resilience moderate the associations between parental problem drinking and adolescents' internalizing and externalizing behaviours? A study of Korean adolescents. *Drug and Alcohol Dependence*, 96(3), 213-221.

Leipold, B., &Greve, W. (2009). Resilience: A conceptual bridge between coping and development. *European Psychologist*, *14*(1), 40-50.

Loh, J., Schutte, N. S., & Thorsteinsson, E. B. (2013). Be Happy: The Role of Resilience Between Characteristic Affect and Symptoms of Depression. *Journal of Happiness Studies*, 15(5), 1-14. Doi: 10.1007/s10902-013-9467-2.

Luthar S, Cicchetti D, Becker B.(2000)The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*,71, 543–562. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1885202/

Luthar, S. S. (2006). Resilience in development: A synthesis of research across five decades. In D. Cicchetti & D. *Cohen (Eds.), Developmental psychopathology: Risk, disorder, and adaptation* (pp. 739–795). New York, NY: Wiley.

Luthar, S. S., & Cicchetti, D. (2000). The Construct of Resilience: Implications for Interventions and Social Policies. *Development and Psychopathology*, 12, 857-885. doi: 10.1017/S0954579400004156

Luthar, S. S., & Sexton, C. C. (2007). Maternal drug abuse versus maternal depression: Vulnerability and resilience among school-age and adolescent offspring. *Development and Psychopathology*, 19, 205–225. doi: 10.1017/S0954579407070113

Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, 71, 543–562. doi: 10.1111/1467-8624.00164

Luthar, S. S., Sawyer, J. A., Brown, P. J. (2006). Conceptual issues in studies of resilience: past, present, and future research. *Annals of the New York Academy of Science*, 1094:105-15. doi: 10.1196/annals.1376.009

Lyons, D. M., Martel, F. L., Levine, S., Risch, N. J., & Schatzberg, A. F. (1999). Postnatal experiences and genetic effects on squirrel monkey social affinities and emotional distress. *Horm. Behavioural*. 36, 266–275.doi: 10.1006/hbeh.1999.1547

Mancini, A. D., & Bonanno, G. A. (2009). Predictors and parameters of resilience to loss: Toward an individual differences model. *Journal of Personality*, 77, 1805–1832. doi: 10.1111/j.1467-6494.2009.00601.x

Martin, A. & Marsh, Herb. (2006). Academic resilience and its psychological and educational correlates: A construct validity approach. *Psychology in the Schools*, 43, 267 - 281. doi: 10.1002/pits.20149.

Masten, A. S. (1994). Resilience in individual development: Successful adaptation despite risk and adversity. In M. C. Wang & E. W. Gordon (Eds.), Educational resilience in inner-city America: Challenges and prospects (p. 3–25). *Lawrence Erlbaum Associates, Inc.*

Masten, A. S. (2001). Ordinary magic: Resilience processes in development. *American psychologist*, *56*(3), 227.doi: 10.1037/0003-066X.56.3.227

Masten, A. S., & Coatsworth, J. D. (1995). Competence, resilience, and psychopathology: Risk, disorder, and adaptation. *In D. Cicchetti, & D. Cohen (Eds.),* Developmental psychopathology: Risk, disorder, and adaptation(Vol. 2, pp. 715-752). Wiley.

Masten, A. S., & Obradovic, J. (2006).Competence and resilience in development. *Annals of the New York Academy of Sciences*, 1094, 13–27. Retrieved from https://doi.org/10.1196/annals.1376.003

Masten, A. S., & Reed, M.-G. J. (2002).Resilience in development. *In C. R. Snyder & S. J. Lopez (Eds.),* Handbook of positive psychology (p. 74–88).Oxford University Press.

Masten, A. S., Best, K. M., & Garmezy, N. (1990). Resilience and Development: Contributions from the Study of Children Who Overcome Adversity. *Development and Psychopathology*, 2, 425-444. doi: 10.1017/S0954579400005812

Masten, A.S. &Garmezy, N. (1985).Risk, vulnerability, and protective factors in developmental psychopathology.*In: Lahey, B.B. &Kazdin, A.E. (Eds.), Advances in Clinical Child Psychology*, Vol. 8, (pp. 1-52). New York: Plenum.

Masten, Ann. & Coatsworth, J. (1998). The Development of Competence in Favourable and Unfavourable Environments: Lessons from Research on Successful Children. *The American psychologist*, 53, 205-20.doi: 10.1037/0003-066X.53.2.205.

McAllister, M., & McKinnon, J. (2009). The importance of teaching and learning resilience in the health disciplines: a critical review of the literature. *Nurse education today*, 29(4), 371–379.doi: 10.1016/j.nedt.2008.10.011

McCann, C. M., Beddoe, E., McCormick, K., Huggard, P., Kedge, S., Adamson, C., &Huggard, J. (2013). Resilience in the health professions: A review of recent literature. *International Journal of Wellbeing*, 3(1), 60-81. doi:10.5502/ijw.v3i1.4

McCubbin, H. I., & Patterson, J. M. (1983). The Family Stress Process: The Double ABCX Model of adjustment and adaptation. *Marriage & Family Review*,6(1-2),7-37.DOI: 10.1300/J002v06n01_02

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. *Rand Health Quarterly*, 1(2). Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4945176/

Moffitt, T. (2005). The New Look of Behavioural Genetics in Developmental Psychopathology: Gene-Environment Interplay in Antisocial Behaviours. *Psychological bulletin*, 131, 533-54.doi: 10.1037/0033-2909.131.4.533.

Moffitt, T., Caspi, A., & Rutter, M. (2005). Strategy for Investigating Interactions Between Measured Genes and Measured Environments. *Archives of General Psychiatry*, 62, 473-81.doi: 10.1001/archpsyc.62.5.473.

Olson, K., Kemper, K. J., & Mahan, J. D. (2015). What factors promote resilience and protect against burnout in first-year paediatric and medicine-paediatric residents? *Journal of evidence-based complementary & alternative medicine*,20(3), 192-198.doi: 10.1177/2156587214568894

Olsson, C. A., Bond, L., Burns, J. M., & Vella-Brodrick, D. & Sawyer, S. (2003). Adolescent Resilience: A Concept Analysis. *Journal of adolescence*.26(1). 1-11. doi: 10.1016/S0140-1971(02)00118-5.

Oshio, A., &Nakaya, M., & Kaneko, H., &Nagamine, S..(2002). Development and validation of an adolescent resilience scale.*Japanese Journal of Counseling Science,* 35, 57-65.

Oshio, A., Kaneko, H., Nagamine, S., & Nakaya, M. (2003). Construct validity of the Adolescent Resilience Scale. *Psychological reports*, 93(3 Pt 2), 1217–1222.doi: 10.2466/pr0.2003.93.3f.1217

Palmer, C. (2008). A theory of risk and resilience factors in military families.*Military Psychology*, 20, 205-217. doi: 10.1080/08995600802118858

Paton, D., Johnston, P., Clarke, J., Violanti, J. M., Burke, K. J., & Keenan, D. (2008). Stress shield: A model of police resiliency. *International Journal of Emergency Mental Health*, 10, 95–108.

Pinho de Oliveira, A. C., Machado, A. G., &Aranha, R. N. (2017). Identification of factors associated with resilience in medical students through a cross-sectional census. *BMJ Open*, 7(11).doi: 10.1136/bmjopen-2017-017189

Polk, L. V. (1997). Toward a middle-range theory of resilience. *Advances in Nursing Science*, 19, 1–13.

Ponce-Garcia, E., Madewell, A. N., & Brown, M. E. (2016). Resilience in men and women experiencing sexual assault or traumatic stress: Validation and replication of the scale of protective factors. *Journal of traumatic stress*, *29*(6), 537-545.

Rajendran, A., Hariharan, M. & Rao, C. R. (2019). A Holistic Approach to Measuring Resilience: Development and Initial Validation of Resilience Test Battery. *International Journal of Humanities & Social Science Studies (IJHSSS),*Vol 6(3), 52-64.

Rajkumar, A. P., Premkumar, T. S., & Tharyan, P. (2008).Coping with the Asian tsunami: perspectives from Tamil Nadu, India on the determinants of resilience in the face of adversity. *Social Science and Medicine*, 67(5), 844-53.doi: 10.1016/j.socscimed.2008.05.014

Reivich, K. J., Seligman, M. E., & McBride, S. (2011). Master resilience training in the US Army. *American Psychologist*, 66(1), 25.doi: 10.1037/a0021897

Richardson, G. E. (2002). The metatheory of resilience and resiliency.*Journal of Clinical Psychology*, 58, 307–321. doi: 10.1002/jclp. 10020

Richardson, G. E., Neiger, B. L., Jensen, S., &Kumpfer, K. L. (1990). The Resiliency Model.*Health Education*, 21(6), 33–39. doi: 10.1080/00970050.1990.10614589

Riolli, L., &Savicki, V. (2003).Information system organizational resilience.*Omega: The International Journal of Management Science*, 31, 227–233. doi: 10.1016/S0305-0483(03)00023-9

Rossouw, P. & Rossouw, J. (2016). The Predictive 6-Factor Resilience Scale: Neurobiological Fundamentals and Organizational Application. *International Journal of Neuropsychotherapy, 4,* 31-45. doi: 10.1244/ijnpt.2016.0031-0045.

Rutter M. (1979). Protective factors in children's responses to stress and disadvantage. In: Kent MW, Rolf JE, editors. Primary Prevention of Psychopathology Volume III: Social Competence in Children. *Hanover, NH: University Press of New England*; pp. 49–74.

Rutter, M. & Tizard, J. & Yule, W. & Graham, P. & Whitmore, K. (1976). Isle of Wight Studies, 1964–1974. *Psychological Medicine*, 6.doi: 10.1017/S003329170001388X.

Rutter, M. (1985).Resilience in the Face of Adversity—Protective Factors and Resistance to Psychiatric-Disorder. *British Journal of Psychiatry*, 147, 598-611. doi: 10.1192/bjp.147.6.598

Rutter, M. (1987).Psychosocial resilience and protective mechanisms. *American Journal of Orthopsychiatry*, 57, 316–331. doi: 10.1111/j.1939-0025.1987.tb03541.x

Rutter, M. (1999). Resilience Concepts and Findings: Implications for Family Therapy. *Journal of Family Therapy*, 2, 119-144. Retrieved from http://dx.doi.org/10.1111/1467-6427.00108

Rutter, M. (2003). Genetic Influences on risk and protection: Implications for understanding resilience. In S. S. Luthar (Ed.), Resilience and vulnerability: Adaptation in the context of childhood adversities (p. 489–509). *Cambridge University Press.* Retrieved from https://doi.org/10.1017/CBO9780511615788.022

Rutter, M. (2006).Implications of resilience concepts for scientific understanding. *Annals of the New York Academy of Sciences*, 1094, 1–12. doi: 10.1196/annals.1376.002

Sameroff, A., Gutman, L. M., & Peck, S. C. (2003). Adaptation among youth facing multiple risks: Prospective research findings. *Resilience and vulnerability: Adaptation in the context of childhood adversities*, 1, 364-391.

Seccombe, K. (2002). "Beating the Odds" Versus "Changing the Odds": Poverty, Resilience, and Family Policy. *Journal of Marriage and Family*, 64(2), 384-394.

Simeon, D., Yehuda, R., Cunill, R., Knutelska, M., Putnam, F. W., & Smith, L. M. (2007). Factors associated with resilience in healthy adults. *Psychoneuroendocrinology*,32(8-10), 1149–1152. doi: 10.1016/j.psyneuen.2007.08.005

Sinclair, R. R., Oliver, C., Ippolito, J., &Ascalon, E. (2003).Development of a fourth generation hardiness measure.*Manuscript in preparation*.

Sinclair, V. &Wallston, K. (2004).The development and psychometric evaluation of the Brief Resilient Coping Scale.*Assessment*, 11, 94-101. doi: 10.1177/1073191103258144.

Singh, R., & Gupta, L. (2016).Psychological preparedness, combat performance and resilience. In U. Kumar (Ed.),*The Routledge International Handbook of Psychosocial Resilience* (pp. 491-504). Routledge.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the Ability to Bounce Back. *International Journal of Behavioural Medicine*, 15, 194–200. doi: 10.1080/10705500802222972

Sojo, V., &Guarino, L. (2011). Mediated moderation or moderated mediation: Relationship between length of unemployment, resilience, coping and health. *The Spanish journal of psychology*, 14(1), 272-281.doi: 10.5209/rev_SJOP.2011.v14.n1.24

Tang, W. (2019). Resilience and Self-Compassion Related with Achievement Emotions, Test Anxiety, Intolerance of Uncertainty, and Academic Achievement. *Psychological Studies*, 64.doi: 10.1007/s12646-019-00482-6.

Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of personality and social psychology*,86(2), 320–333.doi: 10.1037/0022-3514.86.2.320

Ungar, M. (2006). Nurturing Hidden Resilience in At-Risk Youth in Different Cultures.*Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 15(2), 53-58. Retrieved from https://www.researchgate.net/publication/5460773_Nurturing_Hidden_Resilience_in_At-Risk_Youth_in_Different_Cultures

Ungar, M., & Liebenberg, L. (2011). Assessing Resilience Across Cultures Using Mixed Methods: Construction of the Child and Youth Resilience Measure. *Journal of Mixed Methods Research*, 5(2), 126–149. doi: 10.1177/1558689811400607

Van Vliet, K. J. (2008). Shame and resilience in adulthood: A grounded theory study. *Journal of Counseling Psychology*, 55, 233–245.doi: 10.1037/0022-0167.55.2.233

Von Soest, T., Mossige, S., Stefansen, K., & Hjemdal O. (2010), A validation study of the Resilience Scale for Adolescents (READ).*Journal of Psychopathology and Behavioral Assessment*, 32 (2), 215-225. doi: 10.1007/s10862-009-9149-x

Wagnild, G. M., & Young, H. M. (1993).Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement*, 1, 165-178.

Walsh, F. (2003). Family Resilience: A Framework for Clinical Practice. *Family Process*, 42(1), 1-18. Retrieved from https://doi.org/10.1111/j.1545-5300.2003.00001.x

Waters, E. &Sroufe, L. A. (1983).Social Competence as a Developmental Construct. *Developmental Review*, 3. 79-97. doi: 10.1016/0273-2297(83)90010-2.

Werner E, Smith R. (1982). Vulnerable but invincible: A study of resilient children.*McGraw-Hill; New York*.

Werner, E. E., & Smith, R. S. (Eds.). (1992). Overcoming the odds: High risk children from birth to adulthood. *Ithaca, NY:Cornell University Press*.

Williams, J., & Nelson-Gardell, D. (2012).Predicting resilience in sexually abused adolescents. *Child abuse & neglect*, 36(1), 53–63.https://doi.org/10.1016/j.chiabu.2011.07.004

Windle, G. (2011). What is resilience? A review and concept analysis. *Reviews in Clinical Gerontology*. 21(2), 152-169. doi: 10.1017/S0959259810000420.

Wolin, S. J., & Wolin, S. (1993). The Resilient Self: How Survivors of Troubled Families Arise above Adversity. *New York: Villard Books*

Wrenn, G. L., Wingo, A. P., Moore, R., Pelletier, T., Gutman, A. R., Bradley, B., & Ressler, K. J. (2011). The effect of resilience on posttraumatic stress disorder in trauma-exposed inner-city primary care patients.*Journal of the National Medical Association*, 103(7), 560–566. doi: 10.1016/s0027-9684(15)30381-3

Youssef, C. M. &Luthans, F. (2007). Positive Organizational Behaviour in the Workplace: The Impact of Hope, Optimism, and Resilience. *Journal of Management*, 33(5), 774-800. doi: 10.1177/014920630730556

Zautra, A. J., Johnson, L. M., & Davis, M. C. (2005).Positive affect as a source of resilience for women in chronic pain. *Journal of consulting and clinical psychology*, 73(2), 212–220.doi: org/10.1037/0022-006X.73.2.212

Institute Ethics Committee, University of Hyderabad

Justice Rangarajan
Chairperson

Prof. Geeta K. Vemuganti
Member Secretary

Decision Letter of Institute Ethics Committee,

IEC No Application No:	**UH/IEC/2016/193**	**Date of review**	**27-09-2016**
Project Title:	**Development of resilience model :Standardization of measuring resilience(tentative)**		
Principal Investigator/ Co-PI:	Ms. Aarthi Rajendran Prof. Meena Hariharan		
Participating Institutes if any	----------	**Approval from Participating Institute**	-------
Documents received and reviewed	Protocol, ICF , Doctorial Committee report and draft copy of Assessment tool		
In case of renewal submission of update	---		
Decision of the IEC:	Approved Duration : One year from date of approval		
Any other Comments Requirements for conditional Approval	-----		
Members Present	Sri Justice Rangarajan, Prof.Geeta K.Vemuganti,Dr.Mahadev Kalyankar, Prof.Purendra Prasad, Dr.M.Varalakshmi, Mrs.. Jamila Nishat. Asmita &Mrs.Nagalakshmi		

Please note:

a. Any amendments in the protocol must be informed to the Ethics committee and fresh approval taken.
b. Any serious adverse event must be reported to the Ethics Committee within 48 hours in writing (mentioning the protocol No. or the study ID)
c. Any advertisement placed in the newspapers, magazines must be submitted for approval.
d. The results of the study should be presented in any of the academic forums of the hospital annually.
e. If the conduct of the study is to be continued beyond the approved period, an application for the same must be forwarded to the Ethics Committee.
f. It is hereby confirmed that neither you nor any of the members of the study team participated in the decision making/voting procedures.

Chairperson

(Justice Rangarajan)

Member Secretary

(Prof. Geeta K Vemuganti)

Member Secretary
Institutional Ethics Committee (IEC)
School of Medical Sciences
University of Hyderabad
Hyderabad-500046.

Address : School of Medical Sciences, University of Hyderabad, C.R. Rao Road, Gachibowli, Hyderabad - 500 046.

Tel (O) : +91-040-23134781 / 23013279

E-mail : iec_uoh@uohyd.ernet.in, deanmd@uohyd.ernet.in

REST Battery

Informed consent

I am doing a study to standardise a tool to measure Resilience. Resilience refers to a phenomenon where excellence is achieved despite adversities in life. The scale consists of details related to adversities, positive characteristics within a person, facilitating factors in the environment and achievements in your life, attitude and feelings related to attaining one's goals. I seek your responses through ratings for the items mentioned under each of the headings. We seek information on the adversities you have faced, positive qualities within you and facilities in your environment as well as the major achievements in your life. This form requires you to give a rating on these aspects on 4 point, 7 point and 10 point scales. Filling up the entire form may take not more than 20-25 minutes. Your participation in this study by giving your honest responses will contribute to standardising the scale, though you may not directly benefit by participating in this study. After reading the details given about the study, the decision to participate is purely yours. In case you feel like withdrawing half way through after starting your responses on the sheet, you may do so without stating any reason. Your identity and responses will be kept strictly confidential and the information collected will be used strictly for research purpose. If you decide to participate in this study, please sign the consent form given below. You are free to seek any clarification from me on any aspect related to the study/your participation. For any further clarification in future, you may contact the following:

Ms. Aarthi Rajendran, Research Scholar, Centre for Health Psychology, University of Hyderabad.

Ph no: 23013228

Consent form

I have carefully read all the information regarding the procedure involved in participating in the study titled 'Standardisation of resilience scale'. In addition, the investigator orally explained to me the details and clarified all my doubts in connection with my involvement in the study. With all the information, I hereby give my consent to participate in the study voluntarily.

Signature of the participant

Name:	Phone no:
Address:	Email ID:

REST Battery

Appendix 3

FORM A

Instructions:

This sheet consists of 48 items that are considered adversities in life. Adversity means difficulties one faces in life. Please read each item carefully and identify those adversities that you have experienced. At the end of each item there is box given. If you have experienced or experiencing the particular adversity put a (√) mark in that box. For each statement there are 3 sections of severity, frequency and duration of the adversity. You will record your response in these 3 sections only if you have ticked the box. On the three sections, your response will be recorded on a 10-point scale.

The first section refers to severity of the adversity you are facing/ faced. It is rated on a 10-point scale where the rating points of 1 to 10 are arranged from lowest to highest severity. In other words the adversity described as "Breaking down of vehicle on national highway"-if you have experienced the adversity and ticked **(√)** the box, you will examine the extent of severity of this item on a 10-point scale. If you judge that the severity of this experience was temporary and on the lower side you will respond to column 2 by giving a rating of **1, 2 or 3 where 1 indicates lowest severity.** On the other hand if you feel that this adverse experience was highly stressful to you then you will respond by recording with a rating of **8,9 or 10,** where rating **10 refers to highest severity.**

The next section refers to frequency. You are required to respond how frequently the adversity recurs in your life or how frequently you suffer the impact of the experienced adversity. The rating options range from **1 to 10 where 1 refers to lowest frequency and 10 refers to highest frequency**. For example, being posted in a place where the temperature is as low as -25^{o} C, creates a lot of stress. If you have ticked the box against this item, you need to judge how frequently this adversity puts you in a disadvantage. If you feel it does almost every day, you will respond with a rating of **8, 9 or 10.** If you feel it rarely does, your response will be between **4 and 7.**

The last section refers to the duration of your suffering the adversity. It refers to how long have you been facing the adversity described in the item. The rating range from 1 to 10, where **1 equal to shortest duration and 10 equal to longest duration.** For example, suffering from heart disease in case you are diagnosed recently your response to this adversity will fall into the category of shortest duration ranging from **1 to 3.** On the other hand, if you suffer from congenital heart problem your response will have to be a rating of a **8, 9 or 10** depending on your age.

Kindly respond in all the 3 sections appropriately and record your response by **circling** the appropriate number.

1	2	3	4	5	6	7	8	9	(10)

This is not a test of knowledge hence there is no right or wrong answer. THE CORRECT ANSWER IN THIS CASE IS YOUR PERSONAL EXPERIENCE AND SUBJECTIVE JUDGEMENT OF SEVERITY AND OBJECTIVE JUDGEMENT OF FREQUENCY AND DURATION. ONCE AGAIN, I REQUEST YOU TO BE HONEST IN REPONDING TO THE ITEMS.

Items	Less severe- - - - - - - - - More severe										Less frequent- - - - -More frequent										Shorter duration - - - - - Longer duration									
1. Not receiving parental support ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
2. Having dominating parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
3. Being born to a criminal ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
4. Being born to a sex worker ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
5. Divorce/Separation of parents ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
6. Family member meeting with an accident ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
7. Having a family member indulging in crime ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
8. Having a family member jailed ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
9. Ill treatment by step parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
10. Loss of significant others (other than parents) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
11. Marital conflicts of parents ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
12. Prolonged periods of absence of mother in the family ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
13. One or more family members suffering from prolonged physical or mental illness ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
14. Death of parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
15. Harassment at the workplace ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
16. Being neglected by parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
17. Being rejected by parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
18. Parent(s) with mental illness ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
19. Having a parent(s) who is(are) alcoholic or drug addict ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
20. Presence of a family member (other than parents) with mental illness ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
21. Parent(s) suffering from prolonged illness ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
22. Remarriage of parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
23. Being brought up by single parent ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
24. Parent(s) suffering from terminal illness ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
25. Having highly demanding parent(s) ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
26. Being a victim of physical abuse ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

Items	Less severe- - - - - - - - - More severe										Less frequent- - - More frequent										Shorter duration - - - - - Longer duration									
27. Prolonged illness of self ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
28. Being a victim of bullying ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
29. Frequent ill health ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
30. Suffering from infertility ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
31. Suffering from malnourishment ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
32. Meeting with an accident ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
33. Having a physical deformity ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
34. Repeated abortions for self/spouse ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
35. Being a victim of sexual abuse ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
36. Being discriminated due to caste ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
37. Experienced one or more financial crisis ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
38. Living in a hostile neighbourhood ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
39. Being illiterate ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
40. Living in an area with the fear of terrorist or extremist attacks ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
41. Having a low socio economic status ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
42. Facing a natural disaster ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
43. Being jailed ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
44. Suffering from poverty ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
45. Suffering from starvation ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
46.Living in an unhygienic environment ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
47.Witnessing violence in community ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
48. Ill-treatment by guardians ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
49. Suffering from physical disability ☐	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
What is overall severity, frequency & duration of the adversity impacting your life?	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

FORM B

Instructions:

In spite of the adversities that you have ticked, you might have achieved certain things in life. Identify the distinct achievements of your life that make you proud. For example, the achievements like topping the university, getting a high placement might have made you proud. List those personal achievements of yours below. **You need not fill all the ten**. Fill only those which are distinct and which make you proud. After you list them, judge how significant that achievement is for you. Rate each of them on a 10 point scale (1-10) given on the right, based on its significance. Circle the appropriate number that matches with your ratings of that item.

Achievements	**Less significant - - - - - - - - - More significant**									
1.	1	2	3	4	5	6	7	8	9	10
2.	1	2	3	4	5	6	7	8	9	10
3.	1	2	3	4	5	6	7	8	9	10
4.	1	2	3	4	5	6	7	8	9	10
5.	1	2	3	4	5	6	7	8	9	10
6.	1	2	3	4	5	6	7	8	9	10
7.	1	2	3	4	5	6	7	8	9	10
8.	1	2	3	4	5	6	7	8	9	10
9.	1	2	3	4	5	6	7	8	9	10
10.	1	2	3	4	5	6	7	8	9	10

FORM C

Instructions:

This sheet consists of 24 items that are considered strengths in a person. The column on the left of the items is for your responses. Please read the items carefully and relate them to you. Identify those that you possess and put a tick mark against them in the column on the left. Once you finish ticking the items, judge the strength of each of the items to you. Rate each of them on a 10 point scale (1-10) by circling the appropriate number provided on the right of the items. Consider all the strengths that you have ticked from the list. What is the overall advantage of these strengths impacting your life? Give an overall rating between 1 and 10 in the circle provided at the end of the sheet.

I possess it	Items	Lower strength - - - - - - - - -More strength									
	1. Ability to perceive the situation with clarity	1	2	3	4	5	6	7	8	9	10
	2. Being patient	1	2	3	4	5	6	7	8	9	10
	3. Perceiving one's own self positively	1	2	3	4	5	6	7	8	9	10
	4. Ability to express emotions appropriately	1	2	3	4	5	6	7	8	9	10
	5.Ability to think positively	1	2	3	4	5	6	7	8	9	10
	6. Having a sense of humour	1	2	3	4	5	6	7	8	9	10
	7.Ability to apply knowledge productively	1	2	3	4	5	6	7	8	9	10
	8. Having confidence in one's own self	1	2	3	4	5	6	7	8	9	10
	9. Accepting one's own self with all the strengths and weaknesses	1	2	3	4	5	6	7	8	9	10
	10. Sustaining hope at difficult times	1	2	3	4	5	6	7	8	9	10
	11. Ability to mobilise resources to solve problems	1	2	3	4	5	6	7	8	9	10
	12. Belief in one's own self to successfully accomplish the task	1	2	3	4	5	6	7	8	9	10
	13. Getting guided by a set of values	1	2	3	4	5	6	7	8	9	10
	14. Perceiving the positive side in everything	1	2	3	4	5	6	7	8	9	10
	15. Ability to communicate effectively	1	2	3	4	5	6	7	8	9	10
	16. Faith in a supreme power to face problems	1	2	3	4	5	6	7	8	9	10
	17. Ability to confront situations in a novel way	1	2	3	4	5	6	7	8	9	10
	18. Having physical energy	1	2	3	4	5	6	7	8	9	10
	19. Ability to perceive and understand the emotions of others	1	2	3	4	5	6	7	8	9	10
	20. Having purpose in life	1	2	3	4	5	6	7	8	9	10
	21. Leading a disciplined life	1	2	3	4	5	6	7	8	9	10
	22. Ability to understand one's own emotional state	1	2	3	4	5	6	7	8	9	10
	23. Taking up any task for its own pleasure	1	2	3	4	5	6	7	8	9	10
	24. Ability to think and act appropriately	1	2	3	4	5	6	7	8	9	10
What is the overall advantage of these strengths that impact your life?		1	2	3	4	5	6	7	8	9	10

FORM D

Instructions:

This sheet consists of 14 items that are considered resources which you receive from the surroundings. Please read each item carefully and identify those that are available to you. On the left of the list, a column is earmarked for you to tick against those that you have. After completing this column, read those items you have ticked. How advantageous is it to have them? On the right side of the sheet, you have 10 columns (1-10) where the lower scores indicate lower advantage and the higher scores indicate higher advantage of such resources. Please read each statement carefully. Decide on its advantage on a score between 1 and 10. Circle the appropriate number that matches with your rating.

Is available	**Items**	**Lower advantage - - - - - - - - Higher advantage**									
	1. Health care facilities within reach	1	2	3	4	5	6	7	8	9	10
	2. A close-knit family	1	2	3	4	5	6	7	8	9	10
	3. Support from person(s) outside the family	1	2	3	4	5	6	7	8	9	10
	4. Supportive friends	1	2	3	4	5	6	7	8	9	10
	5. A comfortable financial position	1	2	3	4	5	6	7	8	9	10
	6. Democratic parents	1	2	3	4	5	6	7	8	9	10
	7. Consistent support from parents	1	2	3	4	5	6	7	8	9	10
	8. Emergency services within reach	1	2	3	4	5	6	7	8	9	10
	9. A supportive husband/wife	1	2	3	4	5	6	7	8	9	10
	10. Consistent disciplining by parents	1	2	3	4	5	6	7	8	9	10
	11. Living in a supportive community	1	2	3	4	5	6	7	8	9	10
	12. Living in a neighbourhood that is supportive	1	2	3	4	5	6	7	8	9	10
	13. An institutional membership	1	2	3	4	5	6	7	8	9	10
	14. An approachable role model	1	2	3	4	5	6	7	8	9	10
What is the overall advantage of these resources that impact your life?		1	2	3	4	5	6	7	8	9	10

FORM E

Instructions:

Below are 8 statements with which you may agree or disagree. On the right side of the sheet, you have 7 columns (1-7) where the lower scores indicate disagreement and the higher scores indicate agreement. Please read each statement carefully. Decide on your agreement with each statement and rate on a scale between 1 and 7. Circle the appropriate number that matches with your rating.

Items	**Disagree -Agree**						
1. I lead a purposeful and meaningful life	1	2	3	4	5	6	7
2. My social relationships are supportive and rewarding	1	2	3	4	5	6	7
3. I am engaged and interested in my daily activities	1	2	3	4	5	6	7
4. I actively contribute to the happiness and well-being of others	1	2	3	4	5	6	7
5. I am competent and capable in the activities that are important to me	1	2	3	4	5	6	7
6. I am good person and live a good life	1	2	3	4	5	6	7
7. I am optimistic about my future	1	2	3	4	5	6	7
8. People respect me	1	2	3	4	5	6	7

FORM F

1. Name:	
2. Age	
3. Gender:	**Male** ☐ **Female** ☐
4. Educational qualification:	
5. Occupation:	
6. Marital status:	**Unmarried** ☐ **Married** ☐ **Separated** ☐ **Divorce** ☐ **Widow(er)** ☐
7. Family status:	**Joint family** ☐ **Nuclear family** ☐
8. Are you suffering from any chronic illness?	**Yes** ☐ **No** ☐
9. Have you had a history of serious illness?	**Yes** ☐ **No** ☐
10. Have you underwent surgery?	**Yes** ☐ **No** ☐
11. Have you met with an accident?	**Yes** ☐ **No** ☐

Appendix 4

Informed consent

I intend to understand the process of Resilience in my study. In this context, I am approaching you for an audio-recorded interview. The focus of the interview is to understand your thoughts, feelings and perspective in understanding and handling the adversity with your resources. I also intend to understand the way you have achieved/accomplished despite adversity. The audio recordings will be confidential and strictly used only for research purpose.

After reading this, the decision to participate in the interview is completely yours. You also reserve the right to withdraw at anytime without stating a reason. If you decide to participate, please sign the consent form below. For any further clarification, you can contact the following,

Study Investigator/interviewer:

Aarthi Rajendran, Research Scholar, Centre for Health Psychology, University of Hyderabad. Ph no: 9441482577

Consent form

I have carefully read the procedure and purpose of the audio-recorded interview. In addition, the investigator/interviewer has also orally explained to me the details and clarified all my doubts about my involvement in the study. With all the information, I hereby give my consent to participate in the audio-recorded interview.

_____

Signature of the participant

Date:

Appendix 5

Semi-structured Interview Schedule

1. What can you talk about the tough situations you have seen/ seeing in your life?
2. What is that in you that you think helped you from problem situations?
3. Who are the other people/ facilities that helped you during your difficult times?
4. Despite all these difficulties, what would you talk about your achievements?
5. How happy are you?
6. In future, if difficulties come, how would you handle them?

Appendix 6

Evolution of the Construct of Resilience: Challenges in Measurement

*Aarthi Rajendran**

Abstract

Resilience as a concept was understood as 'not being vulnerable to life adversities' or 'performance amidst disadvantages. Resilience as a construct had undergone changes with different waves of research. From being defined as an innate 'trait' to being recognised as a multifactorial functional process, the construct has undergone mutation. The outcome of being the subject of research for more than four decades now, the characteristics of resilience can be crystallised to being dynamic, multidimensional, multifactorial, and multilevel. This posed a challenge to arriving at a holistic measurement of the construct. This article attempts to chronicle the efforts at measuring the construct and identifying the gaps in the existing resilience tools. The article in conclusion, highlights the Synergy Model of Resilience in evolving a holistic approach to measure resilience. It also describes the Resilience Test Battery (REST Battery) that successfully tested the Synergy model by measuring resilience as a multidimensional construct.

Keywords: resilience, measurement, synergy model of resilience, and resilience test battery

---

* Doctoral Scholar, Centre for Health Psychology University of Hyderabad ✉ aarthi44pk@gmail.com

Introduction: The journey of resilience has seen waves of research that included theoretical presentations and empirical studies. The construct has been researched now for more than four decades. The origin of the construct can be traced to a time when there was a paradigm shift from human maladaptive behaviour to human growth and positive behaviour. The researchers started focusing on the positive strength that helped an individual during the times of crisis. This focus was unlike the previous perspective, wherein the vulnerability to crisis, risk factors, and suffering and their impact on life was studied.

The pioneering years of resilience research is the basis of all later development that happened to the construct. Alike any new idea, the initial years of research was more explorative and reflected the then contemporary understanding of resilience as a construct. The initial research of Garmezy (1970) explained how a rare few children turned out to be 'invulnerable' despite being in an adverse situation. Thus, the construct of resilience began to be viewed as a rare 'trait' of a few, mostly recognised as an innate characteristic.

With coming years of research, the construct was recognised as a product, as an ability, as a capacity, as adaptation and as a multidimensional functional process. This evolving nature of resilience research might have richly contributed to the literature. However, there are two important observations in this context. Firstly, the definition of resilience appears fluid and secondly, such a fluid understanding would reap measurement issues while handling the construct. It appears to be a difficult task to narrow down the definition of resilience. Further, it has a cascading effect leading to difficulty in operationally defining, constructing and validating tools measuring resilience.

Method: This paper reviewed 49 years of research publications starting from 1970 to 2019. The sources included edited volumes of books on resilience and journal articles retrieved from Google Scholar, Research Gate, and Academia and articles from journals published by Science Direct, Elsevier, Springer, Sage, JSTOR and other national and international journals. The focus of this review article was on the various measurement tools used in empirical research.

Review of Literature: In order to understand the problems in measuring resilience and the problems in the tools measuring resilience, there is a need to critically review the different tools. While reviewing the tools measuring resilience, they can be categorised into, tools directly measuring resilience, like Resilience Scale (Wagnild& Young, 1993), Connor Davidson Resilience Scale (Connor & Davidson, 2003) and Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher & Bernard, 2008). Secondly, resilience measuring tools for a specific age group like Child and Youth Resilience Measure (Ungar & Leinbenberg, 2011), Adolescent Resilience Scale (Oshio, Nakaya, Kaneko, &Nagamine, 2002), Adolescent Resilience Scale (Bulut, Dogan, &Altungdag 2013), Youth Resiliency: Assessing Development Strength questionnaire (Donnon& Hammond, 2007), Resilience Scale for Adolescent (Hjemdal, Friborg, Stiles, Martinussen, and Rosenvinge (2006), and Resilience Scale for Adults (Friborg, Barlaug, Martinussen, Rosenvinge, and Hjemdal, 2005). Thirdly, resilience measuring tools with a hybrid approach (with a co-construct) like Brief Resilience Coping Scale (Sinclaire&Wallston, 2004), Dispositional Resilience Scale (Sinclaire, Oliver, Ippolito, &Ascalon, 2003), Resilience Attitude and Skills Profile (Hurtes& Allen, 2001), and Academic Resilience Scale (Kaur & Singh, 2016).

The tools from the three categories are presented with their tool description and how resilience is measured and followed by the critical appraisal of the tool.

Tools directly measuring Resilience

Resilience Scale (Wagnild & Young, 1993), Connor Davidson Resilience Scale (Connor & Davidson, 2003) and Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher & Bernard, 2008) are found to focus on the personal characteristics, hypothetical resilient responses, and appeared to have ambiguity over the construct of adversity. Resilience Scale (Wagnild& Young, 1993), a self-reporting scale, has two factors viz. personal competence and acceptance of self and life. It has 14 items and the response format is on a 7-point scale that ranges from Disagree (1) and Agree (7). Higher the score denotes higher the resilience. The scale is a combination of statements of positive characteristics (e.g. humour and self-discipline) and simulated resilient response (e.g. finding way out from problem situation). Thus, the scale measured the hypothetical positive characteristics in an individual. Thus, one cannot rule out the social desirability factor in a self-reporting tool having hypothetical situations.

Connor Davidson Resilience Scale (CD-RISC) (2003) is a 5-point scale with 25 items. The items of the scale were drawn from varied sources, to name a few, from the hardiness (Kobasa,1979), from Rutter's contributions orienting towards self-esteem, self- confidence, adaptability, humour, taking responsibility to tackle stressors and Lyon and colleagues' (1999) research on enduring adversity with patience. The scale was administered on four types of sample: community sample, primary care outpatients, general psychiatric outpatients, clinical trial of generalized anxiety disorder, and participants from two clinical trials of PTSD. The reliability was 0.98 and the scale had good construct validity. Even this scale measured resilience as a collection of personal characteristics.

Brief Resilience Scale (Smith, Dalen, Wiggins, Tootley, Christopher, & Bernad, 2008) has six items focusing on recovery from adverse situations. It is a 5-point Likert scale. The scale looked at resilience as bouncing back from hard times, recovery from difficult times and

stressful events with less of trouble and not too long to get over from setbacks in life. It can be seen that the measure of adversity is lacking, in fact, adversity is denoted by hard times, difficult times, setbacks, thereby missing a very important constituent related to the magnitude of adversity. The tool also missed to record the actual measure of the adversity experienced.

It can be observed that all the three scales had no measurement of adversity or its degree of severity, the tools were a list of personal characteristics possessed by the individual. The major requirement of locating the adversities with their severity in a way was compromised by introducing an element of ambiguity by the use of terms such as difficult times/setbacks/hard times. Thus, the tools could not measure resilience in its totality.

Age specific resilience tools

There were resilient tools constructed for a specific age group like the adolescents and adults. Child and Youth Resilience Measure (Ungar & Liebenberg, 2011), the tool consisted of adversities relevant to the group that included exposure to community violence, institutionalization, mental health problems, social dislocation, homelessness, poverty, exposure to political turmoil and war. The reliability was between 0.70 – 0.82 and convergent and criterion validity was assessed. This study has been extensive in covering different cultures, sample from 11 countries, the scope of adversities is fairly good and the measure includes internal and external atmosphere (which are culture sensitive) for resilience to emerge. This was the first resilient tool to give considerable importance to cultural and spiritual factors contributing to resilience and it was administered on a sample which was culturally diverse. It has also included both personal and environmental factors. One significant factor that is missing in the study is the measurement of perceived severity and length or frequency of exposure to the adversity which play a determining role in impacting the person subjected to such adversities.

Adolescent Resilience scale (Oshio et al. 2002) consisted of 21 items with three factors viz. Novelty seeking, Emotional regulation and Positive future orientation. In addition to construction of this tool, as part of validation the resilience was correlated with allied constructs. Resilience score did not correlate with Negative Life Events scale and negatively correlated with General Health Questionnaire. Three clusters emerged after conducting a cluster analysis. First cluster were mentally healthy with little experience of Negative Life Events, second cluster were poorer mental health with many Negative Life Events and the third cluster were mentally healthy despite many Negative Life Events. These three clusters were named as Well adjusted, Vulnerable and Resilient respectively. The mean scores of the Well adjusted and Resilient clusters were higher than the Vulnerable group and this was used as indicator of construct validity. It is a 5-point Likert scale, wherein 5 = definitely yes and 1 = definitely no. The reliability was 0.85 suggesting a good construct validity (Oshio Kaneko, Nagamine, & Nakaya, 2003). The scale apparently measured the internal characteristics rather than resilience in the face of adversity. Looking at the factors Novelty seeking, Emotional regulation and Positive future orientation it indicates the positive characteristics that one requires to possess to successfully face adversity.

Another similar adolescent scale is, Adolescent Psychological Resilience Scale (Bulut, Dogan, & Altungdag, 2013). It includes factor such as family support, confidant-friend support, school support, adjustment, sense of struggle and empathy. Reliability was 0.81 and criterion validity was assessed. It is a 4-point Likert scale (Not exactly suitable for me = 1: Exactly suitable for me = 4).

Donnon and Hammond (2007) constructed and validated the Youth Resiliency: Assessing Developmental Strengths questionnaire. It was based on the strength-based approach. They defined resilience as a combination of intrinsic or personality attributes like self -efficacy, self- esteem etc and extrinsic or interpersonal environment like family support,

community environments and positive peer influence. It consisted of 94 items with 10 factors measuring aspects of family, community, peers, work—commitment to learning, school culture, social sensitivity, cultural sensitivity, self-concept, empowerment and self-control. There were items to check the frequency of the engagement into at risk behaviour and the pro social behaviour. It also was tested for reliability which produced a Cronbach's alpha 0.75 to 0.96. Though the tools are mindful of including the environmental factors like family, school, confidante, work and peer support in addition to internal factors like empathy and sense of struggle and adjustment, self-concept and self-control, it did not measure adversity. Resilience is measured as combination of internal factors which is very restrictive and incomplete way of measuring resilience.

Hjemdal, Friborg, Stiles, Martinussen, and Rosenvinge (2006), adapted 41 items from Resilience scale for adults (RSA) to construct Resilience scale for adolescents (READ). It consisted of five factors, a) Personal Competence, (b) Social Competence, (c) Structured Style, (d) Family Cohesion, and (e) Social Resources. Out of 41 items, two items were deleted and the rest 39 items were retained in the scale. The initial version of READ had a semantic differential scale but later since some adolescent participants found it difficult to understand and respond, it was changed to 5-point Likert scale. Construct validity was checked by validating it with Short Mood and Feelings Questionnaire (SMFQ). The reliability of READ is 0.70 to 0.90. Resilience is measured as a combination of internal and external factors.

The source of Resilience Scale for Adolescents was Resilience Scale for Adults. Friborg, Barlaug, Martinussen, Rosenvinge, and Hjemdal (2005) constructed Resilience Scale for Adults (RSA) consisting of 'personal strength', 'social competence', 'structured style', 'family cohesion' and 'social resources'. It consisted of 33 items. The unique feature of the scale is the response type being semantic differential scale. Higher score denotes better adjustment

and higher resilience. Friborg et al (2005) cross validated RSA with personality, cognitive abilities, and social intelligence. The scale was measured for convergent and discriminant validity. Resilience factors of the scale were positively correlated to well adjusted personality type profile. RSA-personal strength was associated with emotional stability; social competence was correlated with 5Personality Factors-extroversion and 5Personality Factors-agreeableness, as well as Troms Social Intelligence Scale-social skills. Structured style associated with conscientiousness. Interestingly, measures of RSA-family cohesion and RSA-social resources also correlated with personality. These correlations supported convergent validity. RSA was unrelated to cognitive abilities measured by Raven's Progressive Matrices, thereby supporting discriminant validity. However, the validation of RSA was conducted on an exclusive sample of applicants of military training, which could affect the generalisability of the validation.

The critical appraisal of the age specific resilience tools state that among all the six age related resilience tools, only Child and Youth Measure of Resilience (Ungar & Liebenberg 2006) has included adversity as part of the tool. The remaining tools neither included adversity as part of the tool nor have considered any adversity specific to adolescent age group. However, all the tools except Adolescent Resilience Scale by (Oshio, Nakaya, Kaneko, & Nagamine, 2002) have included both internal and environmental factors. In fact adolescent related external factors like school, peer, friend, family and community are featured in the tools. It is important

to observe that resilience is measured as a combination of internal and external characteristics with no reference to exposure to adversity.

Tools with a Hybrid approach

Resilience measuring tools with a hybrid approach refers to situations where resilience is measured using a co-construct. The Brief Resilience Coping Scale (BRCS) (Sinclair & Wallston, 2004) is a good example for this. The scale was constructed with nine items having

theoretical affiliation to cognitive behaviour therapy. The scale describes an active problem solving coping that reflects resilient coping pattern. The factor analyses, gave rise to two factors. Four items that cleanly loaded in the first component constituted the scale as it suited the theoretical requirements. This four-item scale is a 5-point Likert scale. Construct validity was investigated and reliability was 0.69.

Dispositional Resilience Scale (Sinclaire, Oliver, Ippolito, &Ascalon, 2003). The scale has six dimensions- Control, Powerlessness, Commitment, Challenge, Alienation and Rigidity. It is a 5-point Likert scale wherein the name of the scale itself suggested that it measures one's disposition and not resilience. The scale measured the aspects of hardiness and not purely resilience.

Resilience Attitude and Skills Profile (Hurtes & Allen, 2001). It has seven dimensions viz. insight, independence, creativity, humour, initiativeness, relationships and value orientation. It is 6-point response scale. The scale indicates how attitudes and skills like value orientation, creativity, etc. help in an individual being resilient. Possession of these attitude and skills is understood as resilience.

There are tools constructed to measure resilience in a context of academics like the Academic Resilience Scale (Kaur and Singh, 2016). The initial item pool of the scale consisted of 93 items, which were given to experts for pruning. This reduced the number of items to 68. Further, this was pilot tested and item discrimination index was measured. The discriminative power of each of these 68 items were checked and the items falling in the range of 0.20 to 0.90 were retained and the rest were discarded. This brought the final count of items of the scale to 55 out of which 40 were positive items and 15 negative items. The scale is a 5-point Likert scale. Higher score reflected higher academic resilience. The scale was standardised with a good reliability value (r = 0.70) and the concurrent validity was assessed by expert evaluation. The tools measured the five dimensions – personal accountability, positivity, self-reliance,

persistence and problem-solving ability. It indicated the positive characteristics possessed by the individual. However, it did not reflect specific academic related dimensions in its measurement.

Ego Resiliency scale (Block &Kreman, 1996) is a unidimensional scale that focuses on possessing novelty seeking behaviour, novelty thinking, curiosity, and flexibility to adapt to new and unusual situations. The scale indicates resilience as a personality trait and measures the personal characteristics to be present in one to be called as resilient. Possession of these personal traits is identified as resilience.

Resilience tool that followed a hybrid approach i.e. measuring resilience along with a co-construct has more bane than boon. Firstly, the chances of intrusion of intervening variables into the measure resilience or the co-construct is high. Thus, spirit of measuring resilience would be compromised because of the presence of another construct. Further, though resilience and the co-construct may be correlated there may arise conceptual conflict and methodological issues by combining them in measurement. More importantly, even the hybrid approach has missed including the measurement of adversity.

So far, each tool measuring resilience was individually reviewed. However, a phenomenal effort by Windle (2011) in conducting a methodological review of the existing tools measuring resilience cannot be missed. From eight databases, 15 scales measuring resilience was critically reviewed on nine psychometric parameters. These nine parameters were content validity, internal consistency, criterion validity, construct validity, agreement, reliability, responsiveness, floor and ceiling effect and interpretability. None of the resilience tools scored high in the parameters (in other words meeting the 'gold standard'). It was found that all the measures had missing information regarding their psychometric properties. Only three tools, Connor Davidson Resilience Scale (Connor & Davidson, 2003), Resilience Scale for Adults (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005) and Brief Resilience

Scale (Smith, Dalen, Wiggins, Tootley, Christopher, & Bernard, 2008) fulfilled the criterion of recording the psychometric details. Having reviewed 15 tools measuring resilience, only five tools were capable of measuring resilience on multiple levels that reflects conceptual adequacy.

These five tools are the Child and Youth Resilience Measure (Ungar & Liebenberg 2006), the Resilience Scale for Adults (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005), the Resilience Scale of the California Healthy Kids Survey (Sun & Stewart 2007), and the Resilience Scale for Adolescents (Hjemdal, Friborg, Stiles, Martinussen, and Rosenvinge, 2006) and the Youth Resiliency: Assessing Developmental Strengths (Donnon & Hammond, 2007).

Critical appraisal

None of the reviewed scales has a measurement of adversity, one of the pre requisite of resilience. Thus, the existing resilience scales function on the basis of assumed adversity instead of measured adversity. In other words, these scales do not relate to whether the respondent experienced adversity or not. This leaves an open possibility that one may respond to it hypothetically. If so, the measurement cannot qualify as the real measurement of the construct of resilience.

All these scales over emphasise on protective (internal) factors and promotive (external) factors. Nevertheless, presence of such characteristics cannot be implied as presence of resilience, which is not consistent with Rutter's statement that protective factors are not resilience neither do they create resilience. The process of resilience is not adequately reflected in these scales. The process of resilience involves the way the protective factors operate to create a buffer against the adversity. This is not found to have captured by any of the tools.

The conceptual definition of resilience is still debatable. In addition to that, the conceptual and theoretical understanding of resilience is not translated into measurement

through tools. This indicates the glaring inconsistency between what resilience is (definition) and how resilience is measured. Theory or a model denotes and describes the construct with its associated factors and interconnections. Thus, since majority of the tools discussed in preceding paragraphs are not found to be based on a theoretical foundation, they could not adequately and holistically measure resilience.

Rajendran, Hariharan, and Rao (2019) made an earnest effort to address these measurement issues related to resilience by constructing and validating the Resilience Test Battery (REST Battery) based on the theoretical model viz. Synergy Model of Resilience (Hariharan & Rana, 2017). Thus, based on a sound theoretical foundation, developing a comprehensive measurement called Resilience Test Battery (REST) evolved as psychometrically a robust and theoretically a grounded tool.

The REST Battery took into consideration the factor of life adversities not only in its diverse forms but also in terms of their severity, duration and frequency of experience. Similarly, the positive internal characteristics of the individual measured in terms of their presence and the significance attached to them and the positive external/ environmental factors with their perceived significance measured by the scale focused only on the real life experience of the respondent. In addition to these, the measurement of significant life achievements as well as computation of flourishing score based on life experience furnished all the necessary variables required to measure resilience. Thus, the REST Battery not only measured all factors associated in the complex, measure of resilience but also succeeded in removing the hypothetical factor in experience of adversity or response to the adversity.

Since resilience is a complex phenomenon, Rutter (1999) suggested in obtaining the resilience score as a product score through mathematical approach. The REST Battery (Rajendran, Hariharan, & Rao, 2019) also addressed this proposition by adopting a mathematical model in calculating the resilience score which they denoted as Resilience Index

(RI). Resilience Index is a product of complex multifactorial derivation, based on Hariharan-Rana Synergy Model of Resilience (2017). This took into consideration all the factors like the adversity, protective factors, promotive factors, achievement and flourishing in their totality and reality of experience, thus capturing and quantifying resilience with all its complexity.

The synchronisation of the Synergy Model of Resilience, the constructed REST Battery and the mathematical formula derived Resilience Index makes the triad a strong and holistic measure of resilience. In other words, Resilience Index is a product or a concoction of all the essential components like adversity, protective factors, promotive factors, resistance, and outcome factors. Thus, it can be concluded that the triad of Synergy Model of Resilience – REST Battery – Resilience Index have successfully answered the major gaps in measurement of resilience. However, there is a need to apply REST battery on population across cultures, and regions in various parts of the globe in order to arrive at norms based on Big Data.

References

Block, J. &Kreman, A. M. (1996). IQ and Ego-Resiliency: Conceptual and Empirical Connections and Separateness. *Journal of Personality and Social Psychology*, 70(2), 349-361.

Bulut, S., Doğan, U., &Altundağ, Y. (2013). Adolescent Psychological Resilience Scale: Validity and reliability study.*Suvremenapsihologija*, 16 (1), 21-32

Connor, K. M. and Davidson, J. R. T. (2003).Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 18(2): 76–82.

Donnon, T., & Hammond, W. (2007). A Psychometric Assessment of the Self-Reported Youth Resiliency: Assessing Developmental Strengths Questionnaire. *Psychological Reports*, 100(3), 963–978. doi: 10.2466/pr0.100.3.963-978

Friborg, O., Barlaug, D., Martinussen, M., Rosenvinge, J. H., & Hjemdal, O. (2005).Resilience in relation to personality and intelligence. *International journal of methods in psychiatric research*,14(1), 29–42.

Garmezy, N. (1970). Process and reactive schizophrenia: Some conceptions and issue. *Schizophrenia Bulletin, 2*, 30-74.

Hariharan, M & Rana, S. (2017). Conceptual complexity of resilience.In U. Kumar (Ed.). *The Routledge International Handbook of Psychological Resilience* (pp. 24-45) London: Routledge

Hjemdal, O.,Friborg, O., Stiles, T., Martinussen, M., &Rosenvinge, J. (2006). A New Scale for Adolescent Resilience: Grasping the Central Protective Resources Behind Healthy Development. *Measurement and Evaluation in Counseling and Development*, 39, 84-96. doi:10.1080/07481756.2006.11909791.

Hurtes, K. & Allen, L. (2001).Measuring Resiliency in Youth: The Resiliency Attitudes and Skills Profile.*Therapeutic Recreation Journal*, 35(4), 333-347.

Kaur, K., & Singh, D. (2016). Construction and standardization of academic resilience scale.*International Education And Research Journal, 2*(2). Retrieved from http://ierj.in/journal/index.php/ierj/article/view/137

Kobasa, C. (1979). Stressful life events, personality, and health: An inquiry into hardiness. *Journal of Personality and Social Psychology*, 37, 1-11.

Lyons, D. M., Martel, F. L., Levine, S., Risch, N. J., &Schatzberg, A. F. (1999). Postnatal experiences and genetic effects on squirrel monkey social affinities and emotional distress. *Horm.Behavioural*. 36, 266–275.doi: 10.1006/hbeh.1999.1547

Oshio, A., &Nakaya, M., & Kaneko, H., &Nagamine, S..(2002). Development and validation of an adolescent resilience scale.*Japanese Journal of Counseling Science,* 35, 57-65.

Oshio, A., Kaneko, H., Nagamine, S., &Nakaya, M. (2003). Construct validity of the Adolescent Resilience Scale. *Psychological reports*, 93(3 Pt 2), 1217–1222.doi: 10.2466/pr0.2003.93.3f.1217

Rajendran, A., Hariharan, M. & Rao, C. R. (2019). A Holistic Approach to Measuring Resilience: Development and Initial Validation of Resilience Test Battery. *International Journal of Humanities & Social Science Studies (IJHSSS),Vol 6(3),* 52-64.

Rutter, M. (1999). Resilience Concepts and Findings: Implications for Family Therapy. *Journal of Family Therapy*, 2, 119-144. Retrieved from http://dx.doi.org/10.1111/1467-6427.00108

Sinclair, R. R., Oliver, C., Ippolito, J., &Ascalon, E. (2003).Development of a fourth generation hardiness measure.*Manuscript in preparation*.

Sinclair, V. &Wallston, K. (2004).The development and psychometric evaluation of the Brief Resilient Coping Scale.*Assessment*, 11, 94-101. doi: 10.1177/1073191103258144.

Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The Brief Resilience Scale: Assessing the Ability to Bounce Back. *International Journal of Behavioural Medicine*, 15, 194–200. doi: 10.1080/10705500802222972

Ungar, M. &Liebenberg, L. (2006). Nurturing Hidden Resilience in At-Risk Youth in Different Cultures.*Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 15(2), 53-58. Retrieved from https://www.researchgate.net/publication/5460773_Nurturing_Hidden_Resilience_in_At-Risk_Youth_in_Different_Cultures

Ungar, M., & Liebenberg, L. (2011). Assessing Resilience Across Cultures Using Mixed Methods: Construction of the Child and Youth Resilience Measure. *Journal of Mixed Methods Research*, 5(2), 126–149. doi: 10.1177/1558689811400607

Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement*, 1, 165-178.

Windle, G. (2011). What is resilience? A review and concept analysis.*Reviews in Clinical Gerontology*. 21(2), 152-169. doi: 10.1017/S0959259810000420.

International Journal of Humanities & Social Science Studies (IJHSSS)
A Peer-Reviewed Bi-monthly Bi-lingual Research Journal
ISSN: 2349-6959 (Online), ISSN: 2349-6711 (Print)
ISJN: A4372-3142 (Online) ISJN: A4372-3143 (Print)
Volume-VI, Issue-III, November 2019, Page No. 52-64
Published by Scholar Publications, Karimganj, Assam, India, 788711
Website: http://www.ijhsss.com
DOI: 10.29032/ijhsss.v6.i3.2019.52-64

A Holistic Approach to Measuring Resilience: Development and Initial Validation of Resilience Test Battery

Ms. Aarthi Rajendran
Research Scholar, Centre for Health Psychology, University of Hyderabad
Prof. Meena Hariharan
Head, Centre for Health Psychology, University of Hyderabad
Prof. C. Raghavendra Rao
Professor, School of Computer and Information Sciences, University of Hyderabad

Abstract

Resilience refers to performance in the face of adversities. Two factors interwoven with the concept are 'adversities' and 'achievements' each of which leaves wide variations in interpretation. The process of resilience explains the way the protective factors operate as a buffer against the adversities impacting performance. The outcome in the form of resilience is performance in the face of adversities. Because of the inherent complexity of the construct, the measurement of resilience varied widely to suit the researchers' objectives and the sample chosen to study. It is time that attempts are initiated to measure resilience taking into consideration all the factors in operation in the process of resilience. Resilience Battery was constructed taking into account the adversity, buffering factors, and achievement in the face of adversities. Unlike the existing scales of resilience, this tool follows a multidimensional approach and a formula derived Resilience Index. Resilience Test Battery was constructed and validated using the standard procedure. The Resilience test battery was constructed along the lines Hariharan-Rana Synergy Model of resilience that included all the relevant components of resilience. Psychometric properties of the battery were tested and are found adequate.

Keywords: Resilience; resilience battery; resilience index; psychometric properties; synergy model.

Resilience is often described as a process evolving through a curious interaction between the self and the environment. Thus, internal and external factors aid and facilitate in the emergence of resilience. Researchers found that there has been a considerable shift from risk/vulnerability to resilience. A new approach called the Multilayered Social Resilience framework was developed. This framework helps in understanding the interaction between

enabling factors and capacities operating at varied levels of the society (Obrist, Pfeiffer, & Henley, 2010. Rutter (2012) while explaining resilience as a process of overcoming stress or adversity, positive outcome in the face of risk or reduced vulnerability despite adverse life experiences stated that the very concept of resilience as 'interactive'.Ungar (2011) stated that encountering adversity depends not only on the individual but on the "supportive relationships, practical assistance and environmental resources they are able to access". The complexity of resilience was eventually acknowledged by referring to capabilities, processes or outcome indicated by adaptation in the context of adversities (Masten, 2018).

Adversity, the buffering forces and the consequent positive performance are major identified components in resilience. Some studies chose to have a comprehensive measure of adversity by including the past adversities experienced (Beutal, Tibubos, Reiner, Kocalevent, and Brahler, 2017). Adversity can vary in its severity, duration and frequency. Individuals suffer adversities in multiple domains of life. Hence the measurement has to be comprehensive with all the factors included. Similarly, some internal characteristics of the individual (Protective Factors) as well as some factors of the external environment (Promotive Factors) can function as buffers against the adversities. (Hariharan and Rana, 2017).The advantage in having distinct identity for these buffers is their use in tailoring appropriate interventions for enhancing resilience. Thus, Hariharan-Rana Synergy model incorporates the complexity of the constructs of resilience.

Earlier researchers called the internal factors (personal characteristics like autonomy, resourcefulness) and the external factors (healthy relationships, good schooling or strong social support) as 'Protective factors'. They were construed as acting as a buffer and preventing the risk factors harming the person (Rutter, 1987). Hariharan and Rana (2017) classified them as Protective and Promotive factors. The internal characteristics of the individual were called protective factors for they protect the individual against the negative impact of adversities. The external factors in the physical and social environment are called 'Promotive factors' for they help promoting the performance by providing necessary buffer.

Study of resilience should move from variable approach to processes, mechanisms to understand the dynamic inferential and interactional characteristics of the construct in association with, during and after the experience of adversity (Masten and Wright, 2010). Researchers working in the area of resilience have been increasingly feeling the need to capture the construct with its complexity. It is important to understand how multiple levels of influence operate synergistically (Deb, 2018).

The Resilience Test Battery is constructed to measure resilience as a complex construct that operates through a process.

Objective: The objective of this study is to develop and validate a Resilience Test Battery (REST Battery) as a comprehensive measurement of resilience in line with Hariharan-Rana Synergy model and validate it.

Method: The Method involves the steps in construction of the Resilience Test Battery (REST), evolving the scores through application of the formula and testing the psychometric properties of it.

Construction of Resilience Test Battery (REST Battery): The Resilience Test Battery consists of four scales, viz- Adversity scale, Protective Factors scale, Promotive Factors scale and Achievement scale. The process of developing each of these four scales in the battery is described in detail.

Procedure:

Phase I: Construction of the battery: Construction of the scales of Adversity, Protective factors and Promotive factors followed the three-step method involving item pooling, item writing, and item reduction.

i) Item pooling—We reviewed literature related to resilience and existing scales of resilience and identified and noted the major components of adversities. Similarly, buffering factors like innate characteristics and positive environmental factors facilitating performance were also identified from literature and noted down. A series of six brainstorming workshops with the psychologists and students of Psychology pursuing Master's Degree. Participants were given an orientation on resilience. The adversities having wide range of variations across demography, wide range of positive characteristics in people that help them overcome difficulties and stress and a variety of positive aspects in the environment that shields them from impacts of life adversities were discussed along with the identified factors from literature. Participants were divided into small groups and requested to discuss and add to the list of adversities, protective factors and promotive factors (gathered from literature) facilitating performance in resilient persons. At the end of the workshops, items for the Adversity Scale counted up to 106. Items for the scales of Protective factors and Promotive factors totalled up to 32 and 21 respectively.

ii) Item writing- We took each of the three lists evolved in the workshops. Each item was written in the form of short and crisp statement following the standard procedure of item writing.

The produced statements were checked by subject experts for bias and insensitivity and were modified after further evaluation by the committee of subject experts complying with accepted procedural norms (La Duca, Downing, & Henzel, 1995).

iii) Item reduction—Attempt for item reduction was made following the criteria of Non-repetitiveness, Essentiality, Unambiguity and Relevance to Indian context (NEUR). All the items with content validity ratio of 0.44 and above were retained (Lawshe, 1979). Based on the above, 66 items were retained in Adversity Scale 28 items in Protective factors scale and 19 items in Promotive factors scale.

iii) Achievement Scale- A different approach was adopted for evolving Achievement scale because achievements have wide individual variations and have high subjectivity. Instead of writing down the items based on the literature and expert involvement, inputs were taken from a sample. A sample of 100 participants in the age group of 15– 34 years

were asked to narrate their success and achievements in life. This generated 348 responses that delineated expressed accomplishments. These items were then thematically classified under ten categories

Structure of Scales:

i) Adversity Scale—The 66 items adversity scale comprised of statements of situations of adversities ranging from severe life situations like 'facing a natural disaster' to moderate aberrations like 'frequent ill health'. They pertain to adversities incurred by self like 'being jailed' to adversities that are related to one's close environment such as 'one or more family member suffering from prolonged physical or mental illnesses'. The tool was designed to have five columns. The first column on extreme right was blank. The second column consisted of statements on adversities. The third to fifth columns were blank. The first column was for the respondents to tick those statements that they had experienced in their lives. The third column titles 'Severity' was for the respondents to record their ratings of the severity (Ex: Met with an automobile accident), fourth column titled 'Duration' was for rating the duration for which they suffered the adversity (Ex: Suffered poverty) and the fifth titled 'Frequency' required them to record the frequency with which they encountered the adversity (Ex: Discriminated due to one's caste) Only those items in the scale for which the first column is ticked need responses for other columns. Duration and frequency columns have to be filled as per the relevance of the item (Ex: The item 'Suffered poverty' requires to fill the duration column but not the frequency column).

ii) Protective factors scale—The items in this scale consisted of statements related to 28 internal characteristics helpful to one in encountering the adversities. They ranged from simple characteristics like 'having confidence in self' to complex characteristics like 'ability to mobilise resources to solve problems'. The column on the left of those items is left blank. The participants were asked to tick in the preceding column the characteristics present in them. On the right of the 28 items list is a blank column where participants are required give ratings(on a 10-point scale) on their perceived strength of each characteristic in encountering adversity. This rating was required only for the items ticked by the person indicating its presence in him/her.

iii) Promotive factors scale—This scale consisted of 19 statements related to the environmental resources that promoted a healthy encounter with adverse situation. They ranged from family support like 'having a supportive husband/wife' to formal support like 'health care facilities within reach'. In line with other two scales, the participants were required to check the item present in one's environment in the left side column and then rate the item on advantage of the situation/resources (in encountering adversities) to the person on a 10-point scale (1 being low advantage and 10 being high advantage).

At the end of every scale a blank space was left with a notification 'any other' so that the participants could add the items other than what is included in the list.

iv) Achievement scale— The Achievement Scale consisted of the list of ten thematic categories, viz achievements in fields like scholastic, artistic, athletic, career, promotion, scholarships, first generation doctorates, admission in apex institutes, awards received and medals awarded for any distinction. On the left side of the list was a blank column for the participant to tick indicating his/her achievement in the said category. On the right of the list was a column where the participant is required to rate the achievement on a 10point scale, rating the significance of the achievement to the individual(ranging from of low significance to high significance).

Phase II: Pilot testing and finalization of Resilience Test Battery: Sample: The sample consisted of 1333 participants drawn from the age group of 15 – 34 years (mean age = 23.55). This included both the genders (men = 53.41% & women = 46.58%), with a wide range of educational qualifications (higher secondary = 27%; undergraduates = 32%; post graduates and above = 35%; not disclosed = 6%) and all possible marital status (unmarried = 79%; married = 20.4%; divorced / separated= 0.30%; widow = 0.07%; not disclosed = 0.22%). The sample belonged to different occupations (student = 41.71%; home maker = 7.50%; business = 4.51%; self-employed = 3.03%; employed = 10.02%; not disclosed = 33.23%).

The sample was administered the Adversity scale Protective factors scale, Promotive factors scale and the Achievement scale.

Confirmatory factor analyses were carried out on each of the scales separately. In Protective factors scale of 28 items four items with Eigen value less than 0.39 were dropped. Only a single factor emerged. Thus, the final scale of Protective factors consisted of 24 items.

In Promotive factors scale five items with Eigen value of less than 0.39 were dropped. Five factors emerged. However, the factors were not named or considered as the purpose of the scale was to give a single composite score for the formula. Thus, the final scale of Promotive Factors consisted of 14 items No Factor Analysis was done to finalise the Adversity Scale. It was finalized on the criteria of expert decision to satisfy the essential characteristics stipulated by the theoretical postulate. Those items with a mean rating of 8 or above on severity scale were retained. The reason is that the very assumption of resilience as per Hariharan-Rana model (2017) is 'excellence in the presence of high adversity'. Thus, items with ratings lower than those polarized towards high severity may indicate only minor aberration (ex. Fight with a friend) not warranting serious adversity. By following this method, a total of 49 items were retained in the final format of the scale.

Similar to the adversity scale the expert decision was applied in finalizing the items in order to satisfy the theoretical criteria of the model which is 'excellence in the face of high adversity'. Hence, those achievements receiving a rating of 8 or more on the scale of significance to the individual were retained. Following this criterion all the ten thematic categories were retained,

The final Resilience Test Battery consists of four scales namely Adversity scale (49 items and three dimensions of severity, frequency, and duration), Protective factors (24 items), Promotive factors (14 items), and Achievement scale (10 items).

Phase III: Testing the Final Battery and Arriving at a composite Resilience Index: The purpose of developing a Resilience Test Battery is to evolve a composite score of resilience using the scores of all the scales in the battery. Phase III involved administering the Resilience Test Battery on a sample, computing scores for each scale, developing weightages, application of the formula for arriving at the composite score of resilience.

Sample: A sample of 200 adults ranging in age group (19-39years) from both the gender (men = 47.5% and women = 52.5%) from different educational background (higher secondary = 15.5%, undergraduates = 42%, post graduates and above = 23%, illiterate = 6%, Not disclosed = 13.5%) and belonging to different occupation (students = 10%, homemaker = 6.5%, self-employed = 3%, employed = 75.5%, unemployed = 3%, not disclosed = 2%). Marital status (unmarried = 43.76%, married = 56.24%).

Scoring, developing weightages and application of the formula are described in detail below.

a) Scoring: Ratings given for the items for every dimension were totalled and separate mean scores were calculated for the dimensions of severity, frequency, and duration of the Adversity scale. Mean scores were also calculated for Protective factors, Promotive factors and Achievement scale following the same procedure. Resilience Test Battery gave a total of six mean scores for each individual.

b) Deriving the weighted means: The weighted mean score was calculated for every participants for each of the three dimensions of Adversity, the scales of Protective factors, Promotive factors and Achievement and by using the following formula

$$\text{Weighted mean} = \frac{\text{Mean score of the dimension}}{\text{Weight of the dimension}} \times 100$$

Where,
Mean score of the dimension = the mean score obtained by the individual for the dimension
Weight of the dimension = the highest mean score in the data set obtained by any individual on that dimension.

The rationale for taking the highest mean score from the data set can be explained in following terms. Resilience as per Hariharan-Rana model (2017) refers to excellence amidst high adversity. The parameters of adversity, operating factors, and achievement need to be ideally high. In other words, the individual should be facing high adversity, possessing high protective factors (in terms of positive personal characteristics), having high promotive factors (in terms of high positive factors in the environment) and showing high

achievements. Hence, the highest score of the data set considered as 'ideal' is taken as the standard.

Though the Protective Factors and Promotive Factors are scored separately, while applying the formula their scores are combined and treated as 'Operating Factors' because they operate as buffer against the adversity to resist the impact of adversities on the individual. They are combined under the nomenclature of 'Operating Factors'.

Applying the formula mentioned above, the weighted mean scores were calculated for every participant on severity, frequency and duration of Adversity scale, Operating factors (Protective and Promotive factors) and Achievement scales separately. For the sake of clarity and explanation, the means and weighted mean scores of five randomly picked subjects from the data set are presented in Table 1

Table 1: Mean and Weighted mean scores of the five subjects on the six parameters of resilience

Participant	Adversity severity	Adversity Frequency	Adversity duration	Protective factors	Promotive factors	Achievement
1	0.41	0.41	0.41	2.00	2.29	0.90
	(16.67)	(17.54)	(16.00)	(24.24)	(28.83)	(30.00)
2	0.53	0.53	0.53	2.83	3.07	0.90
	(21.67)	(22.81)	(20.80)	(34.34)	(38.74)	(30.00)
3	0.59	0.59	0.59	1.71	1.71	1.00
	(24.17)	(25.44)	(23.20)	(20.71)	(21.62)	(33.33)
4	0.69	1.00	0.98	4.42	7.00	1.00
	(28.33)	(42.98)	(38.40)	(53.54)	(88.29)	(33.33)
5	0.76	0.76	0.76	1.67	1.21	0.00
	(30.83)	(32.46)	(29.60)	(20.20)	(15.32)	(0.00)

Note: The figures in the parenthesis refer to weighted means

c) Deriving indices and evolving the formula: The next logical step was to derive separate indices for the three major components viz. Adversity, Operating factors and Achievement factors, using the weighted mean scores. Achievement is called the 'Outcome Factor' because it is the outcome in terms of performance. At the outset it is relevant to explain the difference between a mean score and an index. Mean scores indicate on an average the score of an individual on a single parameter whereas, an index is a composite value that measures the changes in a representative group of individual data points. It is a compound measure that aggregates multiple indicators. Index involves the score obtained for the parameter and the weight of the parameter. Using this, the indices were calculated for each parameter for every participant in the sample.

i) Adversity Index (AI): This was calculated using the scores of severity, frequency and duration of the adversities experienced by the participants by using the following formula-

$$AI = \frac{(S_{wm} \times S_w) + (F_{wm} \times F_w) + (D_{wm} \times D_w)}{S_w + F_w + D_w}$$

Where,
AI = Adversity index
S_{wm} = Severity weighted mean of the individual
S_w =Weight of Severity
F_{wm} = Frequency weighted mean of the individual
F_w = Weight of frequency
D_{wm} = Duration weighted mean of the individual
D_w = Weight of Duration

ii) Operating Factors Index (OFI) – Operating Factors Index is a combination of Protective and Promotive factors. OFI was calculated for every participant using the following formula

$$OFI = \frac{(PR_{wm} \times PR_w) + (PM_{wm} \times PM_w)}{PR_w + PM_w}$$

Where,
OFI = Operating Factors Index
PR_{wm} = Protective factors weighted mean
PR_w= Weight of Protective factors
PM_{wm} = Promotive factors weighted mean
PM_w = Weight of Promotive factors

iii) Outcome Index (OI) –The Outcome Index is calculated by using the weighted mean scores of Achievements. The following formula was applied.

$$OI = \frac{ACH_{wm} \times ACH_w}{ACH_w}$$

Where,
OI = Outcome Index
ACH_{wm} = Achievement weighted mean
ACH_w = Weight of Achievement

Using the above formula every participant got an Outcome Index (OI)

iv) Derivation of Resistance Index (RSI) — The concept of Resistance Index was construed taking into consideration Richardson's (2002) Meta theory of resilience where he discussed about the protective factors acting as buffers against adversities negatively impacting the

individual's biopsychosocial homeostasis. Resilience is an outcome of curious interaction between the adversities and operating factors. This interaction indicates the application of resistance, by the operating factors against the adversities. For example, a higher score on protective and promotive factors would enhance the Operating Factors Index. Resistance index is proportional to operating factors and inversely proportional to the adversity. Thus, it is a ratio of operating factors and adversity. When the Operating Factors Index is higher than the Adversity Index, the resistance against yielding to adversity is expected to be higher. This resistance factor needs to be quantified. This was done by applying the following formula.

$$RSI = \frac{OFI}{AI} \times 100$$

Where,
RSI = Resistance Index
OFI = Operating Factors Index
AI = Adversity Index

v) Resilience Index (RI)—
Resilience index is proportional to Outcome index and inversely proportional to Resistance index. Thus, it is a ratio of Outcome index and Resistance index.

$$RI = \frac{OI}{RSI} \times 100$$

Where,

RI = Resilience Index
OI = Outcome Index
RSI = Resistance Index

We can explain the Resilience index by applying Hariharan-Rana Synergy model of Resilience. If the Resistance is equal to the Outcome, the level of Resilience would be indicated as average (a score of 100). This helps the individual in insulating oneself from the negative impact of adverse life conditions. These individuals are successful survivors of adversity (Borderline Resilient). When the Outcome Index (measured in terms of Achievement) is more than the resistance applied against adversities, the level of resilience would be more than 100, indicating that the individuals not only managed to survive the adversities but also went a step ahead by manifesting excellence in life achievements.

The resilience score was computed for every participant.

Phase IV—Validation of the Resilience Battery:
Resilience Battery was validated by correlating the scores with the following three scales.

a. General Self Efficacy Scale (Schwarzer & Jerusalem, 1995): The General Self Efficacy scale is a 10-items scale with robust psychometric properties (reliability being 0.76 and 0.90). It is a 4-point Likert scale with responses ranging from "Not at all true" to "Exactly true". The construct of resilience is understood to be positively related to self-efficacy. This scale is used to test the convergent validity
b. Learned Helplessness Scale (Quinless & Nelson, 1988): The Learned Helplessness Scale is a 20-item scale with reliability of 0.85. It is a 4-point Likert scale with responses ranging from "Strongly disagree" to "Strongly agree". Learned Helplessness is used to test the discriminant validity of the battery as it is a construct different to resilience.
c. Resilience Scale (Wagnild and Young, 2009): The Resilience scale is a14 item scale with the reliability of 0.93. It is a 7-point semantic differential scale with responses ranging from "Disagree-Agree". Resilience scale is used as a parallel tool to test concurrent validity. Three separate correlations were computed between Resilience Index and scores of each of the three scales.

The sample of 200 participants were administered these three scales in addition to the Resilience Battery.

Results revealed a significant positive correlation between Resilience Index and General Self Efficacy scale ($r = 0.52$, $p<0.01$) proving convergent validity.

A non-significant correlation between Resilience Index and Learned Helplessness Scale ($r = 0.12$) proved divergent validity. According to Campbell and Fiske (1959) measures of related constructs ought to correlate with each other significantly (indicating convergent validity) while measures of unrelated constructs ought not to correlate with one another if the measures are valid, thus, discriminating between dissimilar constructs.

Concurrent validity was proved through a significant positive correlation between the scores of the Resilience Battery and the scores of the Resilience Scale (Wagnild, 2009) ($r = 0.57$ ($p<0.01$).

Reliability test—The reliability of the Resilience Battery was tested using Test-Retest method.

Sample: A sub sample of 50 participants from among the sample of 200 were administered the Resilience Battery for the second time with a gap of two weeks. The responses on these two tests were correlated. The adversity scale indicated a high reliability on the dimensions of severity ($r = 0.92$, $p<0.01$), frequency ($r = 0.88$, $p<0.01$) and duration ($r = 0.94$, $p<0.01$). The reliability was high for the Protective factors scale ($r = 0.75$, $p<0.01$) and Promotive factors scale ($r = 0.93$, $p<0.01$). The reliability was also found to be high for Achievement scale ($r = 0.92$, $p<0.01$).

Discussion: The objective of this study was to develop a Resilience Test Battery along the Hariharan-Rana Synergy Model and validate the same. The objective is attained by following an innovative path of using the data set and computation. Measuring resilience

from holistic perspective through a battery rather than a single scale is one of the first attempts. Further, evolving a formula capturing the resilience index with steps that meticulously follow the process is an innovative technique. For example, deriving the resistance score from the adversity index and operating factor index and then finding the ratio between the outcome factor index and resistance index to arrive at resilience index in a way follows the trajectory of resilience from adversity to resilience.

The Synergy model of resilience argued that the process of resilience involves the operation of protective and promotive factors as a force of resistance against the negative impact of adversities so that the individual shows high achievements in the face of high adversities.

The formula for computing a composite Resilience Index was conceived taking the process of resilience into cognizance. Assigning weightages for every parameter by taking the highest score of the data set was in line with the concept of 'high achievement amidst high adversities through high resistance' which is the crux of the definition of resilience as per Synergy model.

The attempt of the REST Battery has been to measure all components of resilience in their totality. For example, the adversity scale measures the component on three dimensions encompassing the subjective and objective aspects of the construct. The severity dimension is a subjective assessment that involves the experience-based judgement, while the frequency and duration are objective assessments involving temporal aspects that are objective. This complies with Mehrotra, Narayanan and Tripathi (2018) who argued that assessment of adversity should include the features like its severity, chronicity (duration) and number of risk factors should be measured.

The last part of the formula tests the two functions of resistance propounded by Hariharan-Rana Synergy model. The model postulated that the resistance either helps the individual insulate oneself from the negative impacts of adversity or empowers one to restructure one's adverse environment (Hariharan and Rana 2017, p 29). According to the model the level of achievement depends upon the force of resistance. In this study, the formula that measures the ratio between the outcome index and resistance index implies that when the outcome in terms of achievement is higher than the Resistance Index, the Resilience Index would be higher than 100. When the Resistance Index is higher than the Outcome Index the Resilience Index will be less than 100 suggesting that the efforts using operating factors to encounter the adversities was just short of insulating oneself from yielding to the adversities. Thus, the formula leaves a scope to categorise the participants on the level of resilience in terms of Resilient (RI = 100 or above) and 'Border line Resilient (RI = 80-99). The possibility of this categorization is very important in view of the scope it provides to identify and plan interventions for those who are found in the borderline.

The study successfully validated the Resilience Test Battery (REST) along the lines of Synergy Model of Resilience with good reliability and validity scores. This has to be treated as initial validation. Further studies should apply the REST Battery on larger population and match the scores with qualitative data.

References:

1. Beutel, M. E, Tibubos, A. N, Klein, E. M, Schmutzer G., Reiner, I., Kocalevent, R. D, Brähler, E. (2017). Childhood adversities and distress - The role of resilience in a representative sample. PLoS One, 12(3).
2. Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological bulletin*, *56*(2), 81.
3. Deb, A. (2008). Psychology of Resilience. In G. Mishra (Ed.), Psychological Interventions for Health and Well-Being (pp. 43-53). New Delhi, Springer.
4. Hariharan, M. (1990). Invulnerable children: Some studies on disadvantaged children's competence and coping style (Unpublished doctoral thesis). Utkal University, Odisha, India.
5. Hariharan, M., Karimi, Meena & Kishore, M. T. (2014). Resilience in Persons with Physical Disabilities: Role of Perceived Environment and Emotional Intelligence. Journal of the Indian Academy of Applied Psychology, 40(1), 96-101.
6. Hariharan, M & Rana, S. (2017). Conceptual complexity of resilience. In U. Kumar (Ed.). The Routledge International Handbook of Psychological Resilience (pp. 24-45) London: Routledge
7. LaDuca, A., Downing, S.M., & Henzel, T.R. (1995). Systematic Item Writing and Test Construction. In: J. Impara (Ed.) Licensure Testing: Purposes, Procedures and Practice, 117-148, Lincoln, NE: Buros
8. Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology, 28*, 563–575.
9. Masten, A. S., & Wright, O. M. (2010). Resilience over the life span: Developmental perspectives on resistance, recovery, and transformation. In J. W. Reich, A. J. Zautra, and J. S. Hall (Eds.), Handbook of adult resilience (pp. 213-237). New York: Guilford Publications Inc.
10. Masten, A. S. (2018). Resilience Theory and Research on Children and Families: Past, Present, and Promise. Journal of Family Therapy and Review, 12-13. Doi: 10.1111/jftr.12255
11. Mehrotra, S., Narayanan, A., & Tripathi, R. (2018). Understanding Resilience: Global Trends & Indian Research. In G. Mishra (Ed.), Psychological Interventions for Health and Well-Being (pp. 43-53). New Delhi, Springer.
12. Obrist, B., Pfeiffer, C., &Henley, R. (2010). Multi-layered social resilience a new approach in mitigation research. Progress in Developmental studies, 10 (4), 283-293
13. Quinless, F. W., & Nelson, M. A. (1988). Development of a measure of learned helplessness. *Nursing Research*, *37*(1), 11-5.
14. Richardson, G. E. (2002). The Meta theory of resilience and resiliency. *Journal of Clinical Psychology, 58*(3), 307-321.
15. Rutter, M. (1987). Psychosocial resilience and protective mechanisms. *American journal of orthopsychiatry*, *57*(3), 316-331.

16. Rutter, M (2012). Resilience as a Dynamic Concept. *Development and Psychopathology,24, P 335-344. Cambridge University Press* doi 10.1017So9545794120000028
17. Schwarzer, R., & Jerusalem, M. (1995). Generalized Self- Efficacy scale. In J. Weinman, S. Wright, & M. Johnston, Measures in health psychology: A user's portfolio. Causal and control beliefs (pp. 35-37). Windsor, UK: NFER-NELSON
18. Ungar, M. (2011). Community resilience for youth and families: Facilitative physical and social capital in contexts of adversity. *Children and Youth Services Review*, *33*(9), 1742-1748.
19. Wagnild GM. The Resilience Scale User's Guide for the US English Version of the Resilience Scale and the 14-Item Resilience Scale (RS-14) Montana: The Resilience Center; 2009.

Development and validation of Resilience Tool

ORIGINALITY REPORT

Appendix 7

5%	4%	4%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	docplayer.net Internet Source	<1%
2	go.sdsu.edu Internet Source	<1%
3	www.routledgehandbooks.com Internet Source	<1%
4	Zoe Hildon. "Understanding adversity and resilience at older ages", Sociology of Health & Illness, 07/2008 Publication	<1%
5	www.ncbi.nlm.nih.gov Internet Source	<1%
6	www.tandfo Internet Source	<1%
7	worldwidesc Internet Source	<1%
8	hdl.handle.n Internet Source	<1%

Submission date: 09-Dec-2020 02:35PM (UTC+0530)
Submission ID: 1469621653
File name: For_plagiarism_Compiled_Thesis_final.docx (494.68K)
Word count: 45205
Character count: 243992

from: Antiplagiarism IGML <antiplagiarism@uohyd.ac.in>
to: Meena Hariharan <meena.healthpsychology@gmail.com>
cc: aarthi rajendran <aarthi44pk@gmail.com>
date: Dec 10, 2020, 9:51 AM
subject: Re: Submission of thesis for final plagiarism check
signed-by: uohyd-ac-in.20150623.gappssmtp.com