

**MEASURING RESILIENCE: STANDARDIZATION OF THE MATHEMATICAL
MODEL**

A thesis submitted during June, 2023 to the Centre for Health Psychology, School of Medical Sciences, University of Hyderabad in partial fulfilment of the requirements for the award of

DOCTOR OF PHILOSOPHY IN PSYCHOLOGY

by

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*In loving memory of my late maternal and paternal grandfathers,
whose unwavering belief in education and love for me shaped who I am today.
Though you are no longer with us, your guiding presence continues to inspire
and motivate me on my academic path. This thesis stands as a testament to the
profound impact both of you have had on my pursuit of knowledge. With deep
gratitude, I dedicate this work to the cherished memories of both my maternal
and paternal grandfathers.*

DECLARATION

I, Suma Lavanya Mutnury, hereby declare that this thesis entitled “Measuring Resilience: Standardization of the Mathematical Model” submitted by me under the guidance 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 Shodhganga/INFLIBNET.

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CERTIFICATE

This is to certify that the thesis entitled “Measuring Resilience: Standardization of the Mathematical Model” submitted by Suma Lavanya Mutnury bearing Reg. No. 18CPPH01 in partial fulfilment of the requirements for the 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 publication(s) 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:

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

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The path from dreams to success does exist. May you have the vision to find it, the courage to get on to it, and the perseverance to follow it.

-Kalpana Chawla

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ABSTRACT

Resilience plays an important role in facilitating positive outcomes for individuals during the experience of adversity(s). Resilience research, however, has faced several drawbacks due to lack of a definite scientific measurement, exhaustive definition, sample selection, and absence of a norm for objective assessment. Resilience is not an observable phenomenon and cannot be assessed in a straightforward manner. Understanding of any psychological phenomenon would require standardized measures for quantitative assessment of the construct, as what cannot be measured cannot be studied holistically. A lack of robust resilience-specific measures and the use of non-specific resilience scales has affected the assessment of resilience to a great extent. There is an urgent need for a reliable methodology to explore resilience across the lifespan and development of resilience measures with sound psychometric properties that are universally accepted. The multidimensionality of resilience is seldom reflected in theoretical models describing it. The Synergy Model of Resilience is one such model that expounds resilience as a function of adversities, promotive & protective factors, and resistance, resulting in positive outcomes such as flourishing and achievement, thereby reflecting the multidimensionality of a complex construct like resilience. The development and validation of the Resilience Test (REST) Battery based on the Synergy Model of Resilience has broadened the scope of measurement research in resilience. While the REST Battery is a tool that facilitates the integration of various scales that measure the different components of resilience, it is the mathematical model that helps in synthesizing the various components and evolving one resilience index (RI) value. This mathematical model was developed and put to a preliminary test in an earlier study, which successfully tested its application on a selected sample and recommended further research to examine and verify whether the weights evolved from a sample pass the test of homogeneity to be recommended as a standard for the entire Indian population. The present study aimed to fill in the lacuna

concerning measurement in resilience research by standardizing the Resilience Test (REST) Battery for the population of a country (India) and later as a single standard across nations for cross-cultural application. This was done by primarily assessing whether the weights from the four regions (North, South, East and West) are in agreement with each other; whether the weights from the twenty-five random groups are in agreement with each other; and whether the weights from the mixed model comprising the regional classification and random grouping are in agreement with each other. Six hundred twenty-seven participants were selected through purposive and snowballing sampling techniques from urban and rural locations and administered the REST Battery comprising the Adversity Scale, Protective Factors Scale, Promotive Factors Scale, Achievement Scale, and Flourishing Scale to standardize the process of measuring resilience. The results from the Kendall's Concordance Test, performed to assess if weights from the four regions, twenty-five random groups, and the mixed model are in agreement with each other, revealed a significant agreement among the weights from the four regions, twenty-five random groups, and the mixed model used for computing resilience index values. The findings of this study, that the weights can be universally applied on the Indian population, contributed to the much-needed unified measurement of resilience. By proving that the weights can be universally applied, the study outcome made it possible to compare the groups across the country and measure the resilience index of any individual from India. The development of norms followed standardization of weights to categorize individuals as low-resilients, borderline-resilients, and high-resilients based on their resilience index for nationwide usage in the Indian population. Sound resilience measures will help foster resilience at the population level, contributing to greater physical and psychological well-being of individuals. Moreover, standardized resilience measures can inform the development of interventions that will enable researchers and practitioners to foster resilience in individuals and communities.

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-

LIST OF ABBREVIATIONS

AI	Adversity Index
ARQ	Adolescent Resilience Questionnaire
ARS	Adolescent Resilience Scale
BPFI	Baruth Protective Factors Inventory
BRCS	Brief Resilience Coping Scale
BRS	Brief Resilience Scale
CD-RISC	Connor-Davidson Resilience Scale
DARS	Devereux Adult Resilience Survey
DRS	Dispositional Resilience Scale
ER 89	Ego Resiliency Scale
ERS	Essential Resilience Scale
FS	Flourishing Scale
KCC	Kendall's Coefficient of Concordance
MTTR	Multidimensional Trauma Recovery and Resiliency Scale
OFI	Operating Factors Index
OI	Outcome Index
PFRS	Protective Factors for Resilience Scale
PR-6	Predictive 6-Factor Resilience Scale
RASP	Resiliency Attitudes and Skills Profile
READ	Resilience Scale for Adolescents
REST	Resilience Test (Battery)
RI	Resilience Index
RPFC	Resilience Protective Factors Checklist
RS	Resilience Scale
RS-14	Resilience Scale (Shorter Version)
RSA	Resilience Scale for Adults
RSAS	Resilience Skills and Abilities Scale
RSCA	Personality Type D scale
RSCA	Resiliency Scale for Children and Adolescents
RSES	Response to Stressful Experience Scale
RSI	Resistance Index

SPF	Scale of Protective Factors
STARS	State-Trait Assessment of Resilience Scale
TRS	Trauma Resilience Scale

Chapter I

INTRODUCTION

Chapter I

INTRODUCTION

Resilience is a multifaceted phenomenon theorized in various ways across different fields, including physical sciences, social sciences, ecology, and engineering. Although the context in which the term is used may change, resilience has been associated closely with the capacity of an element to return to a balanced state post any disruption across disciplines. Resilience is understood as the capacity of an individual to cope effectively with an adverse life situation and adapt positively in the face of it. The focus on resilience research and its implication in designing interventions to foster resilience and equip individuals to better deal with impending adversities has gained widespread attention in recent decades. Initially, individuals were seen to cope or succumb when exposed to adversities. This changed in the 19th century with a few individuals not just coping but also emerging successful in the face of adversities. This significance can be attributed to a shift in focus of looking at human functioning from a languishing perspective to a more positive approach to well-being and flourishing.

Historical Origins and Early Resilience Research

The origin of the word resilience is in the Latin word '*resiliens*,' which translates to 'recoil or rebound' (Harper, 2012). The word '*resilire*,' which is the present participle of '*resiliens*,' also denotes the same, referring to *re* (back) plus *silire* (jump), translating to 'jump back' (Kumpfer, 1999). The concept of going back to a state of equilibrium post-disruption has its roots in physical sciences and engineering, referring to the ability to endure strain or to bounce back like a spring to the object's physical form (Masten & Gewirtz, 2006). An interesting analogy by Anthony (1974) was used to explain resilience wherein three dolls made of glass, plastics, and steel, when struck down by a hammer, respond differently to the hammer stroke. The doll made of glass breaks, and the doll made of plastic is damaged. At

the same time, the steel glass does not lose its shape. Also, it emits a pleasing metallic sound, indicating that resilience is not just retaining equilibrium but also displaying novelty or competence in the face of an adverse situation.

It was in the early 1970s that resilience was discovered and researched. With a growing number of researchers focusing on risk and stressors, surprising findings came their way which led to the discovery of individuals performing well despite disadvantages. In the middle to late 1900s, researchers from the West focused on longitudinal research on the proportion of children from at-risk populations presenting with good mental and physical health outcomes despite the structural, familial, and individual disadvantages (Ungar, 2012).

Traumatology, Child psychiatry, and developmental psychology were the areas that were responsible for the origin of resilience research. Each area contributed to resilience research because of its interest in the negative aspects of adversity. Research findings from these fields were later extended over time to study and understand those individuals who have undergone severe adversities (Kumar, 2016; Vernon, 2004).

It was Garmezy, also known as the founding father of resilience and one of the pioneers in resilience research (Masten & Coatsworth, 1998; Garcia-Dia et al., 2013), who, along with his mentor, when studying a sample of Schizophrenia patients, discovered that a specific section of the sample was surprisingly functional in their everyday lives (Rolf & Glantz, 2002). The number of this sample was inconsistent and unpredictable, leading to an increased interest in understanding the underpinnings of these findings. This led to the initiation of a study on children with Schizophrenic parents (Garmezy, 1971). Results revealed that 90% of these children not only did not develop Schizophrenia but also had a positive adjustment towards aspects of competence-peer relations, having a sense of purpose, and academic achievement.

This was the initial reason behind moving from studying risk factors to the forces responsible for children's survival and adaptation. Similar research was taken up by other researchers focusing on the impact of trauma and adversity, resulting in a large number (50%-70%) of children excelling amidst adversity (war, incarceration in concentration camps, sexual and physical abuse, and parental drug abuse) and displayed competence and went to lead developmentally normal lives (Murphy & Moriaty, 1976; Rutter, 1979; Werner & Smith, 1982; Lazarus et al., 1985). All this research ultimately resulted in the paradigm shift from studying stressors or risk factors to understanding the factors resulting in resilient outcomes.

Three Waves of Resilience Research

Resilience research is discussed in four waves; the first wave was concerned with the factors contributing to individual resilience, research in the second wave focused on acquiring those protective factors helping young individuals achieve this, the third wave dealt with fostering resilience in individuals by strengthening the protective factors, and the fourth and emerging field is focusing on resilience at the neural and cellular levels (Masten, 2007; Wright et al., 2013).

The first wave of resilience research focused on the 'what' questions about those factors related to resilience. Person-focused and variable-focused approaches were adopted to identify the factors impacting resilience. While the person-focused approach outlined the characteristics of those individuals who were termed 'resilient' compared to those who weren't resilient when exposed to the same situation, the variable-focused approach examined the relationship between these individual characteristics and their environment, resulting in resilient outcomes. Resilience research in the first wave resulted in identifying characteristics, personality traits, and environmental factors that were supportive and associated with better and positive outcomes for individuals. The community, family, society,

cultural, and child-related factors were assessed and ascertained. Thus, the first wave of resilience research focused on identifying the protective and promotive factors (Luthar & Cicchetti, 2000; Wright et al., 2013).

The second wave of resilience research focused on the ‘how’ of acquiring factors responsible for resilient outcomes in individuals. The second wave of resilience research focused on understanding the process responsible for imbibing the protective and promotive factors for protection against risk or adversity. There was also an interest in understanding the interaction between the factors identified in the first wave in producing resilient outcomes. Factors promoting resilience and protecting individuals from adversities were found to operate in high- and low-risk environments (Wright et al., 2013; Mizuno et al., 2016).

The resilience research in the third wave concentrated on fostering resilience for all when the construct was not playing its course naturally. This wave of research emphasized integrating the findings from the first and second waves of research to develop interventions to foster resilience to prepare individuals to face any impending adversities (Masten, 2007). Finally, the fourth and continuing wave of research began focusing on the neurobiological and scientific basis for resilience and understanding resilience as a multidimensional and multilevel construct (Masten & Obradovic, 2006).

Thus, we can see that resilience research has been marked by integrating and translating research in all the waves, contributing to a better knowledge base about the construct. The ongoing investigation is testimony to the fact that resilience research is yet to reach saturation, and research through each wave only focuses on throwing light on some of the phenomena's most integral and complex dimensions.

Conceptualization

The numerous conceptual and methodological difficulties that have long plagued resilience research are still present today. These difficulties have compelled scholars to develop consensus-based definitions that accurately describe the underlying principles of a dynamic construct like resilience (Deb, 2018). Many review studies attempted to find the common factors among the definitions of resilience (Stainton et al., 2019; Ayed et al., 2019). Early studies labeled some resilient people as “invulnerable” and “invincible,” but this terminology was later abandoned because it failed to account for any harm an individual might sustain in the face of an adversity (Werner & Smith, 1982).

The idea of resilience has undergone a significant shift during the past two decades, moving from a trait-oriented to an outcome- or process-oriented stance. According to trait-oriented research (Block & Block, 1980; Ong et al., 2006; Hu et al., 2015), resilience is mainly determined by a certain type of personality, frequently referred to as a “hardy personality.” It helps individuals adapt more effectively to stress or adversity. When evaluated as a trait, resilience is regarded as a permanent and innate quality. However, that notion has only been supported by insufficient empirical data (Bonanno & Diminich, 2013; Kalisch et al., 2017). Instead, personality is understood as one of the many risk or resilience factors for preserving or restoring mental health (Luthar et al., 2000; Bonanno & Diminich, 2013).

Resilience was also increasingly viewed as an outcome in the recent years (outcome-oriented approach). Resilience when viewed as an outcome refers to the ability to maintain or regain one’s physical or mental health in the face of significant stress or adversity (Kalisch et al., 2015; Kalisch et al., 2017). Resilience in this context is essentially predicated on subjection to significant risk or adversity (Luthar et al., 2000; Masten, 2001; Earvolino-Ramirez, 2007; Jackson et al., 2007). In this regard, it is only possible to evaluate a person’s

psychological resilience if they have experienced a stressful event or are currently undergoing any stressful event.

Resilience as an outcome is assumed to be changeable (Masten, 2001) and is affected or partially predicted by a number of characteristics related to resilience (Bonanno & Diminich, 2013). Resilience factors can protect individuals by modifying how they respond to stress and adversity from the potentially negative impact of stressors they encounter (Rutter, 1985; Fletcher & Sarkar, 2013). Genetics, resilience-promoting personality qualities like hardiness or optimism; beliefs like self-efficacy are all internal determinants and examples of these variables (Southwick et al., 2011; Southwick & Charney, 2012). In addition to the individual viewpoint, Hobfoll et al. (2015) highlighted the importance of resources (external and environmental) for resilience, including the accessibility and stability of those resources.

The concept of resilience as an adaptation process is increasingly gaining ground (process-oriented approach). Masten (1994) recommended using the term ‘resilience’ to adapt sustainably under challenging circumstances. Many researchers have supported this view as it encompasses the two essential prerequisites of a dynamic construct like resilience, the presence of a threat, and adaptation in the face of this experienced threat (Richters & Weintraub, 1990). Luther et al. (2000) advocated for not considering resilient qualities as predetermined but as those resulting from the life experiences of individuals. Researchers not considering individuals’ subjective experiences and undermining the role of individuals as active agents capable of operating on the immediate environmental stimuli have been criticized for not providing a holistic view of the construct (Gladstone et al., 2006).

Hence, the need to view resilience as an interactive, dynamic, multidimensional, and multi-factorial construct has been emphasized over the years by a multitude of researchers as

this will enable researchers to be able to view the construct for its complexity and help delineate all the essential elements of resilience (Garmezy et al., 1984; Rutter, 1987; Hill et al., 2018; Curtis & Cicchetti, 2007).

Theoretical Frameworks

There have been numerous theories and models of resilience put forth. Some characteristics of resilience are shared by many approaches, viz., understanding resilience as a dynamic construct and that interactions between multiple aspects within the resilience process affect an individual's resilience range. However, each theory or model has a distinct focus, approach, and course toward delineating the nature of resilience.

Models of Resilience

There are three primary models of resilience viz., the compensatory model, protective model, and the challenge model explaining resilience in the context of risk. These models fundamentally focus on describing the same processes for determining the impact of stress on individual adaptation and elucidate the mechanisms through which resilience factors alter the course from a risk exposure resulting in negative consequences (O' Leary, 1998; Fergus & Zimmerman, 2005; Mehrotra et al., 2018).

According to the compensatory model, resilience factors directly impact an outcome. Both the risk and resilience factors work independently in impacting the outcome. The resilience factors operate in the direction opposite to the working of a risk factor (Fleming & Ledogar, 2008; O' Leary, 1998).

In the protective model, resources or assets mitigate or lessen a risk's effects on a bad outcome. Protective factors may affect outcomes in a variety of ways. They might diminish, but not completely eliminate, the negative impact of risks. They might also strengthen another promoting factor's favourable influence in bringing about a result. In the protective

factor model of resilience, there is an interaction between protection and risk factors, which reduces the probability of a negative outcome and moderates the effect of exposure to risk (Fleming & Ledogar, 2008; O' Leary, 1998).

The challenge model is a third resilience model. The relationship between a risk factor and an outcome in this model is “curvilinear.” Whereas exposure to low and high levels of a risk factor is linked to adverse effects, moderate levels of the risk are linked to less harmful (or advantageous) results (Fleming & Ledogar, 2008). According to the challenge model, if a risk factor is not too severe, it can actually improve an individual's adaption. Essentially, the experience gets the person ready for a subsequent challenge (O'Leary, 1998).

There are also specific theories describing the resilience process in context to personal loss, trauma, or in generic terms and are explained in the following paragraphs.

Resiliency Model

The Resiliency Model proposed by Richardson et al. (1990) was developed based on the Law of Disruption and Reintegration given by Flach (1988), who explained the process of resilience in a two-step model where the stress and adversity result in disruption and an individual combats this disruption via reintegration. Richardson developed this prominent model of resiliency to say individuals accessed resilient qualities through conscious or unconscious choice, and these resilient qualities were attained through disruption. He said they could choose the outcomes post disruptions unconsciously or consciously.

An individual's biopsychospiritual homeostasis, which is an adapted state of mind, body, and spirit of an individual, is disturbed due to the continuous bombardment in the form of adversities, stressors, life-events, and any other conditions of change. Individuals deal with these events with the help of protective factors, and an individual's perceived seriousness of any of these factors depends on his or her resilient qualities and experiences of previous

resilient reintegration. Individuals land in a state of equilibrium when they adapt to their current scenarios. Continuous interactions between events and protective factors determine whether disruptions occur, and individuals might have to let go of their comfort zone. With the passage of time, an individual tends to consciously or unconsciously think of his/her situation, thereby initiating the reintegration process.

One can indulge in resilient reintegration, make an effort to return to the state of homeostasis, or engage in reintegrating with loss or reintegrate in a dysfunctional manner. Resilient reintegration essentially focuses on growth and insightful learning post disruptions. This is introspective and aims at determination, gaining access to, and fostering resilient qualities. They focus on the recognition and sustenance of resilient qualities.

Reintegration back to bio psychospiritual homeostasis means staying in the comfort zone and avoiding any learnings or growth post disruptions, though this isn't always possible. Individuals just focus on healing and getting past disruption in this scenario. Some might recover from a loss, meaning these individuals give up some motivation, hope, or drive due to constant stress from the life prompts experienced. Dysfunctional reintegration results when individuals resort to maladaptive practices to cope with the life prompts and indulge in substance abuse or disruptive behaviours.

Integrative Coping, Resilience, and Development Model

Leipold and Greve (2009) proposed an Integrative Coping, Resilience, and Development Model to theorize successful aging. According to the authors who contended that resilience is an individual's ability to remain stable under challenging conditions, results from a great degree of coping mechanisms, including assimilation and accommodation impacted by personal and contextual factors. Resilience was proposed to be understood as a bridge between coping and successful development.

A Model of Resilience in Response to Psychological Trauma

A Generic Model of Resilience was proposed by Agaibi and Wilson (2005) to explain resilience in the aftermath of psychological trauma. The model identifies crucial factors that interact dynamically to determine the resilient behaviour brought on by traumatic life events. The model explains resilience in relation to an individual's perception, processing, and adaptation to traumatic stress from a person-environment framework. The model's integrative design makes it easier to recognize the complex interactions between several factors that can result in a continuum of adaptable behaviour and varying degrees of resilient behaviour after psychological trauma. Resilience was essentially construed as the result of complex interactions.

Hypothesized Model of Resilience

Mancini and Bonnano (2009) put forward the Hypothesized Model of Resilience, which views resilience as a dynamic and multifaceted process influenced by individual and environmental factors. They have studied individuals' capacity to cope, recover and emerge resilient when dealing with loss. According to the model, individual, and exogenous factors influence coping. Individual elements encompass personality characteristics such as defences, self-enhancing biases, attachment style, optimism, identity complexity, capacity for positive emotions, and comfort from positive emotions. These individual factors, directly and indirectly, impact coping, which involves emotional, cognitive, and behavioural dimensions. This is done via emotional and instrumental social support and one's appraisal regarding the event's impact on one's life. Coping involves the emotional dimension dealing with the dynamic regulation of negative emotions and oscillation between negative and positive emotions; the cognitive dimension dealing with the downward comparisons and benefit finding; and the behavioural aspect dealing with self-disclosure and flexible adaptation.

Exogenous factors such as financial resources, cultural beliefs and practices, and physical health also affect coping, resulting in resilience (understood as an outcome), positive experiences, minimal impairments in everyday functioning, sadness quickly resolving, and minimal symptoms. The model also mentions a bi-directional relationship between coping and resilience.

Below are explanations of context-specific theories associated with the armed services (military and police personnel), the organizational structure, the field of medical sciences with a focus on nurses, chronically ill individuals and students pursuing medicine, and sports.

A Theory of Risk and Resilience in Military Families

Palmer (2008) proposed The Theory of Risk and Resilience to discuss the risk and resilience factors contributing to the distress of many military families primarily due to continuous exposure to combat, frequent relocation, PTSD, and deployment or post-deployment reunion. These were considered to be impacting the psychosocial and academic outcomes of children. The findings suggested an indirect pathway leading to negative consequences due to parental stress and psychopathology than a direct impact of the military lifestyle on children. However, the authors made the supposition that resilient characteristics include a person's social circle of people with comparable experiences and interests, steady employment, accessible medical care which is also free, and legal support. This model was proposed as a suggestive measure to understand the resilience factors and plan for future interventions.

The Stress Shield Model of Resilience

The Stress Shield Model of Resilience (Paton et al., 2008) provides a proactive framework for fostering and maintaining police officer resilience by integrating individual, team, and organisational variables. According to the model, a police officer's ability to make

difficult situations meaningful, clear, and controllable reflects the interaction of organizational, team, and individual variables. The study by the authors makes the case that theories taken from the literature on occupational health and empowerment may be used to create a model that considers these elements. This model presented a novel multilevel model of resilience and adaptive ability that builds on previous empirical studies wherein the model can help incorporate the significance of drawing resilience from past experiences to strengthen an officer's capacity to respond to future risk and uncertainty. Finally, this model explains that a person or group's capacity to draw on their psychological and physical resources and skills in ways that enable them to make difficult situations comprehensible, controllable, and meaningful is reflected in how resilient they are.

The Theoretical Model of Organizational Resilience

Xiao and Cao (2017) proposed a model which regarded organizational resilience to be influenced by many factors and at many levels, thereby developing on a multilevel and multi-factors concept according to the Model of Organizational Resilience. An organization needs to be resilient at every level, individual, group, and organizational. Factors operating at each level vary with the individual's personal characteristics, such as optimism, confidence, belongingness, and faith, contributing to the resilience of individuals to be a positive factor for the organization. Resilient groups can view failures and inadequacies as opportunities for growth and learning. Finally, social capital, adaptive structures, attention to failure, and improvisation are the main factors operating at the organizational level. Authors think there will be a mutual influence between every level and 'level transition' operating between low to high levels. This interactional relationship between members will aid in resilience and organizational growth, resulting in forming organizational resilience. This model was only a preliminary idea discussing the impact of a multi-factor and multilevel approach to organizational resilience, which needs to be expanded and tested.

Nursing Model of Resilience

An effort was made by Polk (1997) to create a Nursing Model of Resilience as well as an intermediate theory of resilience. According to Polk (1997, p. 5), resilience is “the ability to transform disaster into a growth experience and move forward.” The four patterns (relational patterns, situational patterns, philosophical patterns, and dispositional patterns) that make up the underlying pattern of resilience were used to categorize the defining qualities of resilience, each of which makes a distinct and active contribution to the person’s support.

Coping Reservoir: A Conceptual Model of Medical Students Well-being

Dunn et al. (2008) reviewed the literature on medical students’ stress, coping strategies, and well-being and created a model of coping they called the “coping reservoir” to emphasize the dynamic nature of students’ experiences with possible results, which also included enhanced resilience and mental health as opposed to burnout and distress. This Coping Reservoir: A Conceptual Model of Medical Students’ Well-being, incorporates the idea regarding the structure of the reservoir, paired with a variety of inputs, which are both good (filling or refilling the reservoir) and negative (draining the reservoir), and can result in either positive or negative effects, such as resilience and improved mental health or burnout and cynicism. The reservoir contains an internal framework comprising the individuals’ characteristics, temperament, and coping mechanisms. These dynamically refill or deplete the reservoir when students employ adaptive and maladaptive coping mechanisms. Hence, according to the authors, students must be equipped with the tools and chances to increase their awareness of their health and well-being throughout their training and acquire enduring skills to maintain their reservoirs. In this way, they may continue to grow as professionals competent in caring for themselves and others.

The Grounded Theory of Personal Resiliency

The grounded theory study (Denz-Penhey & Murdoch, 2008) built the Grounded Theory of Personal Resiliency which aimed to find commonalities among the accounts of patients with severe illnesses and a survival rate of less than 10%. This study explored the data that could define variables common to those individuals who experienced unexpected positive outcomes in terminal diseases. The authors investigated the core theme, viz. *personal resiliency*: an approach of being and acting in the world that allowed the person to feel deeply connected to life through interpersonal relationships and a high quality-of-life experience that resulted in their illness being secondary to their living. Resiliency required five significant aspects for the participants to access their desired quality of life: connectedness to their family, social environment, to their physical environment, to their sense of inner knowledge (experiential spirituality), and psychology with a supportive mindset and way of living which supported their values.

The Grounded Theory of Psychological Resilience and Optimal Performance

The Grounded Theory of Psychological Resilience and Optimal Performance was given by Fletcher and Sarkar (2012) to explain the relationship between psychological resilience and optimal sports performance. According to the theory, psychological resilience is seen as a comprehensive phenomenon encompassing stressors, psychological factors (positive personality, motivation, confidence, focus, perceived social support), cognitive appraisal of the challenges, meta-cognitions, and facilitative processes resulting in optimal performance. These psychological factors are known to influence stress-resilience performance among athletes and bring forth facilitative responses that affect an athlete's optimal performance.

Conceptual Model of Resilience

According to Galli and Vealey's (2008) Conceptual Model of Resilience, resilience results from the perturbed states brought on by an athlete's stress exposure and is controlled by socio-cultural factors and individual resources. This theory contends that when athletes are reintegrated after a traumatic event, they demonstrate positive reactions which improve their resilience skills; in other words, resilience is more than just an attribute of athletes; it also incorporates environmental factors and internal adaption processes. However, the reintegration process that helps athletes improve their resilience skills is not described by the authors as it happens in training.

Also, some theories and models are given to explain resilience in specific exclusive contexts, such as adolescent oncology, shame in adulthood, and community and youth-related vulnerabilities.

Adolescent Resilience Model

The Adolescent Resilience Model was developed by Haase (2004) to provide a framework resulting in improvised care for adolescents with cancer and their families. This was designed to suit the context of adolescent oncology. The model discusses three components important for manifesting resilience: outcome, risk, and protective. The model proposed a comprehensive and integrative presentation of the processes and outcomes of resilience and quality of life in adolescents with cancer.

The Grounded Theory of Shame and Resilience

According to Van Vliet (2008), shame is understood as an adversity, and individuals become resilient post overcoming the experience of shame. The Grounded Theory of Shame and Resilience says that individuals can overcome shame by engaging in a process of self-reconstruction that involves several steps. This process includes connecting with others,

refocusing their attention, accepting their experiences, understanding the causes of their shame, and resisting the negative effects of shame. In other words, individuals recover from shame by rebuilding their sense of self through actions that involve reaching out to others, changing their perspective, accepting their emotions, and actively challenging the negative thoughts and beliefs associated with shame. This process of self-reconstruction can help individuals to develop resilience and move forward from past experiences of shame.

Conceptual Model for Community and Youth Resilience

Brennan (2008) proposed the Conceptual Model for Community and Youth Resilience based on the various vulnerable circumstances encountered by the community, specifically the youth. These vulnerable circumstances included social vulnerabilities (diminished local resources) and socio-economic traits (depressed economies, constrained employment prospects). These elements interacted with one another and affected how much the community agency and social assistance were needed. The interactive action that leads to community agency is started by social support. The antecedent agent is the intervening circumstance which is the community agency that fostering resiliency and affects the result (quality of life).

Most models and theories tried to describe and explain the complex processes associated with a construct like resilience in specific contexts. Though many theories explained the concept of resilience, there were some limitations to studying a complex construct like resilience, viz., the lack of a model to consider all the essential elements of resilience, equating resilience to other positive psychology variables, or generalizing the experience of adversity. Therefore, a theory or model that can adequately capture resilience's multifactorial, multidimensional, and dynamic characteristics was considered essential in studying resilience. This understanding was also supported by researchers advocating a

compelling need to move away from looking at resilience from a trait-based approach and embracing the conceptualization of resilience in a process-based manner which encompasses the multifactorial nature of the term (Bryan et al., 2018). Also, Masten and Wright (2010) underscored the need for resilience to be comprehended as a ‘dynamic, interactional, and inferential’ construct across models/theories to elucidate what happens to an individual during and post the experience of an adversity.

This need for a theoretically sound and robust model of resilience was met by The Synergy Model of Resilience (Hariharan & Rana, 2016), takes into account the complex nature of resilience and explains resilience, as a unique function of the experience of adversity, internal characteristics, and external environmental support, together referred to as operating factors and resistance; which results from the interaction between the adversity and the operating factors and brings forth positive outcomes (achievement or flourishing) for an individual. Rajendran (2020) described the salient features of resilience as expounded by the synergy model (Hariharan & Rana, 2016) of resilience, which encompasses all these factors. A brief description of the construct reflecting its multidimensionality according to the model is given below.

Resilience was described as a multifactorial, multilevel and dynamic construct by the Synergy Model. The term ‘multifactorial’ refers to the presence of several crucial factors that influence the resilience process, such as the adversity experienced, an individual’s internal and external resources, and the final outcome or result of the resilience process. On the other hand, the term ‘multidimensional’ implies that these factors should be viewed and understood in a multidimensional manner, rather than simply considering their presence or absence. For example, the severity, duration, and frequency of adversity should be considered and measured in order to categorize the range of adversity faced by an individual, from minor challenges like illness to major incidents such as accidents, and from daily stressors like work

pressure to significant life events like the death of a loved one. These dimensions help to differentiate the various degrees of adversity an individual may experience. This multidimensional view of adversity/risk factors is endorsed by Mehrotra et al. (2018), who supported the need to consider the experience of all the multiple adversities an individual experiences along with the severity and chronicity of the experienced adversities.

The term ‘multilevel’ refers to how the interaction between the integral factors, such as adversity, an individual's internal and external resources, and outcome indicators, and how one can determine the resilience level of an individual. Therefore, depending on how these factors interact, it is possible to determine the level of resilience an individual exhibits. This can help identify whether an individual is merely adapting and managing to survive a situation or is successfully exhibiting resilience.

Finally, when facing a challenging situation, an individual evaluates their available and effective resources. These resources can be categorized into two dimensions: internal characteristics such as positive thinking and being enterprising, and external resources such as supportive parents, teachers, or access to healthcare. The purpose of these resources is to provide defence against negative impacts, resist such impacts, and enable an individual to perform and outshine in challenging circumstances. The question is whether these factors stop functioning after helping an individual withstand negative impacts or whether they can be leveraged to achieve success. Also, it would be narrow-minded to only consider the presence of a positive outcome. It is important to understand the significance of the outcome to the individual and how it impacts their overall well-being, followed by the positive impact and reflections the individual exudes.

Thus, the need for a theoretically sound and robust model of resilience was met by the Synergy Model of Resilience (Hariharan & Rana, 2016). The model focused on addressing all

the critical aspects of the construct of resilience and incorporated all the essential elements of resilience. The model acknowledged resilience as a product and process, describing the interplay between the integral factors contributing to resilience. This model was empirically tested in an earlier study by Rajendran (2020), where a tool, the Resilience Test (REST) Battery, to assess resilience based on this model was developed and validated. The present study focuses on standardizing resilience measurement based on the revised Synergy Model of Resilience.

Blueprint

The thesis is a psychometric study focusing on standardizing the REST Battery developed on the lines of a conceptually sound model, the Synergy Model of Resilience. It is written in accordance with the 7th edition of the APA Publication Manual. The study is described in five chapters, along with this one. The objective and a review of recent literature are covered in Chapter II. The methodology adopted to conduct the study is outlined in Chapter III. Results, including statistical analyses, tables, and figures, are presented in Chapter IV. Chapter V details the discussion, limitations and implications. Following that, two separate divisions viz., References and Appendices—are included in the thesis.

Chapter II

REVIEW OF LITERATURE

Chapter II

REVIEW OF LITERATURE

This chapter is an in-depth review of resilience literature pertaining to the main theme of the study supported with concomitant concepts explained and critiqued. The review is conducted with an objective to justify the need for operationalization of the construct and development of standardized measures of resilience. Both empirical and theoretical studies have been included in this chapter. Classic and recent studies were considered for the review to trace the development of resilience research over the years and also discuss the recent trends in resilience research. The review begins with an account of the scientific concerns and challenges of resilience research, a critique of measurement and resilience encompassing an account of various psychometric tools dealing with measurement of resilience, methodological frameworks, importance of standardization, benefits and challenges of standardization in resilience research, description of the Synergy Model of Resilience, and development and validation of the Resilience Test (REST) Battery, finally culminating with the need for standardizing the Resilience Test (REST) Battery.

Resilience Research: Scientific Concerns and Challenges

Researchers have a diverse opinion regarding the definition and operationalization of resilience, discordance in conceptualizing resilience as a trait vs process, and incongruity about the terminology used across models and measures of resilience are some of the major concerns and challenges of resilience research (Luthar et al., 2000).

Defining Resilience

Rutter (2013) proposed resilience to be a dynamic construct and though it is quite tempting to adopt a binary approach to understanding resilience, concluding the presence or absence of the construct universally is only seldom possible. The dynamic nature of resilience has also been emphasised by Luthar (2015) explaining that “resilience is never an across-the

board phenomenon.” Resilience is often understood to be present in varying levels across different territories of life (Pietrzak & Southwick, 2011). It is imperative to postulate whether the construct is simply a trait, a continuous process, or an outcome of several processes. Defining resilience specifically is the pre-requisite for developing a measure of resilience. Resilience as a construct is integrated from various disciplines and multifaceted. The definition of resilience given by the American Psychological Association (2014) was “the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress (para. 4).” Though this definition was quite useful, it was not capable of reflecting the complex nature of a construct like resilience viz., the multidimensional, multifactorial, and dynamic aspects related to the construct (Southwick et al., 2014).

Majority of the definitions of resilience focus on relative resistance to a risk or overcoming of stress or adversity (Bowes & Jaffee, 2013). Rutter (2006) used the term to refer to those individuals who had positive psychological outcomes in spite of facing adversities which otherwise have a serious negative consequence; it was essentially described as an interaction between risk (adversity) and constructive adaptation when encountered with it. Luthans et al. (2006) defined resilience as the developable capacity to rebound from adversity. It wasn't just positive adaptation to an environmental stressor but also the capacity to sustain this positive and adaptive behaviour (Bonanno, 2004). The systems approach to resilience was given by Sapienza and Masten (2011) where resilience was defined as the competence of an organismic process to withstand any instabilities that pose a threat to its viability, functioning, or development and adapt successfully in the face of it.

Operationalization of resilience to converge into a universally accepted resilience measure has been a challenging task for resilience researchers. Measurement of resilience has encountered a lot of criticism. Firstly, many existing measures claiming to measure resilience lacked sound psychometric properties as seen in a methodological review conducted by

Windle (2011) on the existing resilience measures. Secondly, psychological tools measuring factors associated with resilience such as well-being etc., have been used in the measurement of resilience (Hemenover, 2003). Also, other existing models of resilience do not outline a universal approach for comprehending resilience which leads to most of the tools claiming to measure resilience yet falling short to be reflective of the construct's multidimensionality. Lastly, adversity and operating factors alone are not sufficient to generate and foster resilience without measuring the resistance used in combating the adversities. This resistance enables an individual to restructure the adverse environment and insulate self from adversity. Though the concept of resistance was discussed as part of theory as 'steeling effect' or 'reintegration' (Anthony, 1974; Richardson, 2002) no single measure tried to assess the role of resistance in the context of resilience. The Synergy Model of Resilience (Hariharan & Rana, 2016) included and discussed resistance as an important component of resilience.

Issues Related to Measurement of Resilience

A variety of methods for measuring resilience have emerged across disciplines. The multitude of resilience definitions highlights the diversity of application in specific contexts. It is easy to conclude that the precise application of resilience ('resilience of what and to what?') and how it's defined will considerably impact how it is assessed or measured (Carpenter et al., 2001; Alinovi et al., 2008).

Much disparity in the measurement tools of resilience led to researchers' questioning if all the existing resilience measures were even measuring the same construct, as the seemingly simple construct of resilience is a term loaded with complexities, ambiguities, and contradictions (Kaplan, 1999). Different measures have been developed, translated, and validated for inclusive usage by all. These different measures define resilience in different ways, and hence there is a lack of one standard universally accepted resilience scale. This scale should have the potential to measure resilience across all situations. A measurement tool

that resolves the issue of situational variations and gives an accurate measurement also would provide a universal conceptualization of the phenomenon. Better conceptualization of resilience is a crucial prerequisite to ensure exactitude in the measurement, thus suggesting the complementarity between the two. This would also result in the confirmation of research findings across methods and domains (Kumar, 2016).

Though numerous measures of resilience have been developed, no one measure has been preferred over the others, nor has there been wide acceptance of these tools (Connor & Davidson, 2003). One of the ways to guarantee the quality of data is to employ those resilience measures in our studies which have been validated. A course through validation would ensure that establishing that the measure does the job accurately in measuring what it aims to measure irrespective of who the respondent is, their time of response, and the effect of the administrator collecting the response. The validation method should also mention sources (potential) of bias in measurement and give a detailed range of possible inaccuracies of the measure. The validation procedure should establish its acceptance by the respondents and that the test items also precisely measure the underlying concept and theory (Streiner et al., 2015). Tools measuring resilience can be categorized on the basis of age, setting, those measuring resilience and those measuring resilience along with another construct.

A meaningful comparison has been attempted by many robust methodological reviews to recognize, draw differences and similarities, and evaluate the psychometric properties of similar measures of the construct. This helps to delineate its applicability to a specific population, intervention, or outcome (Terwee et al., 2007).

Tools Measuring Resilience

Brief Resilient Coping Scale (BRCS)

The Brief Resilience Coping Scale (BRCS) is a 4-item scale measuring resilience as the tendency to cope with stress in an adaptive manner developed by Sinclair and Wallston

(2004). This is a unidimensional scale assessing the resilient coping of adults dealing with current stressors on a 5-point Likert scale where '1' = 'does not describe me at all' to, and '5' = 'describes me very well'. The total score on the scale ranges from 4 to 20. Low resilience was indicated by scores between 4-13; scores between 14-16 indicate medium resilient coping and between 17-20 indicate high resilient coping. The internal consistency established in the sample of the original study was .69 whereas test-retest reliability was .71. The scale reported poor psychometric properties (Cronbach's alpha=0.59) when compared to other resilience measures such as Brief Resilience Scale (Cronbach's alpha=0.71) in a validation study on Chinese college students (Fung, 2020). Also, the scale does not reflect the multidimensionality of a complex construct like resilience.

Brief Resilience scale (BRS)

This is a unidimensional scale consisting of 6 positively (Items 1, 3, and 5) and negatively worded items (Items 2, 4, and 6) assessing resilience as an individual's perceived ability to bounce back from stress (Smith et al., 2008). The scale measures resilience on a 5-point Likert scale with responses ranging between '1' = strongly disagree and '5' = strongly agree. The internal consistency ranged between .80-.91, and validity was established. It is a self-reporting questionnaire assessing resilience on a five-point rating scale. Items 2, 4, and 6 are reversely scored to summate and calculate mean of the scores. Scores are interpreted on the BRS as follows: respondents with BRS scores between 1.00 – 2.99 are categorized as “low” on resilience, respondents with BRS scores between 3.00- 4.30 are categorized as those with “normal” resilience, and those with BRS scores between 4.31- 5.00 as “high” on resilience. According to the authors, BRS is one tool for assessing resilience rather than just focusing on the personality trait that promotes resilience.

Connor-Davidson Resilience Scale (CD-RISC)

The CD-RISC consists of 25-item and assesses the stress coping ability through self-report considering the constructs of hardiness, adaptation, and endurance to stress. This scale measures resilience on a 5-point scale with '0'= not true at all to '4'= true nearly always. Total scores range between 0 and 100. Higher scores denote a higher perceived resilience. The scale was developed to assess the resilience of individuals in the past month and tested on varied populations (university students, PTSD patients, firefighters, etc.). The CD-RISC has a good internal consistency (Cronbach's alpha-0.89), and test-retest reliability in general and clinical populations support its application in clinical practice (Connor & Davidson, 2003). Campbell-Sills and Stein (2007) validated a shorter version of the scale and reported good psychometric properties (Cronbach's alpha-0.85). The respondent using this scale has to respond to every item describing the individual's behavioural response to various adverse situations, irrespective of whether one encountered the situation in real life. A respondent tends to visualize the situation and imagine how one would or would not have behaved had there been adversity and respond accordingly. The absence of the 'not applicable in my case' option tends to force one to hypothesize and respond.

Dispositional Resilience Scale (DRS)

The DRS measures dispositional resilience or the hardiness personality style by assessing how individuals cope with stressors by evaluating commitment, challenge, and control on three subscales (Bartone et al., 1989). This is a 45-item scale measuring dispositional resilience on a 4-point scale ('0'=not at all true, '1'= a little true, '2'= quite true, and '3'= completely true). Item total is cumulative of all scores and between a range of 0-135. 30 items in the scale are reverse coded, while 15 items are positively scored. Higher scores indicate higher dispositional resilience or hardiness. No information is available on the scale's internal consistency (Windle et al., 2022).

The DRS has two more abbreviated versions, viz., Dispositional Resilience Scale-30 item (Bartone, 1991) and Dispositional Resilience Scale-15 item (Bartone, 2007).

Ego Resiliency Scale (ER 89)

Ego-Resiliency Scale (*ER89*) assesses ego-resiliency using 14 items on a 4-point scale ranging in the item's applicability to self. Here, '1' = does not apply, '2' = applies slightly, '3' = applies somewhat, and '4' = applies very strongly. Scores on all the items are summed, and total scores range from 14-56. High scores indicate high ego-resiliency. Ego-resiliency is described as an individual's vibrant ability to adapt to a typical level of ego control to accommodate the demand characteristics of the external context that helps in maintaining or improving the organismic equilibration (Block & Kreman, 1996). Cronbach's alpha of the *ER89* is 0.76.

Essential Resilience Scale (ERS)

The *ERS* is composed of 15-items developed based on an operationalized definition of resilience, viz., to anticipate and flexibly bounce back from physical, emotional, and social stressors on a 5-point scale with '1' = totally disagree to '5' = totally agree. This was administered on a diverse sample consisting of urban-rural residents in China. The scale reported a high reliability, 0.94 (Cronbach's alpha), and was also validated. The scale assesses resilience on three sub-scales, viz., physical, social, and emotional. The mean scores are calculated for items on each subscale and then totalled (Chen et al., 2016). Overall, the *ERS* adds to the global conception of resilience by netting distinctive characteristics of resilience unique to the Chinese culture (Chen et al., 2016; Wong & Song, 2008).

Multidimensional Trauma Recovery & Resiliency Scale (MTRR)

The *MTRR* measures the impact, recovery, and resilience in a 135-item scale that was developed based on 8 domains of an individual's psychological functioning. This is a 5-point scale with '1' = not at all descriptive to '5' = highly descriptive, assessing the subconstructs of

“authority over memory, integration of memory and affect, affect tolerance and regulation, symptoms mastery and positive coping, self-esteem, self-cohesion, safe attachment, and meaning-making” through the same sub-scales (Harvey et al., 2003). The item totals for each domain are calculated along with the mean scores.

Predictive 6-Factor Resilience Scale (PR6)

Rossouw & Rossouw (2016) constructed a scale of 16-items based on a neurobiological model of resilience on a 5-point scale with ‘1’= not at all like me to ‘5’= very much like me. The model takes into account the bi-directional relationship between resilience and physical health, focusing on vision has self-efficacy and goal setting, composure encompasses emotional regulation, tenacity relates to self-preference and hardiness, reasoning includes an individual's problem-solving and resourcefulness, collaboration has humour, context, attachment, and support systems and health (physical health). Each construct has a subscale, and each domain's average score is calculated. The average score across all domains assesses overall resilience, with higher scores indicating greater resilience. Six items are reverse-coded before scoring, whereas ten items are scored normally. The internal consistency of the scale was 0.70.

Resilience Scale

The resilience Scale by Wagnild and Young (1993) is a 25-item scale that assesses resilience as a positive personality characteristic that improves the individual ability to understand stressors, appraise one's resources, solve problems, and adapt effectively. Resilience was assessed on five essential and interrelated components: existential aloneness, perseverance, equanimity, self-reliance, and meaningful life. The two subscales assess two dimensions: the personal competence consisting of 17 items and the acceptance of self and life of 8 items. Resilience is measured on a 7-point scale: ‘1’ = disagree and ‘7’= = agree. Scores on the scale range from 25-175. High scores on the scale reflect high resilience. All

the items on the scale are positively worded. This scale was validated on a sample of 53 to 95 aged adults. The scale had high Cronbach alpha (0.91), indicating good internal consistency, and validity was established by correlating the scale with theoretically relevant constructs. Though the scale was initially tested on an older sample, it was later used across samples of different age groups. Lack of cultural sensitivity regarding the items, not reporting test-retest reliability in the original study, and the possibility of positive items contributing to response bias are some of the criticisms of the scale (Scoloveno, 2017).

A shorter version of the Resilience Scale, RS-14, was developed to reduce participant burden and enhance the response rate. The shorter version also reported good psychometric properties and is available in multiple languages for use by different age groups across settings (Wagnild, 2010).

State-Trait Assessment of Resilience Scale (STARS)

The State-Trait Assessment of Resilience was developed by Lock et al. (2020) as an attempt to fill in the lacuna by considering a state-trait approach in the field of resilience measurement. The scale assesses resilience based on the idea that resilience is influenced by a combination of state and trait characteristics. The ‘trait’ level of resilience is understood as more stable and distal quality, and the ‘state’ level of resilience is an indication of proximal and changeable responses to situations—both laced with an element of one-dimensionality. Each subdomain has 13 items measured on a 4-point response scale (‘1’= disagree, ‘2’= somewhat agree, ‘3’= agree, and ‘4’= strongly agree). Scores are added together for each subscale. Higher scores on the scale indicate higher resilience.

Response to Stressful Experience Scale (RSES)

The RSES is a self-report measure comprising 22 items and assesses the resilient coping tendencies of an individual. It measures internal characteristics focusing on an individual’s cognitive, emotional, and behavioural responses to stressful experiences.

Factor analysis yielded five factors viz., “meaning-making and restoration, active coping, cognitive flexibility, spirituality, and self-efficacy”. The scale reported good psychometric properties, internal consistency (Cronbach's alpha = 0.91–0.93), and test-retest reliability was 0.87. Validity was also established. This scale was validated on military and navy veterans. Resilience was assessed on a 5-point scale (‘0’=not at all like me to ‘4’=exactly like me). The total score was calculated by summing the item scores, and higher scores indicate higher resilience (Johnson et al., 2011). The scale was found to be specifically useful in assessing the resilience of military populations (Gabriel et al., 2015).

Baruth Protective Factors Inventory (BPFI)

BPFI has 16 items. They measure four protective factors “adaptable personality, supportive environment, few stressors, and compensating experiences.” These protective factors are thought to contribute to enhance resilience. The items are assessed on a 5-point scale with responses ranging from strongly agree to strongly disagree. Scoring of items is done in a way so that the most resilient responses are given 5, and the least resilient responses are given 1. Each subscale has a range of 4-16, and the total scale range is 16-80. The internal consistency for the total items is 0.83 and 0.76, 0.98, 0.55, and 0.83 for the four subscales mentioned above (Baruth & Carroll, 2002).

Resilience Scale for Adults (RSA)

Resilience Scale for Adults (RSA) comprises of 33 items exploring the intrapersonal and interpersonal protective variables (personal/dispositional characteristics, familial support, and external support systems, etc) that aid in adaptation to adversities that are psychosocial in nature. The responses are recorded on a 7-point scale; higher scores denote higher resilience (Friborg et al., 2003).

Devereux Adult Resilience Survey (DARS)

Mackrain (2013) developed the Devereux Adult Resilience Survey (DARS) as a 23-item checklist to help the adult population reflect on their strengths considered as protective factors, which may help enhance one's coping abilities when dealing with adversities or stressors. The checklist helps gain an understanding of four domains: "Relationships, Internal Beliefs, Initiative, and Self-Control". Responses on the checklist are yes, sometimes, or not yet. The goal of the DARS is to provide an insightful report to identify personal strengths and scope of improvements instead of comparing individual scores to the population. This is especially beneficial to individuals, specifically teachers who can use this alongside a resilience journal.

The scale of Protective Factors (SPF)

The Scale of Protective Factors (SPF) has 24 items to measure the protective factors contributing to resilience by Ponce-Garcia et al. (2015). The scale assesses social-interpersonal protective factors through social support and social skills; and cognitive-individual protective factors through planning behaviour and goal efficacy. The responses are recorded on a 7-point scale, with '1' (disagree completely) and '7' (agree completely). Total scores are calculated by summing the item scores varying between 24 to 120, while subscale scores range between 6 to 30. Overall scores of 64 or below indicates low resilience, 65-84 suggest moderate resilience, and 85 or higher show high resilience. The internal consistency of the scale was 0.91.

Protective Factors for Resilience Scale (PFRS)

Protective Factors for Resilience Scale (PFRS) was developed by Harms et al. (2017) to measure protective factors in three domains that could predict resilience. The measure was considered multidimensional and elucidated the clear role of family and peers as protective factors. The scale has three subscales, with the personal resources scale having ten items and

the social resources scale-family and social resources scale-peers having five items each (Total scale items=20). The scores were summed for each of the subscales and the total scale. The responses range from '1'= strongly disagree to '7'= strongly agree on a 7-point scale. This scale was tested only on college students and the adult population from Australia and North America. It would require further testing to establish the psychometric properties across age groups and samples of different cultural backgrounds.

Resilience Appraisal Scale

The Resilience Appraisal Scale is a 12-item scale constructed based on the schematic appraisals model of suicide, with the idea that positive self-appraisals may help mitigate suicidal ideations and could possibly serve as a source of resilience in individuals. The three types of self-appraisals assessed by the subscales viz., “emotion and situation coping appraisals”, and “social support appraisals”. These appraisals include assessment of coping mechanisms to deal with emotions, resolve setbacks, and procure social support. The responses are measured on a 5-point scale from strongly disagree to strongly agree. Subscales scores were added to get total score. Higher scores on the scale denote more positive self-appraisals. The overall scale had a Cronbach's alpha coefficient of 0.88, the social support sub-scale had a Cronbach's alpha coefficient of 0.93, the issue-solving sub-scale had a Cronbach's alpha coefficient of 0.92, and the emotion coping sub-scale had a Cronbach's alpha coefficient of 0.92 (Johnson et al., 2010).

Trauma Resilience Scale (TRS)

The Trauma Resilience Scale (TRS) (Madsen & Abell, 2010) was developed in response to a need perceived by the authors regarding a lack of standardized instruments constructed to gauge self-perceptions of protective factors that support people after they have been exposed to violent events. The Trauma Resilience Scale was thus developed to assess the protective factors representing the social, emotional, and psychological aspects. The scale

consists of 59 items and assesses factors contributing to resilient processes on a 7-point scale with responses ranging from '1'=, almost never true of me, to '7'=, almost always true of me. The Cronbach's alpha for the final scale is 0.93.

Currently numerous scales on resilience have been reviewed independently. These scales often aim to evaluate both internal and external factors of resilience. For example, the Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003) and the Resilience Scale for Adults (RSA) Friborg et al. (2003) measures multiple factors of resilience e.g., secure relationships, spiritual influences, family coherence, and social support. Many studies have found incompatible theorizations in diverse populations and cultures for the CD-RISC, hence lacking clarity regarding the uniqueness of each factor contributing to the measure of resilience (Jorgensen & Seedat, 2008). Similarly, applying factor structures such as perseverance, self-reliance, and meaningfulness to the widely used Resilience Scale (RS) has also been problematic (Ahern et al., 2006).

It calls for a clear theoretical vision to distinguish between resilience factors and their tools to appropriate an accurate measurement of the spanning construct. Furthermore, translation of the resilience scales is not thoroughly verified for their validity and comprehensibility in different linguistic communities (Windle, 2011). In such cases, an invariant measurement is applied and interpreted in the same way by different language backgrounds (Horn & McArdle, 1992).

While resilience scales are widely used for screening and research purposes, they seldom find their use in the assessment of needs. Also, needs assessment would require assessment of protective factors which very few resilience measures currently do and are also proposed in a limited model of resilience such as the 'Synergy Model of Resilience' given by Hariharan and Rana (2016). Also, domain-specific resilience measures have not gained

enough attention, and in particular, contexts, theoretically driven comprehensive assessment measures of resilience may be more useful (Yi et al., 2008).

Resilience Measures in Children and Adolescents

There are several resilience tools available that are specifically developed to assess the resilience of individuals belonging to a particular age group, especially children and adolescents. Resilience measures designed to assess resilience in children and adolescents can also be grouped into two categories, viz., measures assessing resilience as a trait or personality characteristic and those measures assessing resilience by taking into consideration a battery of protective factors. Resilience measures developed for use with children and adolescents are described below.

Adolescent Resilience Scale (ARS)

The Adolescent Resilience Scale (ARS) has 21 items assessing psychological features of resilient individuals among Japanese youth, on a 5-point Likert scale with ‘1’= definitely no and ‘5’= definitely yes. It was developed by Oshio et al., (2002) considering three factors such as “novelty seeking, emotional regulation, and positive future orientation”. Cronbach’s alpha for the entire scale was .85 and .79, .77, and .81 for the three factors respectively and construct validity is established (Oshio et al., 2002). The total score on the ARS is obtained by computing the mean of the 21 items. The scores on each sub-scale are obtained by calculating the mean scores for each sub-scale. The scale appears to have examined resilience as an internal trait but only in terms of its potential and not its presence in the face of adversity.

Resiliency Scale for Children and Adolescents (RSCA)

The Resiliency Scale for Children and Adolescents (RSCA) is a 64-item tool consisting of three self-report domains viz., “Sense of Mastery” (20 items), “Sense of Relatedness” (24 items), and “Emotional Reactivity” (20 items). Optimism, self-efficacy, and

adaptability are the three subscales of the ‘Sense of Mastery’ scale. Trust, perceived social support, comfort, and tolerance are the four subscales of the ‘Sense of Relatedness’ Scale. The ‘Emotional Reactivity Scale’ included the subscales of sensitivity, rehabilitation, and impairment (Prince-Embury 2007; 2008). The responses are measured on a Likert scale; ‘0’ =never to ‘4’= almost always. The alpha coefficients on the Sense of Mastery Scale range from .85 to .89. The alpha coefficients for Sense of Relatedness ranged from .89 to .91. Alpha coefficients for Emotional Reactivity range from .90 to .91. For the three global scales, the test-retest reliability correlation coefficients ranged from .79 to .95. Concurrent and criterion validity is established and provided in its technical manual (Prince-Embury, 2008).

7C’s of Resilience Tool

The 7Cs of Resilience Tool by Barger et al. (2017) is a 21-item measure developed to assess adolescent resilience based on the 7Cs model of resilience. This was essentially developed to screen resilience among adolescents and help physicians counsel against indulging in risk behaviours. The 7Cs of resilience are competence, confidence, character, connection, contribution, coping, and control. Each of the seven subscales have three items mentioned and are rated from ‘0’=most resilient to ‘2’=least resilient. Scores from all the subscales are totalled and lower scores reflect higher resilience. This is an internally validated scale and the Cronbach’s alpha is 0.7.

Resilience Skills and Abilities Scale (RSAS)

The Resilience Skills and Abilities Scale (RSAS) (Jew et al., 1999) was developed on the basis of the 12 skills and abilities given by Mrazek and Mrazek (1987). This scale aimed to include those factors which make children (12 years-18 years) resistant to any psychological harm. RSAS has three resiliency subscales viz., “future orientation, active skill acquisition, and independence/risk-taking”. The scale consists of 45 items and assesses

resilience on a 5-point scale. Mean scores are calculated for each of the three subscales.

Internal consistency of the RSAS ranges from 0.66-0.82 (Vannest et al., 2019).

Resiliency Attitudes and Skills Profile (RASP)

The Resiliency Attitudes and Skills Profile was built on the work of Wolin and Wolin (1993), which focuses on the strengths rather than the needs or risks of youth in recreation and social services. The scale has 34 items and assess youth resiliency on a 6-point scale with responses ranging from never to always. RASP has seven dimensions reflecting individual strengths viz., initiative, humour, creativity, insight, independence, values orientation, and relationships (Hurtes & Allen, 2001).

Adolescent Resilience Questionnaire (ARQ)

The Adolescent Resilience Questionnaire (ARQ) is an 88-item self-report measure assessing factors related to resilient outcomes among adolescents (11-19) in the face of adversity. The primary objective behind developing this scale was to construct a questionnaire assessing the resilient factors of adolescents based on a strong model of resilience which is also developmentally appropriate. The scale assesses resilience factors on five domains viz., individual (negative cognition, emotional insight, confidence, social skills, empathy/tolerance) family, peer (connectedness and availability), school (supportive environment and connectedness), community (connectedness). The responses are recorded on a 5-point Likert scale: 1= never, 2=not often, 3=sometimes, 4=most of the time, 5=all of the time. There is also empty space provided in the questionnaire for any comments to be noted. Total scores are calculated for each domain where higher scores indicate higher resilience. The internal consistency of the scale and sub-scales range from 0.60-0.90 (Gartland et al., 2011).

Resilience Protective Factors Checklist (RPFC)

Powell et al. (2020) developed the Resilience Protective Factors Checklist (RPFC) as a measure to identify protective factors (individual, family, and community) associated with resilience and positive outcomes in the context of childhood and adolescent adversity. The checklist has 25 items assessed on a 4-point scale with options ranging from '1'= not true to '4'= almost always true.

Resilience Scale for Adolescents (READ)

Resilience Scale for Adolescents (READ) (Hjemdal et al., 2006) is a 39-item adaptation of the existing 41-item Resilience Scale for Adults (Friborg et al., 2003) developed such that it is relevant and comprehensible to adolescents. It is a 5-point Likert scale that measures resilience factors by taking into consideration personal and social proficiency, family cohesiveness, structured style, and social reserves to understand the adolescent's adaptation to stress. Resilience is understood as the processes and mechanisms causing good outcomes despite exposure to stress and not result in negative mental health outcomes; it essentially considers external and internal factors known to contribute to resilience. The construct validity was tested using the Short Mood and Feelings Questionnaire (SMFQ). Reliability of the scale ranged from 0.70 to 0.90. Mean scores for each subscale and for the entire scale are calculated with higher scores indicating higher resilience.

To summarize, the review of literature on the measurement of resilience provides an insight that there are numerous difficulties in measuring resilience using a combination of measures. Though resilience can be understood by breaking it into different categories, its measurement cannot be achieved by choosing corresponding scales that reflect these components. The use of resilient specific measures is recommended to be employed over other measures if an accurate reflection of the construct of resilience is to be achieved. Efficacy of resilient specific measures should be proven by replication of studies employing

these measures so that robustness and application of measures could be established. A longitudinal measure of resilience has also not been captured to vet the effects of resilience, simultaneously not being able to account that resilience could be metamorphosing in nature over a period in time (Cosco et al., 2016).

Resilience plays an important role in facilitating positive outcomes for individuals during adversity. Resilience research, however, has faced several criticisms as far as measurement, definition, criteria selection and operationalization are concerned. Lack of robust resilience specific measures and use of non-specific resilience scales has affected the assessment of resilience to a great extent. There is a current need for a reliable methodology to explore resilience across the life expectancy as well as the build resilience measurements with sound psychometric properties that are universally accepted.

Methodological Frameworks

Research of a multidimensional concept like resilience employs a wide range of methodological frameworks. Some of the principal approaches to the study of resilience are discussed below (Graber et al., 2015).

Longitudinal Studies

Longitudinal studies emphasize fostering resilience for individuals, and this has resulted in the neglect of the social resilience processes. This approach fails to account for the details of subjective experiences and focuses on individual achievement markers concerning what it means to be resilient, not focusing on the socio-cultural aspects involved.

Randomized Control Trials

Randomized control trials are concerned as a standard design to test the efficacy of an intervention module which would foster resilience processes and adaptive outcomes. These trials can provide details of those approaches which would work to identify those groups most likely to benefit from a particular intervention. Though true randomized trials might not

be feasible in reality, quasi-random trials are considered more appropriate. Also, funding and implementation are two other major issues related to these trails.

Cross-sectional Qualitative Studies

These studies were utilized to recognize protective factors, account for subjective experiences, and examine cross cultural variations or specificities of resilience processes. They also fill the need to document minority populations that cannot suffice the criterion of quantitative studies. There were issues pertaining to lack of generalizability of the qualitative results obtained to be combated while employing this method of approach to study resilience.

Synergy Model of Resilience

Hariharan and Rana (2016) proposed a Model of Resilience: The Synergy-Model of Resilience. The authors proposed this model to stress the need for having a battery of tests to assess resilience in contrast to a unidimensional measure unable to encapsulate the multi-dimensionality of a complex construct like resilience. The synergy model described resilience as a “unique function of operating factors, adversity, and resistance across a time continuum that brings and sustains a positive change in the form of achievement and flourishing”. Resilience is developed and sustained when adversity, operating factors, and resistance overlap meaningfully.

According to the model, adversity can be of any type and is multidimensional. It not only considers an individual’s perception of the adversity (severity) but also encompasses ‘how often’ (frequency) and ‘how long’ (duration) the adversity is felt. Operating factors include protective or inherent factors pertaining to one’s characteristics and promotive or environmental factors refer to positive experiences due to the presence of a support agent or a facility. Combined together, the protective factors and promotive factors are called ‘operating factors’ because of the way they operate on the adversities. The interplay of adversity and operating factors results in resistance by an individual, which helps in restructuring the

adverse situation or insulating the individual from the negative impact of adversity. Finally, the model describes resilience as a result of the unique interplay between adversity, operating factors, and resistance, reflected in high achievement in the face of high adversity.

Achievement is captured by the outcome factors, viz., achievement and flourishing. The authors suggested that all of the model's elements be studied independently using different psychological tools. The independent tools would be brought together in a battery to assess resilience holistically.

The model proposed to test resilience in any population without limiting the Resilience Test (REST) Battery to particular homogeneous samples (orphaned children, deprived people, or in challenged people). This can be applied to normal population to study the distribution of resilience, on physically challenged individuals, family members of alcoholics, people from socioeconomically weak background, orphans, and so on. The model also advocated resilience by flagging achievements in the face of adversities cushioned by 'protective' (internal characteristics) and 'promotive' factors (external resources). Together, the protective and the promotive factors are called operating factors. These operating factors create a buffering effect in the form of resistance to any negative impact of the adversities. Resilience was determined to be varying based on the level of achievement and the power of resistance: level of achievement and resistance, if similar, give rise to average resilience; if the level of achievement is higher than that of the power of resistance, then there is a high degree of resilience, and finally, if the level of achievement is lower than the power of resistance created, there is low resilience.

The model is unique and truly reflects the multidimensionality (dimensions of adversity, operating factors, and outcome factors); and dynamic nature of the model as it accommodates the variations on dimensions, and finally, complexity is captured by the inter-dimensionality of the model.

Development and Validation of the Resilience Test (REST) Battery

An earlier study built on the foundation of the Hariharan-Rana Synergy Model of Resilience, proceeded with the construction of the Resilience Test (REST) Battery, and validation 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 the development of REST Battery, the evolution of a mathematical approach to quantify resilience through the Resilience Index, categorising the levels of resilience, and testing the model (quantitatively and qualitatively).

The study on development and validation of the REST Battery focused on the development of the adversity, achievement, protective, and the promotive factors scales. The viability of these scales was then tested in a pilot study, and scores were given for each scale. All the scales were then brought under the REST Battery along with the flourishing scale. Finally, a mathematical approach was taken to evolve a formula for computing the Resilience Index.

The Resilience Test (REST) Battery was developed and validated based on the Synergy Model of Resilience (Rajendran, 2020). It is imperative to reiterate that current research is the continuation of further testing and standardizing the process of measurement based on the revised Synergy Model of Resilience, now referred to as the Hariharan-Rajendran Synergy Model. Below is a concise yet thorough explanation of the method of Rajendran's study so that it provides the necessary background and the basis for the current study. The primary objective of Rajendran's (2020) study was to test the Hariharan-Rana Synergy Model of Resilience (2016).

The battery used to measure resilience is proposed to include all aspects that contribute to resilience, which illustrates the model's complexity. Based on the Model, a 3-dimension scale of Adversity was developed with the inherent intensity, frequency of

exposure, and duration of the experience of adversity. These are all examined in order to capture the essence of facing adversity holistically. Similarly, the protective factors and promotive factors scales and the achievement scale were constructed. The model then recommended that the outcome indicators (achievement & flourishing), operating factors, and the adversity scale give a single value to compute the final resilience index. The study established the reliability and validity of each scale included in the battery. The present study used the same mathematical model to compute Resilience Index.

Importance of Standardization

When a test or assessment is developed, used, and found robust in its psychometric properties facilitating comparison of individuals and groups over time periods, this process is referred to as standardization. Basically, it involves the process of creating a set of guidelines for administering, scoring, and interpreting test results across samples. To accurately capture and present individual variations, standardization primarily aims to ensure that the test is given, scored, and understood consistently across contexts (APA Dictionary of Psychology, 2021). The development of standardized measures of resilience has been driven majorly by the need to improve the comparability of research findings across studies. According to a review by Vanderbilt-Andriance and Shaw (2008), the proportion of resilient individuals varied between 25% to 84% even when study populations face comparable adversities. This is a major limitation in comparing prevalence across studies. This is due to the lack of consensus among researchers' definition and operationalization of resilience (Hawley, 2012), which make it difficult to compare results across studies. However, by using standardized measures, researchers can more easily compare results and make stronger inferences about the construct of resilience.

The use of standardized measures of resilience in psychology has several benefits including improving the validity and reliability of research findings, enhancing the

comparability of results across studies, and facilitating the development of targeted interventions for individuals with low resilience.

Firstly, the use of standardized measures of resilience can improve the validity and reliability of research findings. Standardized measures generally have higher levels of reliability and validity than ad hoc tools, which are often developed by researchers on an ad hoc basis. For example, one study found that the Connor-Davidson Resilience Scale (CD-RISC) demonstrated high levels of internal consistency and test-retest reliability, as well as convergent and discriminant validity with related constructs (Campbell-Sills et al., 2006). By using standardized measures, researchers can be confident that their findings accurately reflect the construct they are trying to measure. Secondly, standardized measures of resilience enhance the comparability of results across studies. Different researchers may define and operationalize resilience differently, using different measures to assess the construct, it can be difficult to compare results across studies. However, standardization of measures allows ease of comparability and enhances their inferential value. For example, a study comparing the CD-RISC and the Resilience Scale for Adults (RSA) found that both measures were highly correlated and demonstrated similar levels of internal consistency (Lundman et al., 2007). This suggests that the two measures are measuring the same construct, which enhances the comparability of results across studies that use these measures. Finally, standardized measures of resilience can facilitate the development of targeted interventions for individuals with low resilience. By identifying individuals with low resilience using standardized measures, clinicians and researchers can develop interventions that are specifically tailored to address their needs. For example, a study using the CD-RISC to identify individuals with low resilience found that a resilience training program was effective in improving resilience and reducing symptoms of depression (Southwick et al., 2016). By using standardized measures of resilience, researchers and clinicians can more accurately identify individuals who may

benefit from targeted interventions and develop interventions that are more likely to be effective. Tusaie and Dyer (2004) reviewed the literature on resilience measures and recommended the use of multiple measures of resilience to provide a more comprehensive assessment of this construct. They also emphasized the importance of using measures that have been validated in the population being studied. Rather than using multiple measures, one can include multiple measures that constitute the essential construct of resilience and evolve a composite score to measure resilience.

Challenges in Standardization

Standardizing resilience measures presents various challenges, some of which are discussed below.

1. **Conceptualization of resilience:** One of the major challenges in standardizing the resilience measures is the lack of consensus among researchers regarding the conceptualization and operationalization of resilience. Varying views regarding the definition and measurement make it potentially difficult to develop a standardized measure which is universally acceptable across different contexts and samples (Bartone, 2006; Kalisch et al., 2017).
2. **Multiple domains of resilience:** Resilience is a multifaceted phenomenon encompassing biopsychosocial factors. Capturing the interplay between all these domains is very challenging, and requires the use of multiple tests or a comprehensive battery of tests (Kalisch et al., 2017).
3. **Cultural and contextual differences:** The differences across cultures and contexts can invariably impact the conceptualization of resilience across settings, posing a challenge to the process of standardization of resilience measures, further impacting the psychometric properties of numerous resilience measures across groups (Ungar, 2011).

4. Lack of standardized administration and scoring procedures: To maintain the reliability and validity of a resilience measure, it is critical to have standardised administration procedures in place, including instructions for participants as well as guidelines for scoring and interpretation. However, there may be differences in how various researchers or practitioners administer and grade resilience assessments, making it difficult to compare findings across studies (Connor & Davidson, 2003).
5. Inadequate psychometric data: Finally, there may be insufficient psychometric data on existing resilience measures, making it difficult to demonstrate the reliability and validity of these measures or build new, more standardised measures. More research is required to create and validate standardised resilience measures that can be utilised across populations and situations (Windle et al., 2011).

Rationale

The results of the earlier validation study focused on two definite needs. First, the need to extend the administration of this scale on a rural sample. Second, it was strongly felt to see if the weights derived from any particular sample of the country can be used to compute the resilience index across the nation. The proposed study intends to explore these two crucial aspects so that the measurement process is simplified, user-friendly, and standardized.

For the current study, a primary research question was established initially, upon which the major objective and sub-objectives of the study were developed.

Research Question

- Are the weights derived from a sample universally applicable across the entire Indian population to compute the resilience index?

Objective(s)

- To standardize the Resilience Test (REST) Battery

The sub-objectives outlined for testing the primary objective are given below:

- (a) To assess if the weights from the four regions are in agreement with each other
- (b) To assess whether the weights from the twenty-five random groups are in agreement with each other
- (c) To assess whether the weights from the mixed group comprising the regional classification and random grouping are in agreement with each other
- (d) To develop norms to categorize the participants based on their resilience index scores

Chapter III

METHOD

Chapter III

METHOD

This chapter provides an in-depth elucidation of the method, including the plan and design of the study, sample and the sampling technique(s) used, tools, and the procedure, adopted to fulfil the main objective of the current study.

The current study concentrated on standardizing the Resilience Test (REST) Battery. Providing a brief summary of the Resilience Test (REST) Battery developed and validated by Rajendran (2020) may be relevant. The REST was developed and validated to test the Hariharan-Rana Synergy Model (Hariharan & Rana, 2016). The process, in order to arrive at the holistic measure of the resilience index, evolved a robust mathematical model. The mathematical model called for evolving weights and weightages for every construct, which were found to be valid for the sample on which it was administered. However, it was beyond the scope of the earlier study to extend and test the validity of the same weights and weightages on the entire Indian population. This task is taken up by the present study.

The present study aims to standardize the scale by testing the universal applicability of the weights, weightages, and the mathematical model on the whole Indian sample from South, North, East, and West, consisting of urban and rural adults of 18 years and above. It may be relevant to provide a brief description of the Resilience Test (REST) Battery developed by Rajendran (2020).

The REST Battery was used to measure resilience among the normal population in its multidimensionality that includes adversity, positive factors, and achievement in life to indicate high achievement amidst high adversity among the subjects who could resist the impact of adversity in life due to the presence of positive elements either as personal characteristics or in the form of external support from the environment. The Battery measures the four essential variables that are integral parts of resilience, viz. adversity in its holistic

perspective that includes the dimensions of severity, frequency, and duration; operating factors that refer to the positive internal characteristics (protective factors) and positive aspects in the environment (promotive factors), outcome indicators referring to the achievements and flourishing which are the essential manifestations of resilience.

The study aimed to examine the universal applicability of the mathematical model. Specifically, the study proposed to examine if the weights and weightages of the seven parameters of the REST Battery, developed on one sample, can be applied to the entire Indian population in computing the resilience index. If the study confirms the above, the REST Battery can be used on the Indian population. The resilience index of any Indian citizen aged 18 years or above can be computed by referring to the manual of the REST Battery that provides the universal weights and weightages of the parameters. This can enable any individual to take the resilience test and know one's level of resilience in the classification mentioned in the manual.

Plan and Design

The study used a cross-sectional survey design. A mixed sampling technique comprising purposive sampling and snowball sampling was adopted. The data were collected in face-to-face as well as virtual mode. This was inevitable because of the sudden onset of the COVID-19 pandemic just when the study was in the data collection phase. The entire plan of the study is summarised in Table 3.1.

In view of the COVID-19 pandemic situation, a part of the data collection was done in online mode. This method of data collection assisted in reaching the desired sample size and sped up the data collection process by helping the investigator make periodic and necessary changes during data collection in the field. For better comprehension, a Table (3.1) listing each phase, sample location, tasks, procedure, mode of data collection, sampling

technique(s), and the sample is provided below, which constitutes the overall study plan and design.

Table 3.1

Plan and Design of the Study

Phase	Sample Location	Task	Procedure	Mode of data collection	Sampling	Sample (n)
Pandemic & Lockdown	Urban; South, North, west and East Indian cities	Taking online Informed Consent, participant details, and administration of REST battery in virtual mode	Participants were identified, approached on phone and included in the sample	Online	Purposive and snowballing	391
Post-Lockdown	Rural	Taking Informed Consent, participant details, and administration of REST Battery	Visit to rural areas followed by identification of sample for data collection	Face-to-face	Purposive and snowballing	236

Participants

The study planned to include 500 participants from the urban population and 500 from the rural population. Data were collected from a total of 605 urban participants and a total of 340 rural population. After subject attrition and cleaning of data, a total of 391 urban participants and 236 rural participants were retained in the study, making the total sample 627 men and women of 18 years and above.

Inclusion Criteria

1. Participants above the age of 18 years.
2. The inclusion criterion for the urban sample was having access to the internet and laptops or smartphones.

3. The inclusion criterion for the rural sample was the basic ability to read and write.

Sample Description

The total sample of the study was drawn from different States in the South, North, West, and East parts of India. Participants from South India (Telangana, Andhra Pradesh, Kerala, Karnataka, and Tamil Nadu), North India (Uttar Pradesh, Delhi, and Punjab), East India (West Bengal, Orissa, Tripura, Mizoram, and Nagaland), and West India (Maharashtra, Rajasthan, Gujarat, Madhya Pradesh and Chhattisgarh) were recruited through purposive and snowballing sampling techniques.

Demographic Characteristics of the Sample.

A detailed description of the demographics for the entire sample is given below.

The mean age of the participants was 31.37 years ($SD = 11.10$). The gender ratio of the participants was balanced, with men ($n = 320$) constituting 52% of the sample, and women ($n = 307$) constituting 49%. Looking at the marital status, 45.3% were married, 46.7% were single, 7.2% of the sample were in a relationship, 0.6% of the sample's participants were divorced, and 0.2% were widowed.

Less than 50% of the participants were employed (43.51%). Students constituted 28.7% of the sample, followed by self-employed (8.8%) and participants who were homemakers (10.8%). Retired participants (1.1%), along with those who are unemployed (2.4%) or into agriculture/farming (2.6%) and daily wage labour (2.1%), constituted the rest of the sample.

Of the total sample, 37.6% belonged to rural India, and 62.4% in urban areas. The majority of participants (53.3%) described their financial situation as manageable, followed by a comfortable state (37.8%) and a difficult (8.9%) financial state.

Most participants (85.5%) reported being from the middle class. A low percentage (7.7%) from the lower and upper class (6.9%). With regard to educational qualifications,

14.4% of the sample had completed high school, 47.4% of the sample were either pursuing or had completed their post-graduation or doctorate, while 38.3% were either pursuing or had completed their undergraduate degree.

Measure(s)

The study used the following measure(s). Each measure is described below.

Resilience Test (REST) Battery

The REST Battery (Rajendran, 2020) comprises of five scales: the Adversity Scale, Achievement Protocol, Protective Factors Scale, Promotive Factors Scale, and the Flourishing Scale. Each of these scales is described below.

Adversity Scale. This 49-item scale describes the adversities in crisp one or two words. The respondent is expected to rate these adversities on a ten-point scale on three different dimensions. This semantic differential scale is used to identify the adversities an individual has experienced or is experiencing and rate them on three dimensions, viz. severity, frequency, and duration. Adversities varying from serious life events like “facing a natural disaster” to moderate anomalies such as “frequent ill health” are listed in the scale. Additionally, adversities pertaining to one’s own self are also stated, like “being jailed.” Finally, adversities occurring in one’s close proximal surroundings are also mentioned, such as “one or more family members suffering from prolonged physical or mental illnesses.” The severity, frequency, and duration of adversity are all assessed on a 10-point scale. The objective aspect of adversity is captured by the severity and frequency dimensions, whereas the duration dimension evaluates the subjective aspect of the construct. The scale has the items listed on the left. The column to the left of the list of adversities is meant for check marking those items where the participant experienced the said adversity. The participant has to rate the severity, frequency, and duration of only those items that one has ticked in the extreme left column indicating that they have experienced the said adversity. This ensures

that the participant is rating the adversity on the three dimensions on a reality basis and not hypothetically. This is one great advantage of the scale compared to the other scales, which requires the participant to answer hypothetically even though they have not experienced the stated situation.

Scoring. Response options on this scale range from 1- 10, with 1 denoting a perceived adversity's lowest intensity and frequency and 10 denoting the highest intensity. Similarly, a score of 1 on the duration dimension denotes the experience of an adversity for a shorter duration, contrasted to a score of 10, which denotes the experience of an adversity for a prolonged duration. The responses are summed up for all three dimensions separately, and then the sum of each dimension is divided by the total number of items (49) to derive the mean score. The adversity scale presents us with three mean scores. The scores on this scale range from 1-10 on all three dimensions. The test-retest reliability of the severity dimension of the Adversity scale was reported as 0.92, the frequency dimension of the same was found to be 0.88, and the duration dimension of the scale was 0.94.

Protective Factors Scale. This is a 24-item semantic differential scale that evaluates the participants' internal characteristics. The scale's characteristics range from simple qualities like "having confidence in oneself" to complex qualities like "ability to mobilize resources to solve problems." The scale is composed of three columns: the first, on the extreme left, was designated for respondents to mark those characteristics that they possess. The scale items are listed in the middle column, and the extreme right column allows participants to rate their perceived strengths (those tick marked earlier) on a 10-point scale.

Scoring. The response format of the scale is 1-10, with 1 indicating low strength of an internal characteristic(s) and 10 representing greater strength as perceived by a respondent. Individual ratings of items on the scale are summed up, and the mean score is calculated. The

score on this scale ranges from 1- 10. The Test-Retest reliability of the scale was reported as 0.75.

Promotive Factors Scale. This is a 14-item semantic differential scale that assesses the respondents' access to environmental resources (physical and social). On a 10-point scale, the perceived advantage of these resources is evaluated. This scale also consists of three columns: the first, on the far left, is for respondents to mark those resources that are available to them. The scale items are presented in the middle column, and participants can rate those items perceived as resources available to them in the extreme right column. The scale includes resources pertaining to family support like "having a supportive husband/wife" to formal support available to an individual like "health care facilities within reach."

Scoring. The scale's response format is 1-10, with 1 indicating a low advantage of a perceived resource and 10 indicating a more significant perceived advantage of having access to a particular resource. Individual ratings of all the statements are summated, and a mean score is computed. The score on this scale ranges from 1 to 10. The test-retest reliability of the scale was reported as 0.93.

Achievement Scale. This scale listed nine categories of achievements. A column to the left of this list was left blank, where the respondents had to tick if they had any achievement in that category. A column was left blank on the right of the list of categories where the respondents had to rate the significance of their achievement on a ten-point scale that ranged from low to very high. The achievement scale also provided space for participants to describe any other significant achievement which was not considered under the above-mentioned nine categories to extract the respondents' noteworthy accomplishments in the face of adversity.

Scoring. The scale's response format is 1-10, with 1 indicating a low advantage of a perceived achievement and 10 indicating a more significant perceived advantage of a

perceived achievement. Individual ratings of all the statements are summated, and a mean score is computed. The score on this scale ranges from 1 to 10. The test-retest reliability of the scale was reported as 0.92.

Flourishing Scale (FS). Diener et al. (2009) developed the flourishing scale. It is a short 8-item scale that assesses flourishing on a 7-point Likert scale. This is included as part of the REST Battery. The scale's response options ranged from "strongly disagree" to "strongly agree." The format of the scale items was typical and represented as statements. These statements are expressed in a positive direction. The scale generates a single score for psychological well-being by assessing the participant's self-perceived success in crucial areas, such as relationships, purpose, optimism, and self-esteem. Cronbach's alpha coefficient of the original scale is 0.87 (Diener et al., 2009).

Scoring. Scores on the scale ranged from 1 = strongly disagree to 7 = strongly agree. The scores on the scale ranged between 8 and 56. A higher score on the scale indicates that an individual has many psychological strengths and resources. The test-retest reliability of the scale was reported as 0.86.

Participant Details Form: This consisted of eleven questions calling for details such as age, gender, education, occupation, marital status, place of residence, socioeconomic status, perceived financial condition, geographical location, type of family, and contact details.

Translated Telugu version of the Resilience Test (REST) Battery was used in rural areas of Andhra Pradesh and Telangana. The Resilience Test (REST) Battery, along with the translated version of the REST Battery and participant details form(s) is appended in Appendix -A1, A2, A3, and A4.

Procedure

Ethical clearance and permissions

Prior to the commencement of phase I of the study, requisite clearance was obtained from the Institutional Ethics Committee at the University of Hyderabad (Application No: UH/IEC/2021/33) (Appendix B1). Additionally, informed consent was prepared considering the American Psychological Association Guidelines (APA) guidelines and appended in (Appendix B2, B3).

Process of recruitment-Urban Sample

Individuals in the investigator's social network were identified through purposive sampling. These participants were requested to help with further recruitment of participants to the study; thus, a snowballing method was adopted until the desired number of participants were recruited into the sample through virtual means. Participants were approached through phone or a text message, rapport was established, and a brief overview of the study was given to them before requesting their willingness to participate in the current study. Interested and willing respondents were then briefed about the nature of the online survey form they would be required to fill. Respondents were then urged to go through the informed consent, which detailed the participant's role and what the study entailed, the confidentiality clause, potential distress they might experience or benefits of participation, and the voluntary nature of participation. They were also encouraged to clarify doubts before, after, or during the time taken to complete the survey form. The investigator was always accessible on the phone to the participants.

Administration of the scales(s). An online survey form was developed with the help of SurveyMonkey, a website that helps in creating and disseminating online surveys for easy research. SurveyMonkey was the chosen platform because it had a user-friendly interface, which was critical when collecting data from relatively lengthy questionnaires.

The Resilient Test (REST) Battery and informed consent form were sent to the respondents as a link through electronic media via email, WhatsApp, or a text message. The survey form included general instructions at the beginning to assist participants in navigating their way through the form. The form also included section and scale-specific instructions, which the participants were requested to read to ensure a hassle-free response process.

Participants were asked to complete two questionnaires per day in order to avoid any fatigue from spending long periods in front of gadgets or screens, as it could impact their responses. They were persuaded to be as honest as possible while filling out the form. On average, participants submitted the form within a week of receiving it. Following submission, the investigator thanked participants for their time and effort invested in completing the form via phone or text. Debriefing was done before dismissal in their preferred mode of communication, orally or in written format (text message) for all the participants once they had completed their survey.

Process of recruitment- Rural Sample

In order to overcome the obstacle of the digital divide in the interiors of the nation, rural data was gathered in face-to-face mode. This way, the investigator was able to establish a good rapport with both the gatekeepers and participants in order to encourage them to answer the questionnaire honestly. Gatekeepers are those individuals capable of providing access to information or respondents from a particular population to the researcher. They primarily aid researchers in gaining access to something or someone so that they can conduct a study (Holloway & Wheeler, 2002). This was done to gain access to the necessary number of respondents in the rural areas. As a result, gatekeepers in various rural areas were approached to see if they would be willing to participate in the study and provide assistance to the researcher. This was done to reach the required number of responders in the rural areas. Gatekeepers were invaluable in identifying participants, establishing rapport with

respondents, and providing immediate clarification to respondents in the absence or unavailability of the researcher in the field. Since the study adopted purposive sampling, taking help from the gatekeepers was appropriate as they could guide the investigator to reach the sample that complied with the requirements.

Process of recruitment. Initially, the investigator met with the participants at their convenience, apprised them of the study, and solicited their willing consent, orally at first, to participate in the study. The investigator assisted them in understanding the nature of the study and their role in it. They were asked to go through the informed consent, and contact the investigator if they had any questions, after which those who consented to participate were requested to sign the informed consent and begin filling out the Resilience Test (REST) Battery. The participants were duly thanked.

Administration of the scale(s). Questionnaires were given to the participants. After they were thoroughly explained about the study and their willingness to participate was verbally taken, they were given the informed consent form and the Resilience Test (REST) Battery. The participants were encouraged to fill out about three forms at a time. On average, each individual participant took about 60 minutes to fill the forms. The respondents' doubts were addressed during the next field visit by the investigator or gatekeeper. Following the completion of the survey, all participants were debriefed and thanked.

All the scales were scored as described under the scoring for each scale. The scores were entered into the computer for further analysis.

Chapter IV

RESULTS

Chapter IV

RESULTS

The objective of the current study is to standardize the Resilience Test (REST) Battery. This involved evaluating the universal applicability of the mathematical model on the entire Indian population, consisting of urban and rural populations in the age group of 18 years and above. It may be reiterated that the present study is a logical extension of the earlier study (Rajendran, 2020) that evolved a universal formula to comprehensively measure resilience among the normal population, where the mathematical model was validated for a specific sample on which it was initially tested.

The universal applicability of the weights is confirmed when the resilience indices (RI) of the same sample computed using weights from different groups are in agreement with each other. The present study tested this rigorously by deriving the weights and weightages through different criteria of grouping. It followed the process of comparing four resilience indices of the entire sample derived on the basis of four regional groups and doing the same with 25 resilience indices of the same sample based on random groups. It is important to mention here that each subject obtained 4 + 25 resilience indices (computed using the weights and weightages of the four regions and weights and weightages of random groups).

The confirmation of universal applicability of the mathematical model depended upon qualifying the following three tests:

1. The four sets of resilience indices of the whole sample calculated by applying the weights derived from each region (South, North, West and East) do not show significant differences. In other words, have high agreement.

2. When the resilience indices of individual subjects computed using the weights drawn from several randomised data sets do not show significant differences, i.e., show high agreement.
3. When the resilience indices computed using the weights from a region randomly picked up, computed using weights from a random group randomly picked up and the resilience index values computed by using the highest weights from amongst the random groups and resilience index values computed using the highest weights from amongst the regions are compared and found not to differ significantly, i.e., show high agreement.

The entire sample was divided into four groups based on the region of the subjects to test the first point. To test the second point, a random sample of 314 subjects was picked up from the sample of 627 to constitute the model group. This was done 25 times to have 25 random model groups.

The means and weighted means were calculated for individual subjects from each region separately. The weighted means were computed by dividing the mean score of each of the seven constructs by the highest mean score (called the weight) of the data set for the respective seven constructs and multiplying it by 100. The highest weighted means of the respective constructs were considered as their corresponding weightages. The resilience indices of individual subjects in the sample were computed separately using the weights and weightages of each of the four regions. Thus, each subject had four resilience indices independently calculated by applying the weights and weightages of the four regions.

A similar procedure was followed in deriving weights and weightages for 25 random groups. These 25 weights and weightages were used independently to compute the resilience

index for the individual subjects of the entire sample, thus giving rise to 25 independent resilience indices for every subject.

In the next step, an attempt was made to compare the resilience indices of the entire sample computed by applying the weights and weightages of the four regions. To obtain this, four resilience indices of the entire sample derived using the four weights based on the regions were compared by applying Kendall's Concordance Test. This would determine if the agreement amongst the weights used to calculate them was significant. Similarly, the 25 resilience indices for the entire sample, derived by using the weights of the random groups, were also compared by applying Kendall's Concordance Test to check if the agreement amongst the weights used to calculate them was significant.

With the two above goals, the scores on the REST Battery were put through the mathematical model. Weights and weightages were identified. The mathematical formula from the earlier study was applied to compute the resilience index. These resilience indices were used in standardizing the measurement of resilience among the Indian population.

The results are discussed in four parts. Part 1 describes the development of weights and weightages region-wise and applying these weights in computing the resilience index for the entire sample. Part 2 describes the random grouping of the sample and the application of weights and weightages to compute the resilience index. Part 3 describes the process of standardizing the measurement of resilience for the Indian population. The standardization is further confirmed by applying Kendall's Concordance Test on the two sets of resilience index values computed with the weights of regional and random groups. Part 4 describes the norms derived from the data. Before discussing the results, it was felt necessary to provide an overview of the mathematical model evolved by the earlier study using the REST battery. It

describes the process involved in converting the raw scores of the REST battery to indices by developing weights and weightages for the application of the mathematical formula.

An Overview of the Mathematical Model & Its Application in Converting the Scores of REST Battery

The study by Rajendran (2020) computed the weights and weightages for a group (referred to as the model group). It used the values of the model group on another group, referred to as the testing group, to finalize the mathematical model to compute the resilience index. The REST battery consisted of five scales viz. Adversity scale, Protective Factors scale, Promotive Factors scale, Achievement scale, and Flourishing scale. Adversity was measured on three dimensions: severity, frequency, and duration. Operating Factors referred to the Protective and Promotive Factors. Finally, Outcome Factors measured Achievement and Flourishing.

The study used raw scores of each participant on the seven constructs, viz. severity, frequency, duration of the Adversity scale, Protective Factors, Promotive Factors, Achievement, and Flourishing, to compute the mean scores, identify the weights, compute the weighted means and identify weightages from a model group. The derived weights were later applied on a testing group to derive the following indices: Adversity Index, Operating Factors Index, and Outcome Index to finally compute Resistance Index and Resilience Index. For this purpose, the steps outlined in the earlier study (Rajendran, 2020) were adopted to compute the resilience index.

Evolution of the formula involved the following steps for the model group and testing groups, respectively.

Steps Involved in Evolving Scores for the Model group are:

- (a) Calculation of the mean scores

- (b) Identifying weights from the mean scores
- (c) Calculation of weighted means and
- (d) Identifying weightages

Steps Involved in Evolving Scores for the Testing group are:

- (e) Calculation of the mean scores
- (f) Application of the weights (***from the model group***) on the testing group and calculation of weighted means and
- (g) Calculation of index values from all the seven dimensions

A detailed explanation is provided below regarding the role of the model group in computing the means, weights, weighted means, and the weightages, which were then used to evolve the indices to derive the resistance index and resilience index from the testing group.

Model Group

The first step involved the calculation of the mean scores for individual subjects for each of the seven constructs. Secondly, the highest mean score from among the sample for each of the seven constructs was considered to be the weight of that construct referred to. The third step involved the calculation of the weighted means for each of the seven constructs using the formula given below. The weighted mean is calculated using the mean scores and weights of each construct.

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

Where, mean score of the construct is the mean score obtained by the individual on the construct and weight of the construct is the highest mean score of the data set for that construct. Weighted means were calculated on the seven constructs, for all the participants.

And finally, the highest weighted means of each construct were identified as the weightage. The weightages for every construct were found to be 100.

The weights of the seven constructs and the weightages were then applied on the testing group.

Testing Group

The first step involved the calculation of the mean scores using the raw scores for each of the seven constructs. Mean scores were calculated for all the participants. In this case, the weights from the model group were taken into consideration while calculating the weighted means. This involved the calculation of the weighted means for each of the seven constructs using the formula given below. The weighted mean is calculated using the mean scores (from the testing group) and weights (from the model group) for each construct.

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

Where, mean score of the construct is the mean score obtained by the individual on the construct in the testing group and weight of the construct is the highest mean score of the model group for that construct. Weighted means were calculated for all the participants.

Calculation of the Index values for all the seven constructs. Weighted means from the testing group calculated using the weights of the seven constructs from the model group were used in the formula to calculate the indices viz. Adversity Index, Operating Factors Index and Outcome Index along with the weightages of the seven constructs from the model group. Eventually, Resistance Index and Resilience Index were calculated from the above mentioned three indices. The formula for calculating each of the indices is given below.

(a) Adversity Index (AI)

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

Where, AI is the Adversity Index; S_{wm} is the weighted mean of a participant on the severity dimension of the Testing group; S_w is the weightage of the model group on the severity dimension; F_{wm} is the weighted mean of a participant on the frequency dimension of the testing group; F_w is the weightage of the model group on the frequency dimension; D_{wm} is the weighted mean of a participant on the duration dimension of the testing group; D_w is the weightage of the model group on the duration dimension. Using the above-mentioned formula, Adversity Index is calculated for all the participants.

$$(b) \text{ Operating Factors Index (OFI)} = \frac{(PR_{wm} \times PR_w) + (PM_{wm} \times PM_w)}{PR_w + PM_w}$$

Where, OFI is the Operating Factors Index; PR_{wm} is the weighted mean of a participant on the protective factors dimension of the testing group; PR_w is the weightage of the model group on the protective factors dimension; PM_{wm} is the weighted mean of a participant on the promotive factors dimension of the testing group; PM_w is the weightage of the model group on the promotive factors dimension. Using the above-mentioned formula, Operating Factors Index is calculated for all the participants.

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

Where, OI is the Outcome Index; ACH_{wm} is the weighted mean of a participant on the achievement dimension of the testing group; ACH_w is the weightage of the model group on the achievement dimension; FL_{wm} is the weighted mean of a participant on the flourishing dimension of the testing group; FL_w is the weightage of the model group on the flourishing dimension. Using the above-mentioned formula, Outcome Index is calculated for all the participants.

$$(d) \text{ Resistance Index (RSI)} = \frac{\text{OFI}}{\text{AI}} \times 100$$

Where, RSI is the Resistance Index; OFI is the Operating Factors Index and AI is the Adversity Index. Resistance Index is a derived score calculated using the Operating Factors Index and Adversity Index.

$$(e) \text{ Resilience Index (RI)} = \frac{\text{OI}}{\text{RSI}} \times 100$$

Where, RI is the Resilience Index; OI is the Outcome Factors Index and RSI is the Resistance Index. Resilience Index is a derived score calculated using the Outcome Factors Index and Resistance Index.

An overview of this mathematical model will facilitate an easy understanding of the results of the present study.

Note. For conceptual clarity, all the formulae presented above are explained in detail with examples going forward in this study. The examples shown in the sections below involve numerical calculations. While manually checking, it's possible that the values in the thesis and the ones in the calculator may have very slight differences. This discrepancy results from the fact that manual calculators and computer programmes like Microsoft Excel (used in this study) have distinct decimal rounding off algorithms.

In the current study, each of the four-regions (South, North, West and East) were considered as independent Model groups. Weights and weightages were derived from these regional Model groups, and applied on the entire data set, which was considered as the Testing group. Likewise, each of the 25 random groups were considered as independent Model groups. Weights and weightages were derived from these random Model groups, and applied on the entire data set, which was considered as the Testing group.

Same procedure from the earlier study was followed to holistically arrive at the Resilience Index values and standardize the REST Battery. The results are presented in the following four parts.

Part 1: Region-wise Grouping, Development of Weights and Weightages, & Computing Resilience Index for the Whole Sample

The entire sample was divided into South, North, West, and East regions under the four major geographic divisions of the nation in order to achieve the aforementioned goal. The states of Andhra Pradesh, Kerala, Tamil Nadu, Karnataka, and Puducherry were categorized under the South-India region; the states of Uttar Pradesh, New Delhi, Punjab, Haryana, Uttarakhand, and Bihar under the North-India region; the states of Rajasthan, Gujarat, Maharashtra, Madhya Pradesh and Chattisgarh under the West-India region and the states of West Bengal, Orissa, Assam, Tripura, Manipur, and Nagaland under the East-India region. Each region was considered a model group. The weights were derived from each of the regional model groups. These weights were applied on the entire sample irrespective of their regions. The whole sample was considered as the testing group whose resilience index was computed using the weights and weightages of the model group.

Resilience index was computed using the weights derived from the samples of the four regions of the country. The procedure to calculate the resilience index followed the standard steps outlined in the overview of the mathematical model explained above. The steps are repeated below for better understanding. A clear explanation of the mathematical process was provided by applying it on the scores of an individual participant from the South India region. The computation of the region-wise resilience index is described in detail in the following paragraphs.

Following preliminary steps are adopted for deriving the weights and weightages for the participants from each region.

I.(a) Calculation of the mean scores

I.(b) Identifying weights from the mean scores

I.(c) Calculation of weighted means and

I.(d) Identifying weightages

Here, the process of calculation is explained in detail for the South India region.

I. South-India Region as the Model group.

I.(a) Calculation of the mean scores

Firstly, mean scores were computed from the raw scores for the South India region for the Adversity scale for all the three dimensions viz. severity, frequency, and duration. Also, mean scores for the Protective Factors and Promotive Factors, Achievement, and Flourishing scales were computed.

Seven mean scores for ten participants from South-India region were calculated and provided in Table 4.1 below.

Table 4.1

A Sample Table representing the Mean scores of Severity, Frequency, and Duration of Adversity, Protective and Promotive factors of Operating factors, and Achievement and Flourishing of Outcome factors for Ten Participants of South India Region

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
003	0.45	0.24	0.22	7.54	7.00	0.80	6.50
005	0.29	0.24	0.27	7.13	9.00	0.80	6.13
006	0.69	0.41	0.67	3.75	5.07	0.90	6.13
008	0.31	0.35	0.31	8.50	9.64	0.00	6.50
009	0.10	0.10	0.04	7.13	8.79	1.00	6.50
010	0.35	0.33	0.35	7.21	7.64	0.00	5.38
011	0.10	0.06	0.10	6.63	7.29	1.60	5.25
012	0.61	0.39	0.51	8.08	8.14	0.00	5.63
013	0.61	0.37	0.61	7.50	8.07	0.00	5.25
014	0.18	0.22	0.20	5.29	4.64	0.00	5.50

I.(b) Identifying weights from the mean scores

As mentioned earlier, weights for each of the seven constructs were identified from their respective mean scores. The highest mean score of a construct was considered to be the weight of that construct. By referring to the score tables for South India region, the weights for the seven constructs were identified for the South India region and are presented below in Table 4.2.

Table 4.2

Weights of the Seven Constructs Derived from South-India Region

	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
Weights	5.69	6.00	6.04	9.92	10.00	7.30	7.00

I.(c) Calculation of weighted means

Once the weights were identified, weighted means were calculated using these weights and the mean scores in the formula given below. Weighted means were calculated for all the

participants in the South India region. The weighted means for the ten participants listed in Table 4.1 are calculated and presented in Table 4.3. For this, the weights identified from the data set of South-India region and mentioned in Table 4.2 are used.

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

Where, mean score of the construct is the mean score obtained by the individual on the construct and weight of the construct is the highest mean score from the South India region for that construct. Weighted means were calculated for all the seven constructs for all the participants in the South India region by applying the formula mentioned above.

For better understanding, the mean scores of severity of Adversity for the ID No. 003 taken from Table 4.1 and weights from Table 4.2 are used to calculate the weighted mean of that particular construct (here, severity).

$$\text{Weighted mean} = \frac{0.45}{5.69} \times 100 = 7.89$$

Applying the same formula, weighted means for ten participants on each of the seven constructs from the South-India region are presented below in Table 4.3.

Table 4.3

Sample Table of Weighted Means of the Seven Constructs Derived Through the Formula for the South India Region for Ten Participants

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
003	7.89	4.08	3.72	76.02	70.00	10.96	92.86
005	5.02	4.08	4.39	71.82	90.00	10.96	87.50
006	12.19	6.80	11.15	37.80	50.71	12.33	87.50
008	5.38	5.78	5.07	85.69	96.43	0.00	92.86
009	1.79	1.70	0.68	71.82	87.86	13.70	92.86
010	6.10	5.44	5.74	72.66	76.43	0.00	76.79
011	1.79	1.02	1.69	66.78	72.86	21.92	75.00
012	10.76	6.46	8.45	81.49	81.43	0.00	80.36
013	10.76	6.12	10.14	75.60	80.71	0.00	75.00
014	3.23	3.74	3.38	53.34	46.43	0.00	78.57

I.(d) Identifying the weightages

The highest weighted means were identified as the weightages from the weighted means for the participants of the South India region. The highest weighted means were all 100 for all seven constructs. The weightages for all the seven constructs for participants in the South India region are presented below in Table 4.4.

Table 4.4

Weightages of the Seven Constructs of the South India region

	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
Weights	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The weights and weightages from the South India region are applied on the entire data set, which is the testing group. It entailed the following steps.

I.(e) Calculation of the mean scores

I.(f) Application of the weights (*from the South India region*) on the entire dataset and calculation of weighted means

I.(g) Calculation of index values from all the seven dimensions

I.(e) Calculation of the mean scores

To demonstrate the procedure, mean scores are calculated for ten participants from the entire data set on the seven constructs and presented below in Table 4.5.

Table 4.5

Sample Table of Mean Scores of Seven Constructs for Ten Participants from the Entire Data Set

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
001	0.31	0.18	0.27	7.04	7.86	0.00	5.00
002	0.78	0.22	0.18	9.08	9.43	0.90	7.00
003	0.45	0.24	0.22	7.54	7.00	0.80	6.50
004	0.22	0.14	0.10	7.42	8.29	0.00	6.25
005	0.29	0.24	0.27	7.13	9.00	0.80	6.13
006	0.69	0.41	0.67	3.75	5.07	0.90	6.13
007	0.20	0.14	0.16	8.29	8.07	1.00	6.63
008	0.31	0.35	0.31	8.50	9.64	0.00	6.50
009	0.10	0.10	0.04	7.13	8.79	1.00	6.50
010	0.35	0.33	0.35	7.21	7.64	0.00	5.38

I.(f)Application of the weights (*from the South-India region*) on the entire dataset (testing group) and calculation of weighted means.

Mean scores from Table 4.5 and the weights from Table 4.2 are used to calculate the weighted means.

For better understanding, the mean scores of severity dimension of Adversity Scale for the ID No. 005 taken from Table 4.5 and weight(s) from Table 4.2 are used to calculate the weighted mean of that particular construct (here, severity). Weights from Table 4.2 are the weights identified from the South India region.

$$\text{Weighted mean} = \frac{0.29}{5.69} \times 100 = 5.02$$

A sample table of weighted means for ten participants from the entire data set on each of the seven constructs is presented below in Table 4.6.

Table 4.6

A Sample Table Representing the Weighted Mean Values of the Seven Constructs for Ten Participants from the Entire Data Set Using the Weights from the South India Region

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
001	5.38	3.06	4.39	70.98	78.57	0.00	71.43
002	13.63	3.74	3.04	91.57	94.29	12.33	100.00
003	7.89	4.08	3.72	76.02	70.00	10.96	92.86
004	3.95	2.38	1.69	74.76	82.86	0.00	89.29
005	5.02	4.08	4.39	71.82	90.00	10.96	87.50
006	12.19	6.80	11.15	37.80	50.71	12.33	87.50
007	3.59	2.38	2.70	83.59	80.71	13.70	94.64
008	5.38	5.78	5.07	85.69	96.43	0.00	92.86
009	1.79	1.70	0.68	71.82	87.86	13.70	92.86
010	6.10	5.44	5.74	72.66	76.43	0.00	76.79

I.(g) Calculation of index values from all the seven dimensions

(a) Adversity Index (AI)

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

Where, AI is the Adversity Index; S_{wm} is the weighted mean of a participant on the severity dimension of the entire dataset; S_w is the weightage from the South India region on the severity dimension; F_{wm} is the weighted mean of a participant on the frequency dimension of the entire dataset; F_w is the weightage from the South India region on the frequency dimension; D_{wm} is the weighted mean of a participant on the duration dimension of the entire

dataset; D_w is the weightage of the South India region on the duration dimension. Using the above-mentioned formula, Adversity Index is calculated for all the participants.

For better understanding, the weighted mean scores of severity, frequency, and duration of Adversity for the ID No. 005 taken from Table 4.6 and weightages from Table 4.4 are used to calculate the Adversity Index as demonstrated below.

$$AI = \frac{(5.02 \times 100) + (4.08 \times 100) + (4.39 \times 100)}{100 + 100 + 100} = 4.50$$

(b) Operating Factors (OFI)

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

Where, OFI is the Operating Factors Index; PR_{wm} is the weighted mean of a participant on the protective factors dimension of the entire dataset; PR_w is the weightage from the South India region on the protective factors dimension; PM_{wm} is the weighted mean of a participant on the promotive factors dimension of the entire dataset; PM_w is the weightage from the South India region on the promotive factors dimension. Using the above-mentioned formula, Operating Factors Index is calculated for all the participants. For better understanding, the weighted mean scores of protective and promotive factors of Operating Factors for the ID No. 005 taken from Table 4.6 and weightages from Table 4.4 are used to calculate the Operating Factors Index as demonstrated below.

$$OFI = \frac{(71.82 \times 100) + (90.00 \times 100)}{100 + 100} = 80.91$$

(c) Outcome index

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

Where, OI is the Outcome Index; ACH_{wm} is the weighted mean of a participant on the achievement dimension of the entire dataset; ACH_w is the weightage from the South India region on the achievement dimension; FL_{wm} is the weighted mean of a participant on the flourishing dimension of the entire dataset; FL_w is the weightage from the South India region on the flourishing dimension. Using the above-mentioned formula, Outcome Index is calculated for all the participants.

For better understanding, the weighted mean scores of Protective and Promotive factors of Operating Factors for the ID No. 005 taken from Table 4.6 and weightages from Table 4.4 were used to calculate the Outcome Index as presented below.

$$OI = \frac{(10.96 \times 100) + (87.50 \times 100)}{100 + 100} = 49.23$$

The Resistance Index is derived from the following formula that used the indices of Operating Factors and Adversity.

$$(d) \text{ Resistance Index (RSI)} = \frac{OFI}{AI} \times 100$$

Where, RSI is the Resistance Index; OFI is the Operating Factors Index and AI is the Adversity Index. Resistance Index is a derived score calculated using the Operating Factors Index and Adversity Index. All the indices and the Resistance Indices and Resilience Indices so derived by applying the formula for a sample of ten participants can be seen in Table 4.7.

For better understanding, the indices of Operating Factors and Adversity Index for the ID No. 005 taken from Table 4.7 were used to calculate the Resistance Index.

$$RSI = \frac{80.91}{4.50} \times 100 = 1798.66$$

The Resistance Index is used in computing the final Resilience Index. The Resilience Index is finally computed by applying the following formula using the Outcome Index and the Resistance Index.

$$(e) \text{ Resilience Index (RI)} = \frac{\text{OI}}{\text{RSI}} \times 100$$

Where, RI is the Resilience Index; OI is the Outcome Factors Index and RSI is the Resistance Index. Resilience Index is a derived score calculated using the Outcome Factors Index and Resistance Index as presented in Table 4.7.

For better understanding, the indices of Outcome Index and Resistance Index for the ID No. 005 taken from Table 4.7 were used to calculate the Resilience Index.

$$\text{RI} = \frac{49.23}{1798.66} \times 100 = 2.74$$

Table 4.7

Sample Table Showing the Index Values for Adversity, Operating Factors, Outcome, Resistance, and Resilience for Ten Participants Using the Weighted Means Calculated Utilizing Weights from the South India Region

ID No.	Adversity Index (AI)	Operating Factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index-Using South India Weights
001	4.28	74.78	35.71	1748.00	2.04
002	6.80	92.93	56.16	1365.77	4.11
003	5.23	73.01	51.91	1396.12	3.72
004	2.67	78.81	44.64	2949.62	1.51
005	4.50	80.91	49.23	1798.66	2.74
006	10.05	44.26	49.91	440.42	11.33
007	2.89	82.15	54.17	2842.33	1.91
008	5.41	91.06	46.43	1683.06	2.76
009	1.39	79.84	53.28	5744.25	0.93
010	5.76	74.55	38.39	1293.95	2.97

The same procedure employed to arrive at the Resilience Index using the weights and weightages from South India was followed in calculating the Resilience Indices for all the

participants using the weights and weightages of the three other regions (North India, West India and East India). The weights from all the four regions viz. South, North, West and East used to compute Resilience Indices are presented below in Table 4.8. The weightages for all the seven constructs for each of the four regions is 100.

Table 4.8

Weights of the Seven Constructs Derived from the Four Regions

States	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
South-India	5.69	6.00	6.04	9.92	10.00	7.30	7.00
East-India	1.65	1.78	1.73	9.75	10.00	5.10	6.88
North-India	2.84	2.76	2.69	9.71	9.36	6.90	6.88
West-India	1.86	1.92	1.84	9.83	9.86	5.90	7.00

Part 2: Development of Weights and Weightages on Random Groups & Computation of Resilience Index

As a continuation of the testing of the universal applicability of the weights, the weights and weightages evolved from the twenty-five random groups were independently applied on the total sample for computing the resilience indices of each participant in the study. Twenty-five random groups ($n = 314$ in each group) were drawn from the sample of 627. This leaves a probability for a subject to be in more than one group. Each of the twenty-five random groups was considered as an independent Model group before deriving the weights and applying them on the entire dataset ($n = 627$), which is considered as the testing group to calculate resilience index.

The randomization process followed the standard formula for drawing random groups using the =RAND () function in Microsoft Excel. The purpose of selecting these 25 groups randomly was to ensure that there was no bias in selecting participants into any of the random

groups and that each participant had the same probability of being selected into a random group or left out of a random group.

Resilience index was calculated for the entire dataset ($n = 627$) using the weights derived from 25 random groups. The procedure to compute resilience index followed the same standard steps explained under the overview of the mathematical model and applied in the case of regional groups. However, the steps involved are repeated below. A clear explanation is provided with examples for one random group.

II. *Random group 2 as the Model group*

II.(a) Calculation of the mean scores

II.(b) Identifying weights from the mean scores

II.(c) Calculation of weighted means and

II.(d) Identifying weightages

Here, the process of calculation is explained in detail for the random group 2.

II.(a) Calculation of the mean scores

Firstly, mean scores were computed from the raw scores for random group 2 for the Adversity scale for all the three dimensions viz. severity, frequency, and duration. Also, mean scores for the Protective Factors and Promotive Factors, Achievement and Flourishing scales were computed. Seven mean scores were calculated for each participant.

Mean scores for ten participants drawn from the random group 2 is presented in Table 4.9 below.

Table 4.9

A Sample Table Representing the Mean Scores of Severity, Frequency, and Duration of Adversity, Protective, And Promotive Factors of Operating Factors, and Achievement and Flourishing of Outcome Factors for Ten Participants of Random Group 2

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
002	0.78	0.22	0.18	9.08	9.43	0.90	7.00
003	0.45	0.24	0.22	7.54	7.00	0.80	6.50
005	0.29	0.24	0.27	7.13	9.00	0.80	6.13
006	0.69	0.41	0.67	3.75	5.07	0.90	6.13
007	0.20	0.14	0.16	8.29	8.07	1.00	6.63
012	0.61	0.39	0.51	8.08	8.14	0.00	5.63
014	0.18	0.22	0.20	5.29	4.64	0.00	5.50
017	0.61	0.53	0.55	5.63	5.29	1.10	6.00
018	1.67	1.47	1.69	6.33	2.07	2.60	5.13
019	0.57	0.53	0.53	5.67	6.93	0.00	5.88

II.(b) Identifying weights from the mean scores

As mentioned earlier, weights for each of the seven constructs were identified from their respective mean scores. The highest mean score of a construct was considered to be the weight of that construct. By referring to the score tables for random group 2 the weights for the seven constructs were identified for random group 2 and are given in Table 4.10.

Table 4.10

Weights of the Seven Constructs Derived from Random Group 2

	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
Weights	4.73	5.31	5.73	9.88	10.00	6.9	7.00

II.(c) Calculation of weighted means

Once the weights were identified, weighted means were calculated using these weights and the mean scores in the formula given below. Weighted means were calculated for all the

participants (n = 314) in the random group 2. The weighted means in Table 4.11 were computed utilising the mean scores from Table 4.9 and the weights from Table 4.10.

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

Where, mean score of the construct is the mean score obtained by the individual on the construct. Weight of the construct is the highest mean score of the data set (here, random group 2) for that construct. Weighted means were calculated for all the seven constructs for all the participants in random group 2.

For better understanding, the mean scores of severity of Adversity for the ID No. 003 taken from Table 4.9 and weights from Table 4.10 were used to calculate the weighted mean of that particular construct (here, severity).

$$\text{Weighted mean} = \frac{0.45}{4.73} \times 100 = 9.49$$

Likewise, weighted means for all participants on each of the seven constructs from random group 2 were calculated.

Weighted means for ten participants on all the seven constructs are presented below in Table 4.11.

Table 4.11

Weighted Means of the Seven Constructs Derived through the Formula for Ten Participants of Random Group 2

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
002	16.40	4.23	3.21	91.94	94.29	13.04	100.00
003	9.49	4.61	3.92	76.33	70.00	11.59	92.86
005	6.04	4.61	4.63	72.12	90.00	11.59	87.50
006	14.67	7.69	11.75	37.96	50.71	13.04	87.50
007	4.31	2.69	2.85	83.92	80.71	14.49	94.64
012	12.94	7.30	8.90	81.82	81.43	0.00	80.36
014	3.88	4.23	3.56	53.56	46.43	0.00	78.57
017	12.94	9.99	9.62	56.93	52.86	15.94	85.71
018	35.38	27.67	29.56	64.10	20.71	37.68	73.21
019	12.08	9.99	9.26	57.35	69.29	0.00	83.93

II.(d) Identifying the weightages

Highest weighted means were identified as the weightages from the weighted means for the participants of random group 2. The highest weighted means were all 100 for all the seven constructs. The weightages for all the seven constructs for the participants in random group 2 are presented below in Table 4.12.

Table 4.12

Weightages of All the Seven Constructs of Random Group 2

	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
Weights	100.00	100.00	100.00	100.00	100.00	100.00	100.00

The weights and weightages from the random group 2 are applied on the entire data set which is the testing group. It entailed the following steps.

II.(e) Calculation of the mean scores

II.(f) Application of the weights (*from random group 2*) on the entire dataset and calculation of weighted means

II.(g) Calculation of index values from all the seven dimensions

II.(e) Calculation of the mean scores

Mean scores were calculated for the entire sample (considered as the testing group, $n=627$) on the seven constructs. The sample table representing the mean scores for ten participants is presented in Table 4.5 (**part one**). The same table, i.e., Table 4.5 is repeated here for the ready reference of the reader.

Table 4.5

Sample Table of Mean Scores of Seven Constructs for Ten Participants from the Entire Data Set

ID No.	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
001	0.31	0.18	0.27	7.04	7.86	0.00	5.00
002	0.78	0.22	0.18	9.08	9.43	0.90	7.00
003	0.45	0.24	0.22	7.54	7.00	0.80	6.50
004	0.22	0.14	0.10	7.42	8.29	0.00	6.25
005	0.29	0.24	0.27	7.13	9.00	0.80	6.13
006	0.69	0.41	0.67	3.75	5.07	0.90	6.13
007	0.20	0.14	0.16	8.29	8.07	1.00	6.63
008	0.31	0.35	0.31	8.50	9.64	0.00	6.50
009	0.10	0.10	0.04	7.13	8.79	1.00	6.50
010	0.35	0.33	0.35	7.21	7.64	0.00	5.38

II.(f) Application of the weights (*from random group 2*) on the entire dataset and calculation of weighted means.

Mean scores from Table 4.5 and the weights from Table 4.10 were used to calculate the weighted means presented in Table 4.13 using the formula given below.

For better understanding about calculation of weighted means an example for calculating the weighted mean for severity dimension of Adversity scale for one individual participant is given below. The same procedure was followed for all the constructs for the entire sample. The mean scores of severity dimension of Adversity Scale for the ID No. 005 taken from Table 4.5 and weight(s) from Table 4.10 are used to calculate the weighted mean of that particular construct, here, severity. Weights from table 4.10 are the weights identified from random group 2.

$$\text{Weighted mean} = \frac{0.29}{4.73} \times 100 = 6.04$$

A sample table showing weighted means for ten participants is presented in Table 4.13.

Table 4.13

A Sample Table Showing the Weighted Mean Values of the Seven Constructs for Ten Participants from the Testing Group Using the Weights from Random Group 2

ID No.	Adversity			Operating factors		Outcome factors	
	Severity	Frequency	Duration	Protective factors	Promotive factors	Achievement	Flourishing
001	6.47	3.46	4.63	71.27	78.57	0.00	71.43
002	16.40	4.23	3.21	91.94	94.29	13.04	100.00
003	9.49	4.61	3.92	76.33	70.00	11.59	92.86
004	4.75	2.69	1.78	75.07	82.86	0.00	89.29
005	6.04	4.61	4.63	72.12	90.00	11.59	87.50
006	14.67	7.69	11.75	37.96	50.71	13.04	87.50
007	4.31	2.69	2.85	83.92	80.71	14.49	94.64
008	6.47	6.53	5.34	86.03	96.43	0.00	92.86
009	2.16	1.92	0.71	72.12	87.86	14.49	92.86
010	7.33	6.15	6.05	72.96	76.43	0.00	76.79

II.(g) Calculation of index values for all the seven dimensions

(a) Adversity Index (AI)

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

Where, AI is the Adversity Index; S_{wm} is the weighted mean of a participant on the severity dimension of the entire dataset; S_w is the weightage of random group 2 on the severity dimension; F_{wm} is the weighted mean of a participant on the frequency dimension of the entire dataset; F_w is the weightage of random group 2 on the frequency dimension; D_{wm} is the weighted mean of a participant on the duration dimension of the entire dataset; D_w is the weightage of random group 2 on the duration dimension. Using the above-mentioned formula, Adversity Index is calculated for all the participants.

For better understanding, the weighted mean scores of severity, frequency, and duration of Adversity for the ID No. 005 taken from Table 4.13 and weightages from Table 4.12 are used to calculate the Adversity Index.

$$AI = \frac{(6.04 \times 100) + (4.61 \times 100) + (4.63 \times 100)}{100 + 100 + 100} = 5.09$$

(b) Operating Factors (OFI)

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

Where, OFI is the Operating Factors Index; PR_{wm} is the weighted mean of a participant on the protective factors dimension of the entire dataset; PR_w is the weightage of random group 2 on the protective factors dimension; PM_{wm} is the weighted mean of a participant on the promotive factors dimension of the entire dataset; PM_w is the weightage of random group 2 on the promotive factors dimension. Using the above-mentioned formula, Operating Factors Index is calculated for all the participants.

For better understanding, the weighted mean scores of Protective and Promotive factors of Operating Factors for the ID No. 005 taken from Table 4.13 and weightages from Table 4.12 are used to calculate the Operating Factors Index.

$$OFI = \frac{(72.12 \times 100) + (90.00 \times 100)}{100 + 100} = 81.06$$

(c) Outcome index

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

Where, OI is the Outcome Index; ACH_{wm} is the weighted mean of a participant on the achievement dimension of the entire dataset; ACH_w is the weightage of random group 2 on the achievement dimension; FL_{wm} is the weighted mean of a participant on the flourishing dimension of the entire dataset; FL_w is the weightage of random group 2 on the flourishing dimension. Using the above-mentioned formula, Outcome Index is calculated for all the participants.

For better understanding, the weighted mean scores of Protective and Promotive factors of Operating Factors for the ID No. 005 taken from Table 4.13 and weightages from Table 4.12 are used to calculate the Operating Factors Index.

$$OI = \frac{(11.59 \times 100) + (87.50 \times 100)}{100 + 100} = 49.55$$

$$(d) \text{ Resistance Index (RSI)} = \frac{OFI}{AI} \times 100$$

Where, RSI is the Resistance Index; OFI is the Operating Factors Index and AI is the Adversity Index. Resistance Index is a derived score calculated using the Operating Factors Index and Adversity Index from Table 4.14.

For clarifying further, indices of Operating Factors and Adversity for the ID No. 005 taken from Table 4.14 are used to calculate the Resistance Index.

$$RSI = \frac{81.06}{5.09} \times 100 = 1591.18$$

$$(e) \text{ Resilience Index (RI)} = \frac{OI}{RSI} \times 100$$

Where, RI is the Resilience Index; OI is the Outcome Factors Index and RSI is the Resistance Index. Resilience Index is a derived score calculated using the Outcome Factors Index and Resistance Index from Table 4.14.

To explain further, the indices of Outcome factors and Resistance for the ID No. 005 taken from Table 4.14 are used to calculate the Resilience Index.

$$RI = \frac{49.55}{1591.18} \times 100 = 3.11$$

Resilience Index values for all the seven constructs for the entire data set using the weights and weightages is computed and the index values computed from all the seven constructs are presented below in Table 4.14 for ten participants.

Table 4.14

A Sample Table Showing Index Values for Adversity, Operating Factors, Outcome, Resistance, and Resilience for Ten Participants Using the Weighted Means Calculated Utilizing Weights from Random Group 2 for Ten Participants from the Testing Group

ID No.	Adversity Index (AI)	Operating Factors Index (OFI)	Outcome Index (OI)	Resistance Index (RSI)	Resilience Index-Using Weights from Random Group 2
001	4.85	74.92	35.71	1543.60	2.31
002	7.94	93.11	56.52	1172.26	4.82
003	6.01	73.17	52.23	1217.95	4.29
004	3.07	78.96	44.64	2570.04	1.74
005	5.09	81.06	49.55	1591.18	3.11
006	11.37	44.33	50.27	389.93	12.89
007	3.28	82.32	54.57	2506.09	2.18
008	6.12	91.23	46.43	1491.66	3.11
009	1.60	79.99	53.67	5008.21	1.07
010	6.51	74.69	38.39	1146.84	3.35

It may be observed here that the RI value for ID 005 calculated using the weights of South-India region is 2.74 (Refer Table 4.7). However, the RI Value of the same ID number computed using the weights of random group 2 is 3.11 as shown in Table 4.14. These differences, whether considered marginal or significant will be tested further by comparing the groups under KCC.

The same procedure employed to arrive at the Resilience Index using the weights and weightages from random group 2 was followed in calculating the Resilience Indices for all the participants using the weights and weightages from 24 random groups. The weights from all the 24 random groups are presented below in Table 4.15. It should be mentioned here that the weightages for all the seven constructs for each random group is 100.

Table 4.15***Weights of the Seven Constructs Derived from the 25 Random Groups***

Groups	Severity	Frequency	Duration	Achievement	Protective	Promotive	Flourishing
1.	5.69	6.00	6.04	7.30	9.83	10.00	7.00
2.	4.73	5.31	5.73	6.90	9.88	10.00	7.00
3.	4.73	5.31	5.73	6.90	9.88	10.00	7.00
4.	5.69	6.00	6.04	6.90	9.83	9.86	7.00
5.	2.59	2.49	2.51	7.30	9.92	10.00	7.00
6.	5.69	6.00	6.04	6.90	9.92	10.00	7.00
7.	5.69	6.00	6.04	6.40	9.75	9.86	7.00
8.	5.69	6.00	6.04	7.30	9.88	10.00	7.00
9.	5.69	6.00	6.04	7.30	9.92	10.00	7.00
10.	5.69	6.00	6.04	7.30	9.92	10.00	7.00
11.	5.69	6.00	6.04	7.30	9.88	10.00	7.00
12.	5.69	6.00	6.04	7.30	9.88	10.00	7.00
13.	2.96	2.49	2.92	6.40	9.92	10.00	7.00
14.	2.84	2.76	2.69	7.30	9.92	10.00	7.00
15.	5.69	6.00	6.04	6.90	9.92	10.00	7.00
16.	4.73	5.31	5.73	6.90	9.92	10.00	7.00
17.	2.84	2.49	2.51	6.90	9.92	10.00	7.00
18.	3.51	2.71	2.92	6.90	9.92	10.00	7.00
19.	5.69	6.00	6.04	6.90	9.92	10.00	7.00
20.	5.69	6.00	6.04	7.30	9.83	10.00	7.00
21.	5.69	6.00	6.04	7.30	9.75	10.00	7.00
22.	2.96	2.76	2.92	6.80	9.92	10.00	7.00
23.	5.69	6.00	6.04	6.90	9.92	10.00	7.00
24.	4.73	5.31	5.73	6.90	9.88	10.00	7.00
25.	4.73	5.31	5.73	6.90	9.92	10.00	7.00

Having repeatedly computed the resilience index for the entire sample taking the weights from the four regional groups and the twenty-five random groups, the next step is to examine if the resilience index thus computed twenty-nine times (four times taking the weights from the regions and twenty-five times taking the random group weights) show significant agreement. The statistical measures applied to test this are described in part three of the results. Part three of the results tests and confirms the standardization of the mathematical model.

Part 3: Standardization of the Mathematical Model

If at all, the weights derived from the four regions and the weights derived from the twenty-five random groups are universally applicable, the resilience index scores for participants calculated using the weights from the four regions (computed independently for each region) or the resilience index scores calculated using the weights from the twenty-five random groups (computed independently for each random group) should be comparable for all the participants irrespective of the weights used to calculate them, indicating an agreement among the various weights from the four regions and the twenty-five random groups. This can be tested statistically using Kendall's Coefficient of Concordance (KCC) test. The test is applied in this context to find out if:

- A) The weights from the four regions are in agreement with each other. This can be tested by comparing the resilience indices computed using them.
- B) Whether the weights from the twenty-five random groups are in agreement with each other. This can be tested by comparing the resilience indices computed using them; and
- C) Whether the mixed group comprising of regional classification and random grouping have comparable weights. This can be tested by computing resilience indices by randomly picking up weights from a region, from a random group and identifying the highest weights from amongst the regions and the random groups, and computing resilience indices using them and verifying if there is agreement with each other. The appropriate test for the above three is KCC.

Kendall's Coefficient of Concordance (KCC)

Kendall's Coefficient of Concordance, commonly referred to as Kendall's *W* is a non-parametric statistical test used to measure the degree of inter-rater agreement or concordance

while assessing the same samples. The test entails judges to rank certain objects and then checks for agreement among the judges in their ranking or rating of those objects. The value of W lies between 0 (absolute disagreement) and 1 (absolute agreement). Greater or less agreement among the various responses of judges is indicated by intermediate values of W . The test is commonly used in attribute agreement analysis. Kendall's Concordance Coefficient (KCC) helps us understand the degree to which the judges agree with each other.

The test is performed to understand if there is an agreement among the judges with respect to the similarity in the resilience index scores for all the participants. The 'judges' need not be construed as human factor giving their subjective or objective judgement. Here, the judges are the weights from the four regions (in the context of comparison of the resilience index values based on the weights applied from each region) and the weights from the twenty-five random groups (in the context where the resilience index values are computed based on the weights from each random group) used to compute the resilience index scores for the entire sample ($n = 627$). These are considered the judges because they are the determinants of the Resilience Index values.

In this part of the results Kendall's Coefficient of Concordance (W) test is performed thrice to check for the universal applicability of the mathematical model. The first analysis is performed to understand if there is agreement among the weights from the four regions in computing the Resilience Index values. Second, analysis was performed to understand if there is agreement among the weights from twenty-five random groups in computing resilience index. For the third time the analysis was carried out to examine if the weights from the mixed group (regions and random groups) in computing the resilience indices are in agreement. The concordance test analysis is presented below.

(i) Kendall's Concordance Test: Region-Wise Categorization

Kendall's Concordance Test (KCC) was first performed to test the agreement among weights of the four regions. It was found that there was agreement among the weights from the four regions in computing resilience index. This can be confirmed from the analysis explained below. KCC is a rank-order test and hence, the weights from the four regions (here, judges) ranked their agreement of the four resilience index values computed using them.

A sample of ten participants' resilience index values of the testing group i.e., the entire sample computed using the weights of the four-regions, viz-South, North, West and East weights is presented in Table 4.16.

Table 4.16

A Sample Table Depicting the Resilience Indices Computed Using Weights from the Four Regions for Ten Participants and Kendall's Coefficient of Concordance (W) for Resilience Index Scores Computed Using the Weights from the Four-Regions

ID No.	Resilience Index (RI)-South India Weights	Resilience Index (RI)- North India Weights	Resilience Index (RI)-East India Weights	Resilience Index (RI)- West India Weights
001	2.04	4.23	7.10	6.36
002	4.11	8.32	14.91	12.95
003	3.72	7.66	13.44	11.79
004	1.51	3.10	5.25	4.68
005	2.74	5.70	9.93	8.75
006	11.33	23.56	41.43	36.39
007	1.91	3.97	6.95	6.11
008	2.76	5.74	9.56	8.59
009	0.93	1.91	3.37	2.95
010	2.97	6.17	10.29	9.25
Kendall's W	1.000			
P value	<.0001			
Statistical level of agreement	Perfect			

Note. A table comprising the resilience index values computed for all the participants using the weights of the four-regions is appended in APPENDIX C1.

Kendall's Coefficient of Concordance (W) reported from Table 4.16 is $\chi^2(3) = 1.000$, $p < .0001$, indicating a significant agreement among the weights from the four-regions or, in other words, perfect agreement (Gibbons & Kendall, 1990) among the weights from the four-regions used for computing resilience index values.

(ii) Kendal's Concordance Test: Random group categorization

Kendall's Concordance Test (KCC) was performed to test the agreement among weights of the 25 random groups. It was found that there is agreement among the weights from the 25 random groups in computing the resilience index values. This can be confirmed from the analysis explained below.

A sample of ten participants' resilience index values of the testing group i.e., the entire sample computed using the weights of the 25 random groups is presented in Table 4.17.

Table 4.17

A Sample Table Showing Resilience Index Values Calculated Using Weights from the Random Groups for Ten Participants and Kendall's Coefficient of Concordance (W) for Resilience Index Scores Computed Using the Weights from the Twenty-Five Random Groups

ID No.	Resilience Index (RG- 1/20)	Resilience Index (RG- 2/3/24)	Resilience Index (RG- 4)	Resilience Index (RG-5)	Resilience Index (RG-6)	Resilience Index (RG-7)	Resilience Index (RG- 8/11/12)	Resilience Index (RG-9/10)	Resilience Index (RG-13)	Resilience Index (RG-14)	Resilience Index (RG- 15/19/23)	Resilience Index (RG- 16/25)	Resilience Index (RG-17)	Resilience Index (RG- 18)	Resilience Index (RG- 21)	Resilience Index (RG- 22)
001	2.03	2.31	2.02	4.74	2.04	2.01	2.04	2.04	4.27	4.35	2.04	2.32	4.57	3.91	2.03	4.15
002	4.09	4.82	4.09	9.32	4.14	4.11	4.10	4.11	8.49	8.52	4.14	4.83	8.85	7.43	4.08	8.25
003	3.70	4.29	3.70	8.56	3.74	3.71	3.71	3.72	7.86	7.83	3.74	4.30	8.25	7.04	3.68	7.58
004	1.51	1.74	1.50	3.49	1.51	1.49	1.51	1.51	3.18	3.19	1.51	1.74	k3.34	2.86	1.50	3.07
005	2.73	3.11	2.72	6.38	2.75	2.74	2.73	2.74	5.89	5.84	2.75	3.12	6.22	5.36	2.72	5.65
006	11.29	12.89	11.28	26.32	11.41	11.35	11.31	11.33	24.06	24.16	11.41	12.91	25.62	21.92	11.25	23.25
007	1.90	2.18	1.90	4.42	1.92	1.91	1.90	1.91	4.08	4.05	1.92	2.18	4.30	3.69	1.89	3.92
008	2.75	3.11	2.73	6.45	2.76	2.72	2.75	2.76	5.91	5.90	2.76	3.12	6.27	5.44	2.74	5.68
009	0.92	1.07	0.92	2.15	0.93	0.93	0.93	0.93	2.03	1.96	0.93	1.07	2.09	1.81	0.92	1.92
010	2.95	3.35	2.93	6.92	2.97	2.92	2.96	2.97	6.30	6.34	2.97	3.35	6.72	5.81	2.94	6.08
Kendall's W	0.953															
P value	<.0001															
Statistical level of agreement	Very high															

Note: A table comprising the Resilience Index values computed for all the participants using the weights of the 25 random groups is appended in

APPENDIX C2. RG = Random Group

Kendall's Coefficient of Concordance (W) reported from Table 4.17 SPSS is $\chi^2(24) = 0.953$, $p < .0001$, indicating a significant agreement among the weights from the 25 random groups or, in other words, a very high agreement (Gibbons & Kendall, 1990) among the weights from the 25 random groups used for computing resilience index values.

It is observed that the weights from the four-regions and weights from the 25 random groups have been in concordance regarding the resilience index values computed using them, suggesting that these weights can be applied across the Indian population.

(iii) Kendall's Concordance Test: Mixed group Categorization

Taking the standardization process to a more rigorous level, Kendall's Concordance Test was carried out on a mixed random group. This was done by selecting (i) Resilience index values computed using weights from one of the four regions, selected randomly; (ii) Resilience index values computed using weights from one of the twenty-five groups, selected randomly; (iii) Resilience index values computed using the maximum (highest) weights for each of the seven constructs from the four regions; and (iv) The resilience index values computed using the maximum (highest) weights for each of the seven constructs from the 25 random groups and this mixed random group was tested for concordance. Weights used from the model are presented below in Table 4.18.

Table 4.18***Weights of the Seven Constructs Derived from the Mixed Group***

Groups (Mixed Group)	Adversity			Operating Factors		Outcome Factors	
	Severity	Frequency	Duration	Protective Factors	Promotive Factors	Achievement	Flourishing
Randomly selected region- West India	1.86	1.92	1.84	9.83	9.86	5.90	7.00
Randomly selected random group-22	2.96	2.76	2.92	6.80	9.92	10.00	7.00
Maximum weights- regions	5.69	6.00	6.04	9.92	10.00	7.30	7.00
Maximum weights- random groups	5.69	6.00	6.04	9.92	10.00	7.30	7.00

Kendall's Concordance Test (KCC) was performed to test the agreement among weights of the mixed group; and it was found that there was agreement among the weights from the mixed group regarding the resilience index values computed using them. This can be understood from the analysis explained below. Here, an attempt was made to understand whether the resilience index values (of each individual participant) obtained using the weights from the mixed group were consistent with one another with respect to the weights from the mixed group used to compute these resilience index values. In other words, each participant had 4 resilience index values, which were tested for concordance amongst weights (here, weights from mixed model) used to compute them. For this purpose, Kendall's Coefficient of Concordance (KCC) was analysed.

A sample of ten participants' resilience index values of the testing group i.e., the entire sample computed using the weights of the mixed group is presented in Table 4.19.

Table 4.19

Resilience Index Values Computed Using the Weights from the Mixed Group for Ten Participants and Kendall's Coefficient of Concordance (W) for Resilience Index Scores of the Proposed Model

ID No.	Resilience Index (RI)- (Randomly selected group from the twenty-five random groups)	Resilience Index (RI)- West India (Randomly selected weights from the four regions)	Resilience Index (RI)-Maximum Weights-Regions	Resilience Index (RI)- Maximum Weights-Random Groups
001	4.15	6.36	2.04	2.04
002	8.25	12.95	4.11	4.11
003	7.58	11.79	3.72	3.72
004	3.07	4.68	1.51	1.51
005	5.65	8.75	2.74	2.74
006	23.25	36.39	11.33	11.33
007	3.92	6.11	1.91	1.91
008	5.68	8.59	2.76	2.76
009	1.92	2.95	0.93	0.93
010	6.08	9.25	2.97	2.97
Kendall's W	1.000			
P value	<.0001			
Statistical level of agreement	Perfect			

Note: A table comprising the resilience index values computed for all the participants using the weights from the mixed model is appended in APPENDIX C3.

Kendall's Coefficient of Concordance (W) reported from Table 4.19 is $\chi^2(3) = 1.000$, $p < .0001$, indicating a significant agreement among the weights from the mixed group (Gibbons & Kendall, 1990) or, in other words, a perfect agreement among the weights from the mixed group used for computing resilience index values.

The results of all three tests of KCC established a strong agreement among the weights used to compute the resilience index of participants 29 times, each time using weights from a different region or random group on the criterion of being the highest mean score.

Thus, it was proved that the weights evolved in this study could be used for the entire Indian population. This fulfilled the objective of standardizing the weights to compute the resilience index for the Indian population. Having achieved this, the next logical step is to facilitate the interpretation of the resilience index of any individual computed by applying the standard weights. This calls for evolving norms for the resilience index. Part four of the results chapter presents the procedure adopted towards this goal.

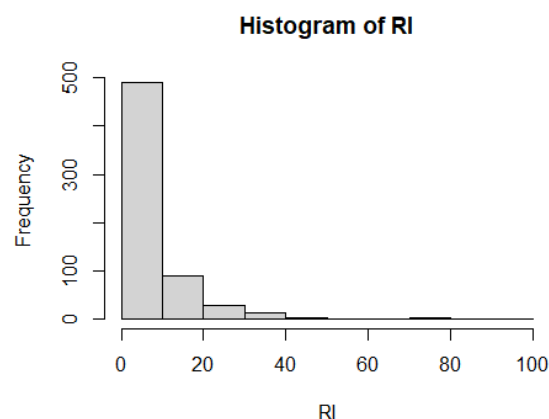
Part four: Development of Norm

Norm development was done following a series of statistical procedures. The study represented the data through a histogram initially, after which, Kernel Density Estimation (KDE) was further applied for evolving norms for the resilience index scores, based on which an individual's RI score can be classified as high-resilient, survivors, and low-resilient.

Firstly, a histogram was used to visually represent the full data set comprising the resilience index scores of 627 participants. The histogram was used to visualize the frequency distribution of the resilience index scores, identify the shape of the distribution, and determine whether the distribution is normal. The histogram representing all the 627 resilience index scores is represented in Figure 4.1.

Figure 4.1

Histogram Representing Distribution of Resilience Index Scores in the Sample

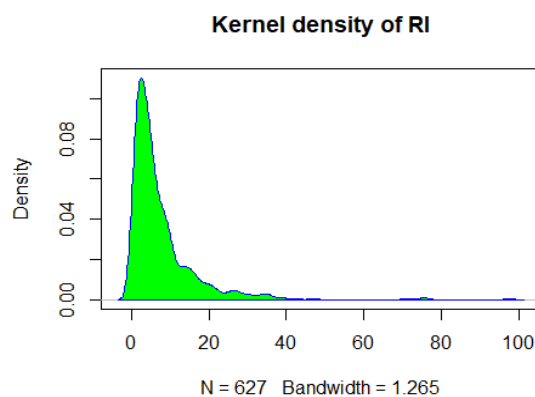


It can be observed from the figure that nearly 70% of the resilience index scores fall between 0.22 and 8.02 in the first two bins. The histogram hinted that the distribution could be normal, but this needed to be investigated further.

For this purpose, a smoothing technique called Kernel Density Estimation (KDE) was subsequently applied to help in estimating the density and distribution of the data accurately. KDE test is a non-parametric method that can estimate the probability density function of a continuous random variable, which, in this case, was the resilience index score. In other words, a KDE plot is a smoothed version of a histogram, where each observation is represented by a “kernel” function that is centered at the value of the observation. The KDE plot is shown in Figure 4.2.

Figure 4.2

Kernel Density Estimate Plot Depicting the Distribution of Sample on Resilience Index



The KDE plot in Figure 4.2 above, clearly indicates that the data is normally distributed. That is to say, a majority of the study’s resilience index scores are concentrated around the mean, leading to a roughly bell-shaped curve that is representative of a normal distribution.

The cutoffs used to categorize the sample have been chosen using the normal distribution rule of thumb [$\text{mean} + 1.96 \times \text{SD}$], which states that approximately 95% of

the data falls within two standard deviations (1.96 sigma) of the mean in a normally distributed dataset.

In this sample, containing 627 resilience index scores, the mean RI score of the data + (1.96 x standard deviation) covers a large proportion (approx. 95%) of the dataset; i.e., up to the RI value of 26.12. Participants with this RI score of 26.12 or below can be treated as falling within one classification, i.e., **low-resilience**. Participants whose scores fall within this range (0 to 26.12) of RI scores belong to the category of low resilient group.

A small proportion of **borderline resilient** or **survivor's** participants fall into the interval between 2 standard deviations of the mean (mean + 1.96 x SD) to twice of that (mean + 1.96 x 2 x SD); i.e., between the RI scores of 26.12 and 44.59. If the RI value is higher than the upper range of the values of the second group (i.e., 44.59), it can be categorized as **high-resilience**. In other words, participants whose RI scores are above **44.59** can be classified as **resilients**. The calculation of these cut-offs is explained below.

Cut-offs for Low-Resilient, Potentially Resilient (Survivors), and High- Resilient groups are presented below:

First cut-off: $7.65 \text{ (mean)} + 9.42 \text{ (SD)} \times 1.96 = 26.12$

Second cut-off: $7.65 \text{ (mean)} + 9.42 \text{ (SD)} \times 1.96 \times 2 = 44.59$

Low-resilient group: Equal to or less than the RI value of 26.12. A large percentage of the sample (amounting to 95.4%) in this study (around 598 participants) fall into this group.

Borderline-resilient group (survivors): Their RI values fall between 26.12 and 44.59. A low proportion of 3.8% of the population of this study (24 participants) falls into this group.

High-resilient group: RI values are above 44.59. Very low proportion of the sample, i.e., 0.8% (5 participants) in this study fall into this group.

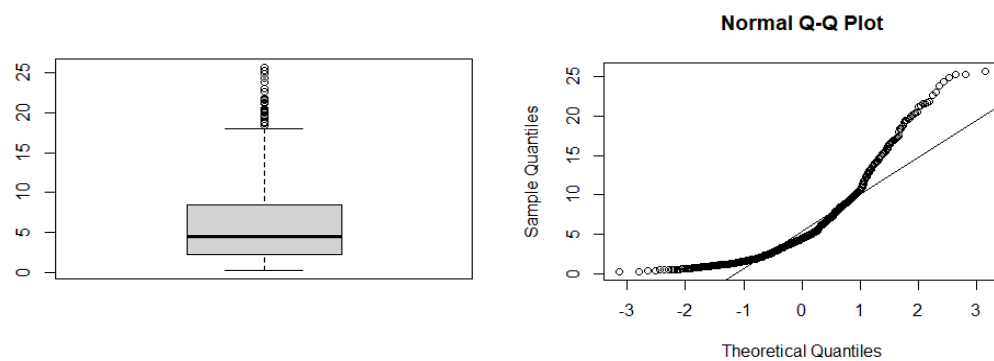
The table with the entire list of participants of this study belonging to low-resilient, (borderline) survivor, and the high-resilient groups along with their RI values is attached in appendix C4 for a ready reference.

Further interpretations of each group using graphical descriptive analyses.

Low-resilient group: A good number of outliers exist in this group as the RI values are non-homogenous as shown in Figure 4.3. This indicates the participants in this group are mixed and gravitate towards being potentially resilient on the other end of the spectrum.

Figure 4.3

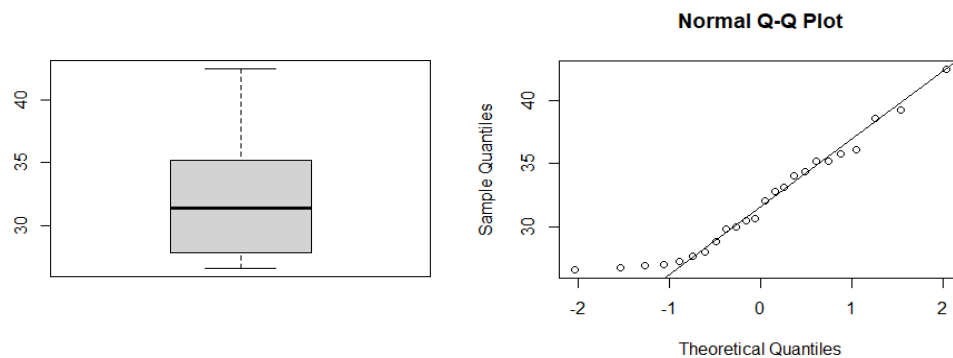
Figure Depicting the Boxplot and Q-Q Plot of RI Scores Falling in the Low-Resilient Group



Borderline-resilient (Survivors) group: This group has no outliers, and the RI values are homogenous as shown in Figure 4.4. This group is statistically the most meaningful as they follow a normal distribution.

Figure 4.4

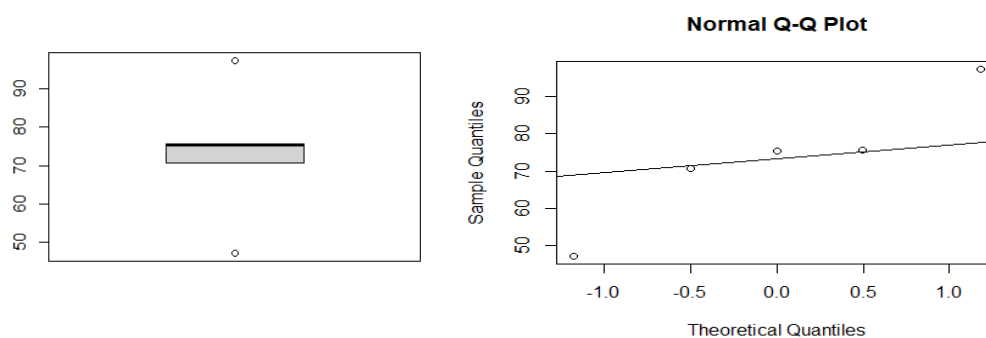
Figure Depicting the Boxplot and Q-Q Plot of RI Scores Falling in the Borderline-Resilient Group



High-Resilient group: This group demonstrates outliers at both extreme ends of the normal distribution as shown in Figure 4.5 indicating that this group is diverse and varied in their levels of resilience.

Figure 4.5

Figure Depicting the Boxplot and Q-Q Plot of RI Scores Falling in the High-Resilient Group



These characteristics of homogeneity in the Borderline Resilient Group and lack of it in the low and high resilient groups suggests a possibility of the low resilient group to move to the borderline group and the high resilience group to excel further or drift to the borderline

group. In other words, this finding is indicating the scope for improving resilience index among the participants with appropriate interventions.

Chapter V

DISCUSSION

CHAPTER V

DISCUSSION

The main objective of the present study was to standardize the Resilience Test (REST) Battery. The key findings, limitations, and implications of the study are discussed in this chapter. The study was successful in standardizing the Resilience Test (REST) Battery for the Indian population. The study, its approach, and the findings are discussed under various heads.

Application of the Revised Synergy Model

The present study administered the REST Battery, developed weights, and tested the weights for their universal applicability on the Indian population, taking into consideration the revised synergy model called Hariharan-Rajendran Synergy Model, which replaced the Hariharan-Rana-Synergy Model (2016).

The original synergy model developed by Hariharan and Rana (2016) advocated resistance as the by-product of a synergic action between the adversities and operating factors (protective and promotive factors), resulting in the outcome factors equated with resilience. Empirical testing of the synergy model by Rajendran (2020) revealed that resilience results from an interplay between the resistance and outcome factors but cannot be equated to the outcome factors. Thus, the original synergy model was revised. This revised model explained that the adversities and operating factors contributed to resistance, which in turn resulted in outcome factors in terms of achievement and flourishing. The outcome of resistance culminates either in insulating the individual from the impact of the adversities or having a steeling effect and excelling in life. This is resilience. This revised model introduced the component of outcome between resistance and resilience. This revised model replaced the Hariharan-Rana Synergy model and is called the Hariharan-Rajendran Synergy model.

Unique Features of this Measurement Study

The unique features of this study are the synergy model as the basis of the study, and the tool used, i.e., REST Battery which is designed as an all-encompassing approach to assess resilience, taking into account all the essential components of the construct of resilience.

The theories of development postulate the impact of the environment on the functioning level of the individual, be it cognitive, emotional, or personality dimension. Exposure to enriched experiences is expected to result in higher performance or achievement, while impoverished environments and adverse experiences in life are expected to lower performance. There are occasions when pathological behaviour is predicted based on the adversities experienced by an individual (Felitti et al., 1998). However, there are exceptions to this. In reality, despite exposure to the enriched environment and stress-free experiences, despite not being exposed to adversities, some manifest dysfunctional behaviour. This violates developmental theories. We call these individuals digressers (Westphal & Bonnano, 2007). On the other hand, despite an impoverished environment and adversities in life, the performance and achievements are high for some individuals. This group is behaving in violation of the proposition of developmental theories, and this is the resilient group, where individuals are thriving despite adversity (Luthar & Cicchetti, 2000) and not just ‘bouncing back’ from adversities but ‘bouncing forward’ (Walsh, 2002). Thus, measuring these two essential components (adverse circumstances and achievements) in combination promises good insight into the phenomenon. Hence, the identification of participants who present both - experience of adversities and achievement in life was an essential challenge of this study.

The very definition of resilience across studies talks about the presence of adversity(s) and positive outcomes amidst adversity(s) (Vella & Pai, 2019; Luther et al., 2000). According to Fletcher and Sarkar (2013), many researchers concur that both these factors are necessary to define resilience. Thus, to identify someone as resilient, they must be resilient to some

degree of risk or adversity and show some positive adaptation resulting in significant achievement in the face of the said experienced adversity(s).

As we can see from the results of this study, approximately one-fourth of the original sample had to be excluded from the study (230 out of 945 participants were excluded) because of a zero score on the adversity scale. Thus, we can conclude that the absence of the experience of a significant adversity for several individuals is evidence that adversities are not distributed normally. Some people may face numerous challenges, while others may never face any challenges. Bonanno et al. (2015) differentiated between ‘emergent resilience’ and ‘minimal-impact resilience’ based on the nature of adversities. Emergent resilience occurs post-chronic adversity, and ‘minimal-impact’ resilience follows acute adversity. The measurement Battery used in this study was suitable in excluding those with a zero score on the adversity dimension and fulfilled the basic requirements in quantifying resilience.

Scales like the Connor-Davidson Resilience Scale [CD-RISC] (Connor & Davidson, 2003) require individuals to respond hypothetically to statements implying the experience of adversity without the experience of adversity. This is a cause of concern in resilience measurement as there is a lot of difference between assuming adversity and responding hypothetically versus having had a lived experience and responding to a particular statement. One of the unique features of this study is the use of a standardized tool requiring participants to identify those statements or items in the adversity scale (as part of the Resilience Test (REST) Battery by Rajendran, 2020) that apply to them and to rate the experience of those adversity (s) along the dimensions of the severity, frequency, and duration. This feature was extended to the achievement and protective factors and promotive factors scales. Thus, responding hypothetically is totally done away with in this approach of the present study to measuring resilience.

The present study has taken into consideration not only the experiences of adversities in life along with the achievements but also included the factors that are responsible for resisting the impact of the adversities so as to protect the individual and lead one to perform and achieve in life. Previous research found that achievement or positive adaptation is possible because of certain internal characteristics and external support, which resist the impact of adversity on the individual (Rutter, 1987). The REST Battery used in this study included independent scales to measure protective (internal Characteristics) and promotive factors (positive factors in the environment), which curiously interact with the adversities and resist their impact.

In other words, resilience necessarily features four different conditions: presence of adversity, performance amidst adversity, presence of certain internal and external characteristics, both of which work in combination and resist the impact of adversity that is produced on the individual's performance. This clearly indicates that resilience does not occur in isolation but only on a continuum in a multidimensional manner (Rutter, 2006).

Characteristics of resilience have to be studied in totality as unless and until all these factors are studied, resilience cannot be learned or developed in individuals (Jackson et al., 2007). Even though a number of studies (Luther et al., 2000) spoke about taking into consideration these factors, none of the existing tools could include all four important features of resilience, measured them independently, and evolved a composite value. None of the tools or measurement techniques in vogue to date could identify and measure these characteristics individually and then combine them to evolve a mathematical model which would give a composite score. The Resilience Test (REST) Battery used in the study was developed and validated by Rajendran (2020) based on the synergy-model of resilience (Hariharan & Rana, 2016) was designed to capture and ensure the presence of all these essential characteristics in the person in whom we are trying to measure resilience.

REST Battery for Normal Population

The findings of this study assume significance in using the REST Battery to measure resilience among the normal population. The Hariharan-Rana Synergy Model of Resilience (2016) posits that resilience is normally distributed in the population, which means that people can be placed on a continuum based on their Resilience Index scores.

One of the strengths and unique features of this study is its holistic approach to measuring resilience in the normal population based on the assumption that there is a normal distribution of resilience among the population. Standardization of the weights, which is achieved in this study, enables this test battery (REST) to facilitate comparison of groups when used in the context of research. The REST battery, which is designed for normal population, that requires responses based on real-life experiences of adversities, protective and promotive factors, with their objective and subjective components, and achievements with their objective and subjective components, optimizes in capturing the essential features in the complex construct.

No special group is excluded from the application of the tool because the Battery has made provision to record every possible adversity in life, every possible protective and promotive factor, and achievement in a variety of fields in life. There is also an option to expand the scope of the Battery by adding a blank space for a category called ‘any other’ in the achievement scale where the respondent can record his/her unique achievement that could not have been included in the existing scale categories. Thus, the REST battery as a measurement tool is found to be an inclusive tool that is not culture-specific. Hence, the tool can be applied in countries other than India for which one proposes to develop the weights. This characteristic of inclusiveness of the REST Battery is a definite value addition to the field of resilience. The findings of this study, that the weights can be universally applied on the Indian population, contributed to the much-needed unified measurement of resilience. By

proving that the weights can be universally applied, the study outcome made it possible to compare the groups across the country and also measure the Resilience Index of individuals. With this feature, one can compute the Resilience Index of any individual by using the common weights.

Use of Mathematical Model in Evolving the Resilience Index

The mathematical model was developed and put to the preliminary test by Rajendran (2020), and successfully tested its application on a selected sample and recommended further research to examine and verify if the weights evolved from a sample qualify the test of homogeneity to be recommended as the standard for the population of a country and later as a single standard across nations for cross-cultural application. The present study expanded on the mathematical model by validating the weights for their universal application on the Indian population based on the finding of homogenous characteristic of the weights evolved from 29 different sets of samples.

While the REST Battery is a tool that facilitated in integrating various scales that measured different components in resilience, it is the mathematical model used that helped in synthesizing the various components and evolve one resilience index (RI) value. Rutter (2006) theorized the operation of resistance on adversities. This operation, according to him, was possible by positive personal and environmental factors. This insight has been significant, and the theory of resistance was convincing. However, there was no way of testing this postulate. The mathematical model evolved by Rajendran (2020) enabled to test the possibility of testing the operation of the protective and promotive factors on adversity in creating resistance. The ratio of this resistance to the outcome, i.e., in terms of achievement and flourishing, could evolve the resilience index. While Rajendran tested the possibility of applying the weights evolved on a model group to be applied on a testing group which was homogenous in nature, the present study took the mathematical model several steps ahead by

proving that so far as the weights are concerned, the Indian population is homogenous where the same weights can be applied on all irrespective of regions and groups. This is a significant contribution of the study. The weights evolved and standardized in this study are found to be universally applicable on the Indian population. Hence, any researcher who wishes to measure resilience in any group of the Indian population can use these weights to compute the RI.

In the absence of the findings of this study, the mathematical model evolved by Rajendran (2020) was still valid. However, the researchers would have had to repeat the rigorous process of having two sets of samples- one as the model group and the second as the testing group so that the weights evolved from the model group would be used on the testing group. This repetitive step is now unnecessary because the weights are standardized and universally applicable.

Standardization of Weights and the Advantages

Unlike the usual procedure in standardizing the psychological tools, the standardization here involved not only the standardization of the tool but also the measurement procedure since the computation of RI involved the application of a mathematical model. This standardization brought with it several advantages.

While the earlier study focused on capturing and quantifying resilience using REST Battery, the weights developed to compute the Resilience Index were not generalizable across the nation as they were derived from and applied to a set of homogeneous samples. It was challenging to generalize the weights from the earlier study to samples from different regions of the country and the rural sample since the weights were established primarily to be evaluated on a homogenous sample. Hence, universalization was not plausible. Unless the whole process is standardized by universalizing the applicability of the model, REST Battery as a measurement tool will not be of great significance to researchers as it demands laborious

field work for data collection followed by calculation of various indices to arrive at the RI for two sets of samples.

Further, there will not be any clarity as to whether one can compare the resilience index of two different studies calculated on two different weights evolved from the independent samples. Hence, this step of standardizing the weights is highly significant to ascribe the qualities of objectivity, feasibility, and cost-effectiveness, which are as important as the reliability and validity of the Battery and the need for quantification of the construct of resilience, which has been a perpetual demerit generally pointed out by critics of resilience studies. The rigorous process adopted for standardizing the weights merits objectivity and a scientific approach.

When the RI was computed by taking the random weights from the regions, a statistically significant agreement among the weights from the four-regions (South, North, West, and East) was found. As implied from the results, we can see that for ID No. 018, the resilience index scores computed using the weights from the four regions are 35.16, 74.96, 137.61 and 118.31. As we can see, there is a difference in the Resilience Index scores computed for an individual participant using the weights from the four-regions, but the corresponding ranks for the above-mentioned resilience index scores are; 616, 616, 617, and 617, which do not show a marked difference.

The same is found when randomly selected weights were used in computing the RI values for 25 random groups. The results revealed a statistically significant agreement. As implied from the results, we can see that for ID No. 021, the Resilience Index scores computed using the weights from random groups 1, 2, 5, and 10 are 13.21, 15.41, 31.46, and 13.57. As we can see, there is a difference in the resilience index scores computed for an individual participant using the weights from the random groups. However, the corresponding ranks for the Resilience Index scores mentioned above are 530 across the four

random groups and do not show a marked difference. It is seen that the ranks of the resilience index score are similar.

The verification further extended to checking if the mixed group comprising regional classification and random grouping have comparable weights. This was tested by computing resilience indices by randomly picking up weights from a region and weights from a random group and considering the highest weights from amongst the regions and the highest weights from amongst the random groups verifying if there is an agreement with each other.

The results revealed a statistically significant agreement among the weights from the four groups of the mixed model. As implied from the results, we can see that for ID No. 001, the resilience index scores computed using the weights from the four groups of the mixed model are 4.15, 6.36, 2.04, and 2.04. As we can see, there is a difference in the resilience index scores computed for an individual participant using the weights from the mixed group. However, the corresponding ranks for the resilience index scores mentioned above are; 142, 142, 143, and 143 and do not show a marked difference. It is seen that the ranks of the resilience index score are similar.

It may be interesting to note that irrespective of the similarities or relative differences in the resilience index scores computed using weights from the scenarios mentioned above, there was a statistically significant agreement among the weights used to compute resilience indices of the sample in all three scenarios. This indicated that the weights from any random group or one of the four regions could be selected for standardizing the measurement.

Another interesting thing to note would be that the weights identified from the four-regions and random groups are the same, and these weights were used to develop the nationwide norms for categorizing individuals based on their resilience index scores. Hence, these maximum weights were considered as the universal weights, and the study has successfully achieved the objective of giving one set of weights for the entire nation.

Norm Categorization

Previous research (Richardson, 2002; Siebert, 2006) has supported the prevalence of resilience in varied degrees among the population depending on the adversity faced and achievements made using protective (internal characteristics) and promotive (external support) factors, indicating that individual participants are on a continuum. Southwick et al. (2014) also advocated for understanding resilience on a continuum rather than concluding the presence or absence of resilience in individuals.

Expanding on one of the objectives of the earlier study (Rajendran, 2020), this study focused on categorizing the individual participants based on their resilience index. The sample from the previous study utilized the Resilience Index scores of the participants and could successfully categorize them into three categories (non-resilients, survivors, and resilient), adopting the decile cut-off method. This was useful in categorizing the individuals in a particular data set but did not greatly contribute towards the development of universal norms for the population of the country. In this study, standardization of weights was followed by developing norms to categorize individuals as low-resilients, borderline-resilients, and high-resilients for nationwide usage in the Indian population.

Adoption of the norms on the dataset of this study revealed that 95.4% are low-resilients, 3.8% are borderline resilient, and 0.8% are high-resilients. It is essential to observe that the percentage of resilient in various studies differs primarily due to the lack of consensus on the definition and operationalizing a seemingly simple construct like resilience, ultimately impacting measurement (Hariharan & Rana, 2016; Haskett et al., 2006; Luthar et al., 2000). Resilience is a very rare characteristic. It is found in the extreme tail-end of a normal probability curve. In the absence of an established norm, estimation of prevalence is also difficult. The estimations by various researchers ranged between 25 to 84% (Vanderbilt-Adriance, 2008); 7.8% (Rajendran, 2020); and 3% (Hariharan, 1990).

This study used a more conservative method that estimated the prevalence of resilience to 0.8% in the normal population. However, the findings leave a provision for the scope of the low-resilient individuals to shift to the borderline group and borderline groups to shift to the high-resilient group. Thus, though the classification used a conservative measure, the path to the next level is left open because there is always a scope for a new promotive factor in the environment, a new adversity that casts a steeling effect on the individual at any point in life. The present study, thus, took into consideration for the high scorers in a category to move to the next level with life experiences.

Limitations

This psychometric study on the REST battery and the mathematical model has some inherent limitations that must be mentioned. The sample size from various regions is not uniform. In order to overcome this limitation, future research should aim to recruit a more representative sample evenly distributed across different regions of the country. The scope of this study is limited to standardizing the mathematical model only for the Indian population. Therefore, extending the applicability of the REST battery would require replication of similar validity testing measures across nations to evolve country-specific weights until a universal measure is established.

Implications

Sound resilience measures will help foster resilience at the population level contributing to the well-being of individuals. Interventions that aim to foster resilience on various levels and in various settings, have been more effective than those that only target risk reduction or narrowly target specific resilience mechanisms (Masten, 2001). Moreover, standardized resilience measures can inform the development of interventions that will enable researchers and practitioners to foster resilience in individuals and communities. For example, a study by Windle et al. (2011) observed that a resilience-based intervention for

older adults significantly improved resilience, self-esteem, and lowered levels of depression. Similarly, a study by Ungar et al. (2013) noted that a community-based resilience intervention for youth significantly enhanced resilience, social support, and mental health.

One of the critical implications of developing standardized resilience measures is the ability to identify and foster resilience among the groups at risk of developing mental and physical health problems or experiencing adverse outcomes in the face of stress or adversity. Resilience helps mitigate the detrimental effects of adverse events and circumstances on individuals' physical and mental health (Khosla, 2017).

Cognitive Health and Resilience

The ability of people to employ better and more active coping strategies, improve their problem-solving skills, and possess a positive orientation toward problem situations impacting the individual's mental health are among the numerous advantages of promoting resilience on an individual's cognitive health (Feder et al., 2009; Sharma, 2015). Other cognitive benefits associated with developing resilience in people include academic success, life satisfaction, and job productivity (Abolghasemi & Varaniyab, 2010; Masten & Monn, 2015).

Emotional Health and Resilience

Fostering resilience has certain implications in regulating one's emotional health. Resilient individuals can consciously reassess an adverse situation to find meaning, motivation, and a desire to strive towards their aspirations with increased endurance, resulting in a faster recovery from the psychological ramifications of traumas (Torgalsbøen, 2012).

According to studies, individuals with lower levels of resilience are more susceptible to the negative consequences of stress and trauma (Bonanno, 2004; Luthar et al., 2000), and increased resilience among individuals resulted in impacting and lowering levels of depressive symptomology (Mehta et al., 2008; Schure et al., 2013). Therefore, identifying and addressing low levels of resilience can help in preventing mental health problems and promoting an individual's well-being.

Physical Health and Resilience

Resilience is seen to impact well-being despite facing age-related challenges and also improve the optimism of aged individuals. Higher resilience also impacts one's physical health and lowers chronic pain (Schure et al., 2013). Ma et al. (2013) found an association between resilience and health-promotive behaviours such as a holistic nutritious diet, indulging in stress-reducing activities, and engaging in appropriate exercises. Also, many studies observed an inverse relationship between resilience and disease progression (DeNisco, 2011; Erim et al., 2010; Wingo et al., 2010).

Hence, interventions can be planned to foster resilience by developing protective factors and identifying promotive factors among disadvantaged groups, chronically-ill patients, students, the aged, and individuals working in various organizations and sectors to help them progress along the resilience continuum.

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APPENDICES

RESILIENCE TEST (REST) BATTERY

APPENDIX A1

FORM A (ADVERSITY SCALE)

Instructions: This sheet consists of 49 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 a box. If you have experienced or are experiencing the particular adversity, put a (✓) mark in that box. For each statement of adversity there are 3 sections viz, severity, frequency and duration. You record your response in these 3 sections only if you have ticked the box. Your response in these sections should be 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°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 inclined to a number towards less frequent.

The last section refers to the duration of your suffering the adversity. It refers to how long you have been facing the adversity described in the item. The rating range from 1 to 10, where **1 equals 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 an **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. I REQUEST YOU TO BE HONEST IN RESPONDING 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

FORM B
(ACHIEVEMENT SCALE)

Instructions:

In spite of the adversities that you have experienced and responded to in the previous section, you might be proud of certain achievements in life. This sheet consists of nine major areas of achievements in an individual's life. Identify the distinct achievements in your life that make you proud from this list and please respond with a yes against only those achievements which make you proud. After you select those achievements which are distinct in your case, judge how significant that achievement is for you and rate each of them on a 10-point scale (1-10) given below, based on its significance. Here, the rating of 1 indicates that the achievement is of least significance while a rating of 10 indicates that the achievement is of highest significance.

P.S. Please respond only to your most significant achievements in spite of the adversities faced by you.

S.No	Achievement	If applicable, please (✓)	Less significant-----More significant									
1.	Recognition for academic achievement		1	2	3	4	5	6	7	8	9	10
2.	Recognition for an art achievement		1	2	3	4	5	6	7	8	9	10
3.	Recognition for athletics or games or sports		1	2	3	4	5	6	7	8	9	10
4.	Recognition for building a career		1	2	3	4	5	6	7	8	9	10
5.	Recognition for getting an important promotion in job		1	2	3	4	5	6	7	8	9	10
6.	Recognition for being awarded with scholarships		1	2	3	4	5	6	7	8	9	10
7.	Recognition for being the first to receive doctorate degree in the family		1	2	3	4	5	6	7	8	9	10
8.	Getting admission to apex institutes in the country or abroad		1	2	3	4	5	6	7	8	9	10
9.	Receiving awards and medals for standing first in an area		1	2	3	4	5	6	7	8	9	10
10.	Any other achievement (please mention in detail)		1	2	3	4	5	6	7	8	9	10

FORM C
(PROTECTIVE FACTORS SCALE)

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 yourself. 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 how much of strength you derive from each of the items. Rate each of them on a 10-point scale (1-10) by circling the appropriate number provided on the right of the items.

P.S. Please respond only to those items applicable to you.

I possess it	Items	Lower strength -----More strength									
		1	2	3	4	5	6	7	8	9	10
	1. Ability to perceive the situation with clarity										
	2. Being patient										
	3. Perceiving one's own self positively										
	4. Ability to express emotions appropriately										
	5. Ability to think positively										
	6. Having a sense of humour										
	7. Ability to apply knowledge productively										
	8. Having confidence in one's own self										
	9. Accepting one's own self with all the strengths and weaknesses										
	10. Sustaining hope at difficult times										
	11. Ability to mobilize resources to solve problems										
	12. Belief in one's own self to successfully accomplish the task										
	13. Getting guided by a set of values										
	14. Perceiving the positive side in everything										
	15. Ability to communicate effectively										
	16. Faith in a supreme power to face problems										
	17. Ability to confront situations in a novel way										

	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

FORM D
(PROMOTIVE FACTORS SCALE)

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.

P.S. Please respond only to those items applicable to you.

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

FORM E
(FLOURISHING SCALE)

Instructions: Below are 8 statements with which you may agree or disagree. On the right side, 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.

P.S. You need to respond to all the items in this section.

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

ఆర్ ఇఎస్ బేటరీస్

ఫారమ్ A

సూచనలు

ఈ షీట్ లో జీవితంలో చిక్కుల్ని సూచించే 49 అంశాలు ఉన్నాయి . చిక్కులు అనగా ఒక మనిషి తన జీవితంలో ఎదుర్కొనే కష్టాలు . మీరు ప్రతి అంశాన్ని శ్రద్ధగా చదివి మీరు ఎదుర్కొనే కష్టాన్ని గుర్తించండి . ప్రతి అంశమూ మన ఒక బాక్సు ఉంది మీరు కనుక ఆ కష్టాన్ని ఎదుర్కొన్నా లేక ఎదుర్కుంటున్నా ఒకటికీ మార్క ఆ బాక్సులో పెట్టండి . ప్రతి కష్టాన్ని మూడు భాగాలుగా విభజించారు అవి తీవ్రత , తరచుగా సంభవించడమరియు వ్యవధి . మీరు టీక పెట్టినప్పుడే మీ స్పందన రికార్డు అవుతుంది మీ స్పందన 10 పాయింట్ స్కేల్ పై ఉండాలి

మొదటి భాగం మీరు ఎదుర్కొన్న కష్టపు తీవ్రతని సూచిస్తుంది . ఆ స్కేలులో రేటింగ్ కిరింది నుండి పైకి అనగా ఆరో హణ్డ్రక్రమంలో ఉంటుంది మరొక విధంగా చెప్పాలంటే ఒక వేళ మీ మోటార్ సైకిల్ నేపనల్ హైవేపై బ్రేక్ డ్రపున్ అయ్యి ఉంటే ఆ కష్టపు తీవ్రత మీరు ఆ 10 పాయింట్ స్కేలు పై కొలుస్తారు . ఒకవేళ ఆ కష్టం తాత్కాలికమై నది ఐతే కనుక తక్కువ తీవ్రతగా భావించి మీరు రెండవ కాలమ్ లో మీ రేటింగ్ 1,2 లేదా 3 గా సూచిస్తారు . ఒకవేళ మీకు ఆ కష్టం ఎక్కువ జ్ఞాతి కలిగించినట్లయితే మీ రేటింగ్ 8,9 లేదా 10 గా సూచిస్తారు .

తరువాతి భాగం తరచుగా సంభవించడమీరు ఆ కష్టం మీ జీవితంలో ఎన్నోసార్లు సంభవిస్తుంటే దాని వల్ల మీరు ఎంత ప్రభావితం అవుతారో తెలియపరుస్తుంది . మీ రేటింగ్ ఎంపికలు నుండి 10 వరకు ఉంటాయి . 1 అతి తక్కువగా సంభవించడాన్ని 10 ఎక్కువగా సంభవించడాన్ని సూచిస్తాయి . ఉదాహరణకమ్మీ పాస్టింగ్ -25°C లో కనుక సంభవిస్తే అది మీకు చాలా జ్ఞాతి ని కలుగచేస్తుంది . మీరు కనుక ఆ బాక్సులో టీక్కు పెట్టాలంటే ఇది ఎంత ఎక్కువగా మీమ్మల్ని ప్రతికూలపరుస్తుందో జ్ఞాతి చేయవలసి వస్తుంది . ఇది మీమ్మల్ని ఇబ్బందిపరుస్తుంది అనిపిస్తే మీరు 8,9 లేక 10 రేటింగ్ ఇస్తారు . లేదు అని అనిపిస్తే మీ రేటింగ్ ని అతి తక్కువ నంబరు సూచించండి

చివరి భాగం మీ కష్టపు వ్యవధిని సూచిస్తుంది . ఇది మీరు ఎంతకాలంగా ఈ కష్టాన్ని ఎదుర్కొంటున్నారో సూచిస్తుంది . 1 అతి తక్కువ వ్యవధిని 10 ఎక్కువ వ్యవధిని సూచిస్తుంది . ఉదాహరణకమ్మీరు ఇటీవల కాలంలో గుండె జబ్బుతో బాధపడుతున్నట్లు ఐతే ఆ కష్టం అతి తక్కువ కాలపరిమాణం కలదిగా ఉంటే 1 నుండి 3 రేటింగ్ లో నమోదు అవుతుంది ఒకవేళ ఆ కష్టం దీర్ఘకాలిక గుండె జబ్బు ఐతే మీ స్పందన మీ వయస్సును బట్టి 8,9 లేక 10 గా నమోదు అవుతుంది

దయచేసి మూడు భాగాలలో సరియైన అంకె చుట్టూ వృత్తం గీసి మీ స్పందనను తెలియజేయండి .

1	2	3	4	5	6	7	8	9	10

ఇది మీ విజ్ఞానానికి పెట్టిన పరీక్ష కాదు కనుక దీనిలో సరైన సమాధానం లేదా తప్పుడు సమాధానం ఉండదు మీ సరైన సమాధానం తీవ్రతపై వ్యక్తిగత అనుభవమైనా లేదా వ్యవధిపై మీ బాహ్యమైన పరిగణనపై ఆధారపడి ఉంటుంది నేను కేవలం ఈ అంశాలపై మీరు నిజాయితీగా స్పందించాలని కోరుతున్నాను .

అంశాలు	తక్కువ తీవ్రమైన - - - ఎక్కువ తీవ్రమైన										తక్కువ సార్లు - - - - ఎక్కువ సార్లు										తక్కువ వ్యవధి - - - - - ఎక్కువ వ్యవధి									
1. తల్లిదండ్రులు ఆసరా లేకపోవడం ☐	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. తల్లిదండ్రుల ఆధిపత్యం ☐	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. నేరుస్తులకు జన్మించడం ☐	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. సెక్స్ వర్గరకు జన్మించడం ☐	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. తల్లిదండ్రులు విడిపోవడం ☐	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. కుటుంబసభ్యుల్లో ఒకరు యాక్సిడెంట్ పాలవ్వడం ☐	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. కుటుంబసభ్యుల్లో ఒకరు నేరంలో పాలుపంచుకోవడం ☐	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. కుటుంబసభ్యుల్లో ఒకరు చెరసాల పాలవ్వడం ☐	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. సవతి తల్లిదండ్రులు సరిగా చూసుకోకపోవడం ☐	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. తల్లిదండ్రులు కాకుండా వేరే ముఖ్యమైన కుటుంబసభ్యుల లోటు ☐	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. తల్లిదండ్రుల వైవాహిక సమస్యలు ☐	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. తల్లి తరుచుగా కుటుంబంతో గడపకపోవడం ☐	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. ఒకరు లేక ఎక్కువ కుటుంబసభ్యులు (చాలా కాలంగా) శారీరక మానసిక రుగ్మతులతో భాధపడడం ☐	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. తల్లిదండ్రుల మృతి ☐	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. వృత్తి పరమైన వేధింపులు ☐	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. తల్లిదండ్రుల నిర్లక్ష్యం ☐	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. తల్లిదండ్రుల తిరస్కారం ☐	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. మానసిక రోగులైన తల్లిదండ్రులు ☐	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. తల్లిదండ్రుల్లో ఒకరు మత్తు పానీయాలకు కానీ, మత్తు పదార్థాలకు కానీ బానిస అవ్వడం ☐	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

	తక్కువ తీవ్రమైన -----ఎక్కువ తీవ్రమైన										తక్కువ సార్లు -----ఎక్కువ సార్లు										తక్కువ వ్యవధి-----ఎక్కువ వ్యవధి									
20. తల్లిదండ్రులు కాకుండా ఇతర కుటుంబసభ్యుల్లో ఒకరికి మానసిక రుగ్మత ☐	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. దీర్ఘ కాల రోగంతో బాధపడే తల్లిదండ్రులు ☐	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. తల్లిదండ్రుల పునర్నివాహం ☐	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. కేవలం తల్లి మాత్రమే లేక తండ్రి మాత్రమే పెంచడం ☐	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. మరణకారక రోగంతో బాధపడుతున్న తల్లిదండ్రులు ☐	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. చండశాసనలైనతల్లిదండ్రులు ☐	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. భౌతిక దుర్వనియోగానికి గురి అవ్వడం ☐	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
27. దీర్ఘకాలిక రోగం ఉండటం ☐	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. బెదిరింపులకు గురి అవ్వడం ☐	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. తరచునారోగ్య సమస్యలు ☐	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. వయస్సు త్వ సమస్య ☐	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. అసమతుల్య ఆహారం ☐	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. యాక్సిడెంట్ పాలవ్వడం ☐	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. శారీరిక అవిటితనం ☐	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. మరణమరణార్థకు గర్భస్రావం ☐	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. లైంగిక వేధింపులు ☐	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. కులీరాతిపదికన విచక్షణ ☐	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. ఆర్థిక సమస్యలు ☐	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. విరోధి పొరుగులో జీవించడం ☐	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. నిరక్షరాస్యత ☐	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. తీవ్రవాద శక్తుల దాడికి వీలైన పరాంతాల్లో భయపడుతూజీవించడం ☐	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. అతితక్కువ ఆర్థిక , సామాజిక స్థాయి ☐	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

అంశాలు	తక్కువ తీవ్రమైన ----- ఎక్కువ తీవ్రమైన										తక్కువ సార్లు -----ఎక్కువ సార్లు										తక్కువ వ్యవధి----- ఎక్కువ వ్యవధి									
42. సహజ విపత్తులను ఎదుర్కోవలసి రావడం ☐	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. చెరసాల పాలవ్వడం ☐	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. పేదరికంతో బాధాపడడం ☐	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. కరవుతో బాధాపడడం ☐	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. ఆపరిశుభ్ర వాతావరణంలో జీవించడం ☐	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. సంఘంలో అహింస నగుర్పించడం ☐	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. రక్షకుల నుండి అన్యాయాలకు ప్రవర్తన ☐	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 అంగవైకల్యం ☐	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

ఫారమ్ B

సూచనలు:

మునుపటి విభాగంలో మీరు ఎదుర్కొన్న మరియు ప్రతిస్పందించిన ప్రతికూలతలు ఉన్నప్పటికీ, మీరు జీవితంలో కొన్ని విజయాలు సాధించినందుకు గర్వపడవచ్చు. ఈ పీట్ ఒక వ్యక్తి జీవితంలో సాధించిన విజయాల యొక్క తొమ్మిది ప్రధాన రంగాలను కలిగి ఉంటుంది. ఈ జాబితా నుండి మిమ్మల్ని గర్వించేలా మీ జీవితంలో సాధించిన విభిన్న విజయాలను గుర్తించండి. విభిన్నమైన మరియు మిమ్మల్ని గర్వించేలా చేసే విజయాలకు దయచేసి అవును అని ప్రతిస్పందించండి. మీరు మీ విషయంలో విభిన్నమైన విజయాలను ఎంచుకున్న తర్వాత, ఆ అచీవ్మెంట్ మీ కోసం ఎంత ముఖ్యమైనదో నిర్ధారించండి మరియు వాటిలో ప్రతి ఒక్కటి దాని ప్రాముఖ్యత ఆధారంగా క్రింద ఇవ్వబడిన 10 పాయింట్ల స్కేల్ (1-10)పై రేట్ చేయండి. ఇక్కడ, 1 యొక్క రేటింగ్ సాధనకు తక్కువ ప్రాముఖ్యతనూ 10 రేటింగ్ సాధనకు అత్యధిక ప్రాముఖ్యతనూ -సూచిస్తుంది.

దయచేసి మీరు ఎదుర్కొన్న ప్రతికూలతలు ఉన్నప్పటికీ, మీ అత్యంత ముఖ్యమైన విజయాలకు మాత్రమే ప్రతిస్పందించండి.

S.No	సాధన	వర్తిస్తే, దయచేసి (✓)	తక్కువ ముఖ్యమైనది-----మరింత ముఖ్యమైనది									
1.	విద్యావిషయక సాధనకు గుర్తింపు		1	2	3	4	5	6	7	8	9	10
2.	కళా సాధనకు గుర్తింపు		1	2	3	4	5	6	7	8	9	10
3.	అథ్లెటిక్స్ లేదా గేమ్స్ లేదా క్రీడలకు గుర్తింపు		1	2	3	4	5	6	7	8	9	10
4.	కెరీర్ను నిర్మించుకున్నందుకు గుర్తింపు		1	2	3	4	5	6	7	8	9	10
5.	ఉద్యోగంలో ముఖ్యమైన ప్రమోషన్ పొందడం కోసం గుర్తింపు		1	2	3	4	5	6	7	8	9	10
6.	స్కాలర్షిప్లతో ప్రదానం చేసినందుకు గుర్తింపు		1	2	3	4	5	6	7	8	9	10
7.	కుటుంబంలో డాక్టరేట్ పట్టా పొందిన మొదటి వ్యక్తిగా గుర్తింపు		1	2	3	4	5	6	7	8	9	10

8.	దేశంలో లేదా విదేశాలలో అపెక్స్ ఇన్స్టిట్యూట్‌లలో ప్రవేశం పొందడం		1	2	3	4	5	6	7	8	9	10
9.	ఒక ప్రాంతంలో మొదటి స్థానంలో నిలిచినందుకు అవార్డులు మరియు పతకాలు అందుకోవడం		1	2	3	4	5	6	7	8	9	10
10.	మీరు సాధించిన ఇతర విజయాలు, పైన పేర్కొన్నవి కాక మరి అధికంగా విజయాలు ఏవైనా సాధించినట్లయితే (దయచేసి వివరంగా పేర్కొనండి)		1	2	3	4	5	6	7	8	9	10

ఫారమ్ c

సూచనలు

ఈ షీట్ లో ఒకవ్యక్తి తనబలాలుగాభావించే 24 అంశాలుఉన్నాయి . ఎడమవైపు ఉన్న ఒకకాలమ్ , మీ స్పందనకోసం . దయచేసి అంశాలన్నీ చదివి మీకు అన్వయించుకోండి . మీకు సరిపోయినవి గుర్తించి ఎడమవైపు ఉన్న కాలమ్ లో టిక్ పెట్టండి . మీరు టిక్కులు పెట్టిన తరువాతప్రతి అంశాన్నుండి మీరు ఎంతబలం పొందారో పరిశీలించండి 10 పాయింట్ స్కేలుపై (1-10) మీ సరియైన నంబర్ చుట్టూ వృత్తం గీయడం ద్వారా మీ రేటింగ్ తెలపండి. మీరు టిక్ పెట్టిన అంశాలనుండి మీ బలాలను గుర్తించండి . మొత్తం మీకు ఉన్న ఈ బలాల ద్వారా మీకు కలిగిన ప్రయోజనం ఎంతమొత్తం మీ రేటింగ్ ఈ షీట్ చివర 1 నుండి 10 వరకు మీ ఇష్టప్రకారం ఇవ్వండి .

నేను దీన్ని కలిగి ఉన్నాను	అంశాలు	తక్కువ బలం-----ఎక్కువ బలం									
	1. సమస్యను స్పష్టంగా చూడగల సత్తా	1	2	3	4	5	6	7	8	9	10
	2. సహనంగా ఉండడం	1	2	3	4	5	6	7	8	9	10
	3. తన నజాను సానుకూలంగా అవగతం చేసుకోవడం	1	2	3	4	5	6	7	8	9	10
	4. తన భావాలను సరిగ్గా వ్యక్తం చేయగల సత్తా	1	2	3	4	5	6	7	8	9	10
	5. సానుకూల భృక్పథం	1	2	3	4	5	6	7	8	9	10
	6. చక్కటి హస్తచతురత	1	2	3	4	5	6	7	8	9	10
	7. జ్ఞానాన్ని ఉత్పత్తి కారకంగా ఉపయోగించగలగడం	1	2	3	4	5	6	7	8	9	10
	8. తనపై తనకవమ్మకం ఉండటం	1	2	3	4	5	6	7	8	9	10
	9. తన బలాలను తనలోటుపాట్లను తాను స్వీకరించ గలడం	1	2	3	4	5	6	7	8	9	10
	10. కష్ట సమయాలలో కూడా ఆశావాదంగా ఉండటం	1	2	3	4	5	6	7	8	9	10
	11. సమస్యలను పరిష్కరించడానికి వనరులను మీకరించుకునే సత్తా	1	2	3	4	5	6	7	8	9	10
	12. కార్యాన్ని సాధించడానికి తనపై తనకవమ్మకం	1	2	3	4	5	6	7	8	9	10
	13. విలువలపై గౌరవం	1	2	3	4	5	6	7	8	9	10
	14. ప్రతిదానిలో ఒక సానుకూలతను చూడడం	1	2	3	4	5	6	7	8	9	10
	15. తెలియపరచటంలో నేర్పరితనం	1	2	3	4	5	6	7	8	9	10

		తక్కువ బలం-----ఎక్కువ బలం									
	16. చిక్కుల్ని ఎదుర్కోవడంలో దైవిక శక్తిపై అపారనమ్మకం	1	2	3	4	5	6	7	8	9	10
	17. పరిస్థితులను వినూత్న పద్ధతులలో అదుపుచెయ్య గలగడం	1	2	3	4	5	6	7	8	9	10
	18. శారీ రిక బలం	1	2	3	4	5	6	7	8	9	10
	19. ఇతరుల వావేశాల ను అవగతం చేసుకొని అర్థం చేసుకోగలగడం	1	2	3	4	5	6	7	8	9	10
	20. జీవితానికి ఒక ప్రయోజనం ఉండటం	1	2	3	4	5	6	7	8	9	10
	21. క్రమశిక్షణాయుతమైన జీవితం గడపడం	1	2	3	4	5	6	7	8	9	10
	22. తన స్వంత భావావేశాన్ని తనకు తాను అర్థం చేసుకోగలగడం	1	2	3	4	5	6	7	8	9	10
	23. కార్యాన్ని నిర్వర్తించడంలో ఉండే ఆనందకోసం ఏకాగ్రానైనా తలకెత్తుకోవడం .	1	2	3	4	5	6	7	8	9	10
	24. సరియైన పద్ధతిలో ఆలోచించగల సత్తా	1	2	3	4	5	6	7	8	9	10

ఫారమ్ D

సూచనలు

ఈ షీట్ లో మీ చుట్టూపక్కల ఉండే వనరులకుబంధించి 4 అంశాలుఉంటాయి. దీనిని శ్రద్ధగా చదివి వీటిలో ఏవనరులనుకు అందుబాటులో ఉన్నాయో గుర్తించండి . మీకు ఎడమవైపు ఉన్న ఈ కాలమ్ లో మీకు ఉన్న వాటిని టీక్ పెట్టండి . మీరు ఈ కాలమ్ పూర్తి చేసిన తరువాత మీరు టీక్ పెట్టిన వాటిని చదవండి మీకు అవి ఉండటాదలన ఎంతవరకూ ప్రయోజనకరం ? మీకు కుడివైపు 10 కాలమ్ లు(1-10) ఉన్నాయి . తక్కువ ప్రయోజనం ఎక్కువ ప్రయోజనం సూచించే సూచికలు ఉన్నాయి . ప్రతి ప్ర తిపాదనను శ్రద్ధగా చదవండి-10 లోపు దాని ప్రయోజనం గురించి నిర్ణయించండి . మీకు నప్పిన విధంగా ఆనంబరముట్టూ వృత్తం గీయండి.

అందుబాటులో ఉన్నది	అంశాలు	తక్కువ ప్రయోజనం ----- ఎక్కువ ప్రయోజనం									
	1.మీకు అందుబాటులో ఉన్న ఆరోగ్య సదుపాయాలు	1	2	3	4	5	6	7	8	9	10
	2. సామరస్యమైన కుటుంబము	1	2	3	4	5	6	7	8	9	10
	3. కుటుంబేతర వ్యక్తుల నుండి సహాయం	1	2	3	4	5	6	7	8	9	10
	4. సహాయపడే స్నేహితులు	1	2	3	4	5	6	7	8	9	10
	5. సుఖమైన ఆర్థికస్థితి	1	2	3	4	5	6	7	8	9	10
	6. ప్రజాస్వామ్యపద్ధతిలో ఉండే తల్లిదండ్రులు	1	2	3	4	5	6	7	8	9	10
	7. తల్లిదండ్రుల నిరంతర ఆసరా	1	2	3	4	5	6	7	8	9	10
	8. అత్యవసర సౌకర్యాలు అందుబాటులో	1	2	3	4	5	6	7	8	9	10
	9. సమర్థించే జీవితభాగస్వామి	1	2	3	4	5	6	7	8	9	10
	10. స్థిరమైన క్రమశిక్షణనిచ్చే తల్లిదండ్రులు	1	2	3	4	5	6	7	8	9	10
	11. స్థిరమైన సమాజం	1	2	3	4	5	6	7	8	9	10
	12. సామరస్యమైన పొరుగు	1	2	3	4	5	6	7	8	9	10
	13. ఒక సంస్థాగత సభ్యత్వం	1	2	3	4	5	6	7	8	9	10
	14. అందుబాటులో ఉన్న ఆదర్శ వ్యక్తి	1	2	3	4	5	6	7	8	9	10

ఫారమ్ E

సూచనలు

కొరింద మీరు అంగీకరించేవి లేదా అంగీకరించనివి 8 ప్రతిపాదనలు ఉన్నాయి . కుడివైపు మీకు 7 కాలమ్ లు (1-7) ఉన్నాయి . అందులో తక్కువ స్కోరు అనంగీకారం ఎక్కువ స్కోరు అంగీకారం తెలుపుతాయి . ప్రతి ప్రతిపాదనని శ్రద్ధగా చదవండి మీ అంగీకారమో లేదా అనంగీకారమో నిర్ణయించుకుని 1 నుండి 7 వరకు ఉండే స్కోరు పై రేటింగ్ తెలపండి. సరియైన నంబరు ట్యూ వృత్తం గీసి మీకు నచ్చిన రేటింగ్ తెలపండి.

అంశాలు	అనంగీకారం - - - - - అంగీకారం						
1. నేను ప్రయోజనకరమైన , అర్థపూరితమైన జీవితం గడుపుతున్నాను	1	2	3	4	5	6	7
2. నా సామాజిక అనుబంధాలు నాకు ఆసరాను తృప్తిని కలిగిస్తున్నాయి	1	2	3	4	5	6	7
3. నేను నా దైనందిన కార్యకలాపాలలో చాలా ఇష్టంతో నిశ్చయంతో వ్యవహరిస్తాను	1	2	3	4	5	6	7
4 నేను ఇతరులతో పంకోసం ఉన్నతి కోసం దోహదపడతాను	1	2	3	4	5	6	7
5. నా ముఖ్యమైన పనులలో నేను సమర్థుడను	1	2	3	4	5	6	7
6. నేను ఒక మంచి జీవితం గడిపే ఒక మంచి వ్యక్తిని	1	2	3	4	5	6	7
7. నేను భవిష్యత్ పట్ల ఆశావాదిని	1	2	3	4	5	6	7
8. ప్రజలు నన్ను గౌరవిస్తారు .	1	2	3	4	5	6	7

**University of Hyderabad
Centre for Health Psychology
Participant Details Form**

APPENDIX A3

Participant ID No:

Please fill in your details in the space provided next to each item or tick mark the most suitable response from the given categories.

Name	
Phone Number	
Email	
Gender	1. Male 2. Female 3. Other
Age	
Education	1. Illiterate 2. High school 3. Undergraduate 4. Postgraduate/ Professional 5. PhD
Occupation	
Marital status	1. Single 2. Married 3. In a relationship 4. Divorced 5. Widowed
Place of residence	1. Urban 2. Rural
Socio-economic status	1. High 2. Middle 3. Low
Financial Condition	1. Difficult 2. Manageable 3. Comfortable

Have you ever studied/worked in rural areas or small towns?	1. Yes 2. No

**యూనివర్సిటీ ఆఫ్ హైదరాబాద్
సెంటర్ ఫర్ హెల్త్ సైకాలజీ
పాల్గొనేవారి వివరాల ఫారమ్**

APPENDIX A4

దయచేసి ప్రతి అంశం పక్కన అందించిన స్థలంలో మీ వివరాలను పూరించండి లేదా ఇచ్చిన వర్గాల నుండి అత్యంత అనుకూలమైన ప్రతిస్పందనను టీక్ మార్క్ చేయండి.

పేరు	
ఫోను నంబరు	
ఇమెయిల్	
లింగం	1. పురుషుడు 2. స్త్రీ 3. ఇతర
వయస్సు	
చదువు	1. నిరక్షరాస్యుడు 2. ఉన్నత పాఠశాల 3. అండర్ గ్రాడ్యుయేట్ 4. పోస్ట్ గ్రాడ్యుయేట్ 5. డాక్టరు పట్టం
వృత్తి	
వైవాహిక స్థితి	1. సింగిల్ 2. పెళ్లయింది 3. నేను ఒక సంబంధంలో ఉన్నాను 4. విడాకులు తీసుకున్నారు 5. వితంతువు
నివాస ప్రదేశం	1. నగరం 2. గ్రామీణ
సామాజిక ఆర్థిక స్థితి	1. అధిక 2. మధ్య 3. తక్కువ

ఆర్థిక పరిస్థితి	1. కష్టం 2. నిర్వహించదగినది 3. సౌకర్యవంతమైన
మీరు ఎప్పుడైనా గ్రామీణ ప్రాంతాల్లో లేదా చిన్న పట్టణాల్లో చదువుకున్నారా/పనిచేశారా?	1. అవును 2. లేదు

APPENDIX B1



UNIVERSITY OF HYDERABAD INSTITUTIONAL ETHICS COMMITTEE DECISION LETTER



IEC No.	UH/IEC/2021/33	Date of review	09-03-2021
Application No:			
Project Title:	Standardization of the Resilience Test (REST) battery		
Principal Investigator/ Co-PI:	PI: Suma Lavanya Mutnury CI: NA		
Participating Institutes if any	----	Approval from Participating Institute	---
Documents received and reviewed	Application, proposal, consent form, participant information sheet and CV submitted		
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	Dr. A.S.Sreedhar, Prof. B. R. Shamanna, Dr. M. Varalakshmi, Sri.A. Madhava Rao, Dr. M. Srinivas, Dr. Deepa Srinivas, Dr. M.K. Arunasree and Ms. A. D. Shobhavathi		

Please note:

- Any amendments in the protocol must be informed to the Ethics committee and fresh approval taken.
- Any serious adverse event must be reported to the Ethics Committee within 48 hours in writing (mentioning the protocol No. or the study ID)
- Any advertisement placed in the newspapers, magazines must be submitted for approval.
- 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.
- It is hereby confirmed that neither you nor any of the members of the study team participated in the decision making/voting procedures and declared conflict of interest.

A S Sreedhar
09/03/2021

Chairman

(Dr. A S Sreedhar)

B.R. Shamanna
9/3/21

Member Secretary

(Prof. B.R.Shamanna)

M. Varalakshmi

Convenor

(Dr. M. Varalakshmi)

Address: School of Medical Sciences, University of Hyderabad, C. R. Rao Road, Gachibowli, Hyderabad-5000046
Tel (O): +91-040-23135470/23135471 Email: iec_uoh@uohyd.ernet.in, deanmd@uohyd.ernet.in

**INFORMED CONSENT
FORM**
**Centre for Health Psychology
University of Hyderabad**

APPENDIX B2

Title of the study : **Standardization of the Resilience Test (REST) Battery**

Investigator : **Suma Lavanya Mutnury**

Introduction

All of us have capacity to face adversities, though it varies in degree among us. This capacity may come from within or as a help from outside. One bounces back or even excels in the face of severe adversities because of this. This phenomenon is called Resilience. My research work relates to finding a technique to measure this resilience. Towards this I am standardizing a scale to measure how people overcome adversities by using their internal qualities and external resources. Resilience refers to the capacity of an individual to excel in the face of an adversity. The development of a tool (REST) taking into consideration the interaction among various factors contributing to resilience helped in understanding the complexities involved in measuring resilience. This study aims to further the process of tool development.

Why am I approached?

You are approached with a request to participate in the study because you might have faced an adversity or are currently experiencing an adversity in your life. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully to know more about the study and your role in it. Please contact the investigator if you have any questions or if you need more information.

What is done in this study?

As part of this study, I will administer few psychological questionnaires to measure some aspects related to your situations, personality and behaviour. These scales are related to psychosocial aspects. They will be administered on you as per your convenience.

What is involved in participating in this study?

You will be required to spend about 60 minutes of your time to fill in the questionnaires as part of the study. If and when you consent to participate in this study, you will be approached for data collection and asked to fill in the forms online or offline as per your convenience.

What are the risks of this study?

There are no potential risks or harmful consequences to your participation in this study. Psychological counseling will be offered to you for any unforeseen discomfort experienced by you during the process of data collection by the investigator.

Are there any benefits to participating in this optional study?

You may not directly benefit by participating in this study. However, your participation would contribute to developing and standardizing a measurement scale for quantifying resilience in people.

Confidentiality

Your identity will not be revealed to anybody. The information collected from you will be only utilized for the purpose of research work. Any information projected will be the collated data of all the participants, where individual identity will not be revealed.

Is participation in this study mandatory?

You have the option of participating or declining to participate in the study without citing any reasons. Even if you initially decide to participate and if you do not want to continue, you can leave the study at any point even after enrolling yourself for participation. I request you to read all the details about the study and clarify all your doubts before communicating your decision to be a part of the study. In case you decide to participate, you will have to sign the form consenting to participate. However even after signing the form, you can withdraw from the study at any point in time.

In case you have any questions or need any clarifications, I will be glad to respond now or later. You may contact me on the following number Miss Suma Lavanya Mutnury- +91 9177671492, or email - sumalavanya@gmail.com.

Consent

I, _____ (your name), have read all the information related to Standardization of the Resilience Test (REST) Battery developed along the lines of synergy model of resilience. I was given sufficient time to reflect on the study. I was also given sufficient opportunity to have my questions clarified. With full knowledge about the proposed research, I give my consent to participate in the research.

Signature

Name:

Address:

అధ్యయనం యొక్క శీర్షిక : స్థితిస్థాపకత పరీక్ష (REST) బ్యాటరీ యొక్క ప్రమాణీకరణ
పరిశోధకురాలు : సుమ లావణ్య ముట్నూరి

పరిచయం

మనలో ప్రతి ఒక్కరికీ ప్రతికూలతలను ఎదుర్కొనే సామర్థ్యం ఉంది, అయినప్పటికీ అది ఒక్కొక్కరికీ ఒక్కొక్క స్థాయిలో మారుతూ ఉంటుంది. ఈ సామర్థ్యానికి ప్రేరణ, అంతర్గతంగా లేదా బహిర్గతంగా ఉండవచ్చును. ప్రతికూలతలను ఎదుర్కోవడం వలన కొందరు తిరిగి వెనక్కు రాగలుగుతారు లేదా మరింత రాణించగలుగుతారు. ఈ దృగ్విషయాన్ని ఆ వ్యక్తి యొక్క స్థితిస్థాపకత అని అంటారు. నా ఈ పరిశోధన వ్యక్తిలో ఉన్న స్థితిస్థాపకత ను సాంకేతిక ప్రమాణాలతో కొలవడానికి సంబంధించినది. ఈ దిశగా ప్రజలు తమ అంతర్గత లక్షణాలను మరియు బాహ్య వనరులను ఉపయోగించడం ద్వారా ప్రతికూలతలను ఎలా అధిగమిస్తారో కొలవడానికి నేను ఒక కొలమానాన్ని ప్రమాణీకరిస్తున్నాను. స్థితిస్థాపకత అనేది ప్రతికూల పరిస్థితులలో రాణించగల వ్యక్తి యొక్క సామర్థ్యాన్ని సూచిస్తుంది. ఒక వ్యక్తి యొక్క స్థితిస్థాపకత ని అంచనా వేయడానికి, ప్రస్తుతం అభివృద్ధి చేసిన సాధనం (REST) ఆ వ్యక్తిలో ఉన్న స్థితిస్థాపకత ను యొక్క సంక్లిష్టతలనూ, వాటికి దోహదపడే వివిధ అంశాల మధ్య ఉన్న సమన్వయాన్నీ కొలవడానికి దోహదపడుతుంది. ఈ అధ్యయనం స్థితిస్థాపకత ని కొలివగలిగే సాధనాలను మరింత మెరుగుపరచే దిశగా సహాయకారి కాగలదు.

నేను ఎందుకు సంప్రదింపబడ్డాను?

మీరు ఒక ప్రతికూలతను ఎదుర్కొని ఉండవచ్చు లేదా ప్రస్తుతం మీ జీవితంలో ప్రతికూలతను ఎదుర్కొంటున్నందున అధ్యయనంలో పాల్గొనమని అభ్యర్థనతో మిమ్మల్ని సంప్రదించడం జరిగింది. మీరు ఈ అధ్యయనంలో పాల్గొనాలని నిర్ణయించుకునే ముందు, పరిశోధన ఎందుకు జరుగుతోంది మరియు దానిలో ఏమి ఉంటుంది అనే విషయాన్ని అర్థం చేసుకోవడం ముఖ్యం. అధ్యయనం మరియు దానిలో మీ పాత్ర గురించి మరింత తెలుసుకోవడానికి దయచేసి క్రింది సమాచారాన్ని జాగ్రత్తగా చదవండి. మీకు ఏవైనా ప్రశ్నలు ఉంటే లేదా మీకు మరింత సమాచారం కావాలంటే దయచేసి పరిశోధకురాలిని సంప్రదించండి.

ఈ అధ్యయనంలో ఏమి జరిగింది?

ఈ అధ్యయనంలో భాగంగా మీ పరిస్థితులు, వ్యక్తిత్వం మరియు ప్రవర్తనకు సంబంధించిన కొన్ని అంశాలను కొలవడానికి నేను కొన్ని మానసిక ప్రశ్నపత్రాలను అందిస్తాను. ఈ ప్రమాణాలు మానసిక సామాజిక అంశాలకు సంబంధించినవి. మీ సౌలభ్యం ప్రకారం అవి మీపై నిర్వహించబడతాయి.

ఈ అధ్యయనంలో పాల్గొనడంలో ఏమి ఉంది?

అధ్యయనంలో భాగంగా ప్రశ్నపత్రాలను పూరించడానికి మీరు మీ సమయాన్ని దాదాపు 60 నిమిషాలు వెచ్చించాల్సి ఉంటుంది. ఒకవేళ మీరు ఈ అధ్యయనంలో పాల్గొనడానికి సమ్మతిస్తే, డేటా సేకరణ కోసం మిమ్మల్ని సంప్రదించి, మీ సౌలభ్యం ప్రకారం ఆన్‌లైన్ లేదా ఆఫ్‌లైన్‌లో ఫారమ్‌లను పూరించమని అడుగుతారు.

ఈ అధ్యయనం యొక్క ఇబ్బందులు ఏమిటి?

ఈ అధ్యయనంలో మీ భాగస్వామ్యానికి సంభావ్య ఇబ్బందులు లేదా హానికరమైన పరిణామాలు లేవు. పరిశోధకుల డేటా సేకరణ ప్రక్రియలో మీకు ఏవైనా అనుకోని అసౌకర్యం ఉంటే మానసిక సలహాలు మీకు అందించబడతాయి.

ఈ ఐచ్ఛిక అధ్యయనంలో పాల్గొనడం వల్ల ఏమైనా ప్రయోజనాలు ఉన్నాయా?

ఈ అధ్యయనంలో పాల్గొనడం ద్వారా మీరు నేరుగా ప్రయోజనం పొందకపోవచ్చు. అయితే, మీ భాగస్వామ్యం ప్రజలలో ప్రతిఘటనాసామర్థ్యాన్ని తెక్కించడానికి కొలమానాన్ని అభివృద్ధి చేయడానికి మరియు ప్రామాణీకరించడానికి దోహదం చేస్తుంది.

గోప్యత

మీ గుర్తింపు ఎవరికీ బహిర్గతం చేయబడదు. మీ నుండి సేకరించిన సమాచారం పరిశోధన పని కోసం మాత్రమే ఉపయోగించబడుతుంది. సమాచారం మొత్తం, పాల్గొనేవారి యొక్క క్రోడీకరించబడిన సమాచారంగా ఉంటుంది, ఎక్కడా కూడా ఎవరి వ్యక్తిగత గుర్తింపు బహిర్గతం చేయబడదు.

ఈ అధ్యయనంలో పాల్గొనడం తప్పనిసరి కాదా?

మీరు ఎటువంటి కారణాలను పేర్కొనకుండా అధ్యయనంలో పాల్గొనడానికి లేదా నిరాకరించే అవకాశం ఉంది. మీరు మొదట పాల్గొనాలని నిర్ణయించుకున్నప్పటికీ మరియు మీరు కొనసాగించకూడదనుకుంటే, మీరు నమోదు చేసుకున్న తర్వాత కూడా ఏ సమయంలోనైనా అధ్యయనాన్ని వదిలివేయవచ్చు. అధ్యయనంలో భాగం కావాలనే మీ నిర్ణయాన్ని తెలియజేయడానికి ముందు అధ్యయనం గురించిన అన్ని వివరాలను చదవవలసిందిగా మరియు మీ సందేహాలన్నింటినీ స్పష్టం చేయవలసిందిగా నేను మిమ్మల్ని అభ్యర్థిస్తున్నాను. ఒకవేళ మీరు పాల్గొనాలని నిర్ణయించుకున్నట్లయితే, మీరు

పాల్గొనేందుకు సమ్మతిస్తూ ఫారమ్ పై సంతకం చేయాలి. అయితే ఫారమ్ పై సంతకం చేసిన తర్వాత కూడా, మీరు ఏ సమయంలోనైనా అధ్యయనం నుండి ఉపసంహరించుకోవచ్చు.

పై అంశాలకు సంబంధించి మీకు ఏవైనా ప్రశ్నలు ఉన్నా, లేదా ఏవైనా వివరణలు అవసరమైనా, వెంటనే అయినా లేదా తరువాత అయినా వాటికి సంతోషంగా ప్రతిస్పందిస్తాను. మీరు నన్ను క్రింది నంబర్ లో మిస్ సుమ లావణ్య ముట్నూరి- +91 9177671492 లేదా ఇమెయిల్ - sumalavanya@gmail.com లో సంప్రదించవచ్చు.

సమ్మతి

నేను, _____ (మీ పేరు), సినర్జీ మోడల్ ఆఫ్ రెసిలెన్స్ తో పాటు డెవలప్ చేసిన రెసిలెన్స్ టెస్ట్ (REST) ప్లాండరైజేషన్ కు సంబంధించిన మొత్తం సమాచారాన్ని చదివాను. అధ్యయనం గురించి ఆలోచించడానికి నాకు తగినంత సమయం ఇవ్వబడింది. నా ప్రశ్నలకు స్పష్టత ఇవ్వడానికి నాకు తగిన అవకాశం కూడా ఇవ్వబడింది. ప్రతిపాదిత పరిశోధన గురించి పూర్తి అవగాహనతో నేను పరిశోధనలో పాల్గొనడానికి నా సమ్మతిని తెలియజేస్తున్నాను.

సంతకం

పేరు:

చిరునామా:

Table Showing Resilience Indices Calculated Using Weights from the Four Regions for all the Participants

ID No.	Resilience Index (RI)-South India Weights	Resilience Index (RI)- North India Weights	Resilience Index (RI)-East India Weights	Resilience Index (RI)- West India Weights
001	2.04	4.23	7.10	6.36
002	4.11	8.32	14.91	12.95
003	3.72	7.66	13.44	11.79
004	1.51	3.10	5.25	4.68
005	2.74	5.70	9.93	8.75
006	11.33	23.56	41.43	36.39
007	1.91	3.97	6.95	6.11
008	2.76	5.74	9.56	8.59
009	0.93	1.91	3.37	2.95
010	2.97	6.17	10.29	9.25
011	1.04	2.18	3.96	3.43
012	4.22	8.74	14.66	13.14
013	4.32	8.97	15.03	13.49
014	2.72	5.68	9.40	8.48
015	1.14	2.37	3.96	3.55
016	1.63	3.41	6.19	5.36
017	8.81	18.41	32.39	28.40
018	35.16	74.96	137.61	118.31
019	6.12	12.70	21.25	19.07
020	4.87	10.16	17.85	15.68
021	13.57	28.06	47.06	42.17
022	0.67	1.40	2.40	2.13
023	3.83	7.92	13.80	12.15
024	4.08	8.48	14.13	12.70
025	4.13	8.60	14.84	13.13
026	7.67	16.08	28.01	24.68
027	3.81	7.98	13.82	12.22
028	4.13	8.53	14.60	12.96
029	0.97	1.98	3.38	3.00
030	3.67	7.76	13.45	11.88
031	3.52	7.41	13.20	11.51
032	0.87	1.80	3.01	2.70
033	4.70	9.75	16.29	14.62
034	0.57	1.18	1.97	1.77
035	2.94	6.16	10.21	9.21
036	5.15	10.82	18.75	16.56
037	2.02	4.24	6.98	6.30

038	22.62	46.89	82.17	72.23
039	3.33	6.93	12.24	10.70
040	5.05	10.47	17.57	15.77
041	1.42	2.95	4.92	4.42
042	16.92	35.02	58.76	52.68
043	13.29	27.67	46.02	41.38
044	1.74	3.63	6.39	5.60
045	6.10	12.63	21.15	18.97
046	9.60	20.06	37.21	31.88
047	0.47	0.96	1.62	1.45
048	0.45	0.94	1.56	1.41
049	3.19	6.65	11.04	9.93
050	3.08	6.36	10.66	9.55
051	9.00	18.81	31.21	28.12
052	3.48	7.24	12.60	11.10
053	1.25	2.61	4.36	3.92
054	9.05	18.90	31.37	28.24
055	1.46	3.04	5.06	4.56
056	5.00	10.49	17.33	15.64
057	3.33	6.94	11.55	10.40
058	1.99	4.12	6.90	6.19
059	3.52	7.42	13.35	11.60
060	12.80	26.13	44.48	39.59
061	14.22	29.59	52.03	45.57
062	0.78	1.57	2.70	2.39
063	0.53	1.11	1.86	1.67
064	1.92	3.98	7.46	6.36
065	7.91	16.40	27.50	24.66
066	5.72	11.88	20.50	18.12
067	0.36	0.73	1.23	1.10
068	6.23	12.96	22.20	19.70
069	5.31	10.99	19.19	16.90
070	7.85	16.32	29.25	25.46
071	1.94	3.99	6.74	6.02
072	1.48	3.10	5.34	4.73
073	3.87	8.09	13.78	12.25
074	9.86	20.77	36.07	31.80
075	3.47	7.21	12.59	11.08
076	1.82	3.70	6.32	5.61
077	1.13	2.37	3.93	3.55
078	1.22	2.55	4.47	3.93
079	9.87	20.49	34.31	30.80
080	4.16	8.69	14.89	13.21

081	3.60	7.46	13.48	11.67
082	0.75	1.56	2.70	2.38
083	3.83	7.97	13.29	11.94
084	0.74	1.54	2.55	2.30
085	6.20	12.95	21.48	19.35
086	8.92	18.69	30.84	27.82
087	2.42	5.04	8.41	7.56
088	3.93	8.16	13.66	12.27
089	7.28	15.08	28.02	23.96
090	10.34	21.57	35.82	32.24
091	1.87	3.90	6.50	5.85
092	2.03	4.22	7.33	6.47
093	8.39	17.35	29.05	26.03
094	3.72	7.69	12.89	11.54
095	4.78	9.99	16.60	14.95
096	6.37	13.37	23.11	20.42
097	4.98	10.36	18.16	15.94
098	2.68	5.54	10.16	8.73
099	7.58	15.79	26.29	23.65
100	10.59	22.11	39.91	34.57
101	2.68	5.44	9.34	8.28
102	13.95	29.18	48.20	43.44
103	3.30	6.86	11.45	10.28
104	17.53	36.62	64.97	56.76
105	1.05	2.19	3.64	3.27
106	1.36	2.82	4.92	4.33
107	4.24	8.67	14.74	13.12
108	4.54	9.42	15.75	14.13
109	15.86	33.04	54.93	49.41
110	5.33	11.09	18.48	16.61
111	15.64	32.87	60.63	52.07
112	9.33	19.21	32.38	28.94
113	4.47	9.31	15.50	13.93
114	1.40	2.90	4.87	4.36
115	2.82	5.87	10.21	9.02
116	9.12	18.99	32.98	29.07
117	4.22	8.71	14.64	13.10
118	2.56	5.35	9.27	8.20
119	8.66	18.00	31.64	27.77
120	18.43	38.68	66.58	58.96
121	5.31	11.05	18.43	16.57
122	1.08	2.26	3.97	3.48
123	5.42	11.36	18.77	16.94

124	4.41	9.18	15.26	13.72
125	7.10	14.90	24.60	22.22
126	14.06	29.04	48.77	43.67
127	2.52	5.21	8.71	7.82
128	0.91	1.90	3.17	2.85
129	3.72	7.73	12.91	11.59
130	1.55	3.19	5.39	4.81
131	19.48	40.66	67.43	60.71
132	13.76	29.10	50.61	44.71
133	3.86	8.15	14.14	12.49
134	9.37	19.69	34.03	30.09
135	4.63	9.67	16.61	14.74
136	10.69	22.17	37.04	33.24
137	1.96	4.12	6.80	6.15
138	3.23	6.76	12.36	10.66
139	7.33	15.53	27.74	24.17
140	2.15	4.42	7.44	6.65
141	23.08	48.23	91.19	77.51
142	2.30	4.87	8.71	7.59
143	1.62	3.39	5.87	5.19
144	15.02	31.36	55.02	48.33
145	1.79	3.75	6.44	5.71
146	5.82	12.21	22.02	19.08
147	4.73	9.96	17.85	15.53
148	5.50	11.43	19.99	17.59
149	10.64	22.22	36.86	33.19
150	0.73	1.53	2.64	2.34
151	1.52	3.19	5.60	4.91
152	6.80	14.20	25.78	22.30
153	1.22	2.54	4.23	3.80
154	4.95	10.28	17.18	15.43
155	1.08	2.24	3.78	3.38
156	19.16	40.17	74.56	63.79
157	4.40	9.09	16.07	14.05
158	4.23	8.66	15.15	13.32
159	0.90	1.87	3.43	2.95
160	4.05	8.36	14.12	12.63
161	19.69	41.59	75.30	65.18
162	2.27	4.72	8.30	7.27
163	10.95	22.87	42.32	36.26
164	12.26	25.51	42.49	38.19
165	7.94	16.81	28.98	25.65
166	5.86	12.22	20.21	18.19

167	1.58	3.30	5.49	4.94
168	4.76	9.88	16.49	14.81
169	8.91	18.54	30.91	27.79
170	6.95	14.44	24.08	21.64
171	8.82	18.40	33.46	28.90
172	7.44	15.42	25.78	23.14
173	27.22	57.14	106.49	91.06
174	21.38	44.90	79.81	69.67
175	4.22	8.75	15.77	13.67
176	0.45	0.95	1.65	1.46
177	0.49	1.03	1.71	1.54
178	25.74	54.21	91.46	81.67
179	0.29	0.60	1.06	0.93
180	0.66	1.39	2.41	2.13
181	1.08	2.23	3.92	3.44
182	5.66	11.80	19.61	17.64
183	3.00	6.30	10.78	9.58
184	4.94	10.26	17.14	15.39
185	20.25	42.65	73.21	64.82
186	8.13	17.03	29.67	26.13
187	12.12	25.61	41.85	37.91
188	15.53	32.42	53.74	48.39
189	9.33	19.46	34.19	29.99
190	18.73	39.14	67.80	59.86
191	32.76	68.45	119.42	105.08
192	1.93	4.01	6.69	6.01
193	0.69	1.46	2.60	2.27
194	19.66	41.17	76.27	65.35
195	1.09	2.21	4.00	3.46
196	3.54	7.39	13.31	11.56
197	1.33	2.76	4.61	4.14
198	1.56	3.20	5.42	4.83
199	2.91	5.86	10.09	8.93
200	10.00	20.56	36.12	31.65
201	1.40	2.93	5.09	4.49
202	1.17	2.44	4.07	3.66
203	1.26	2.64	4.57	4.03
204	0.68	1.44	2.48	2.20
205	0.64	1.33	2.29	2.03
206	14.77	30.82	51.16	46.06
207	1.71	3.62	7.09	5.93
208	13.88	29.16	50.63	44.67
209	13.83	29.15	52.45	45.51

210	2.84	6.04	11.85	9.92
211	15.17	32.19	58.45	50.54
212	17.29	36.27	70.44	59.13
213	14.32	30.05	57.88	48.76
214	2.89	6.04	10.95	9.48
215	8.51	17.76	33.44	28.44
216	8.84	18.58	33.15	28.87
217	2.63	5.52	11.02	9.16
218	7.24	15.17	27.58	23.84
219	0.84	1.76	3.38	2.85
220	3.89	8.13	14.65	12.70
221	4.78	9.99	17.95	15.59
222	6.27	13.25	24.85	21.19
223	9.80	20.55	37.36	32.29
224	1.46	3.07	5.43	4.75
225	0.95	1.91	3.46	2.99
226	3.75	7.88	15.80	13.09
227	1.80	3.82	7.31	6.18
228	3.47	7.31	12.50	11.11
229	1.28	2.63	4.56	4.02
230	2.30	4.70	8.58	7.40
231	13.26	27.76	50.94	43.79
232	15.37	31.97	58.94	50.59
233	16.89	35.34	60.75	53.83
234	7.21	15.06	26.51	23.26
235	1.17	2.38	4.49	3.81
236	1.11	2.33	4.21	3.65
237	1.28	2.71	5.24	4.41
238	10.17	21.27	36.83	32.54
239	10.15	21.42	39.84	34.08
240	8.12	17.11	32.02	27.32
241	2.53	5.36	9.96	8.54
242	6.85	14.43	27.32	23.21
243	3.27	6.90	12.51	10.84
244	6.33	13.35	24.18	20.91
245	3.28	6.87	12.20	10.65
246	1.40	2.98	5.16	4.57
247	1.12	2.32	4.19	3.63
248	21.73	46.08	86.63	73.75
249	18.36	38.76	66.91	59.13
250	1.17	2.45	4.06	3.66
251	0.50	1.04	1.94	1.66
252	1.47	3.15	5.88	5.03

253	0.48	0.99	1.71	1.51
254	5.13	10.60	19.65	16.80
255	6.44	13.62	25.26	21.64
256	7.90	16.76	32.14	27.18
257	9.25	19.21	32.31	28.91
258	8.73	18.47	33.93	29.17
259	1.66	3.48	6.36	5.48
260	3.21	6.70	11.96	10.42
261	4.70	9.82	18.33	15.66
262	2.07	4.33	7.70	6.72
263	8.52	17.85	34.25	28.85
264	34.33	72.73	137.28	116.69
265	18.01	38.12	72.54	61.46
266	1.80	3.78	7.01	6.01
267	4.64	9.89	18.77	15.90
268	4.80	9.96	17.31	15.24
269	4.25	9.03	17.05	14.49
270	75.32	159.67	313.18	262.13
271	7.85	16.51	27.88	24.90
272	26.75	56.34	103.77	89.17
273	0.85	1.70	3.08	2.66
274	1.18	2.50	4.82	4.06
275	35.17	74.61	143.29	120.88
276	4.77	9.95	17.02	15.13
277	0.64	1.34	2.41	2.09
278	2.93	6.02	11.41	9.67
279	1.11	2.35	4.29	3.70
280	3.65	7.68	15.20	12.65
281	20.40	42.90	81.34	69.00
282	10.52	21.94	38.96	34.05
283	1.74	3.67	6.81	5.84
284	10.99	23.29	42.86	36.87
285	8.04	16.93	30.37	26.44
286	4.23	8.87	15.85	13.79
287	3.62	7.60	14.13	12.10
288	5.39	11.35	20.48	17.75
289	2.19	4.62	8.31	7.21
290	3.06	6.40	11.10	9.79
291	25.33	53.66	99.27	85.08
292	42.52	89.97	169.12	144.00
293	6.14	13.07	25.65	21.45
294	1.72	3.67	6.54	5.70
295	0.90	1.87	3.36	2.91

296	12.82	27.12	52.53	44.15
297	5.96	12.64	23.72	20.22
298	20.60	43.64	83.77	70.70
299	5.20	10.84	19.81	17.08
300	39.23	83.14	153.34	131.62
301	5.54	11.36	20.27	17.66
302	8.66	18.07	34.34	29.06
303	12.53	26.49	49.67	42.38
304	6.92	14.49	25.82	22.48
305	27.64	58.80	109.89	93.67
306	16.17	33.77	66.77	55.65
307	8.00	17.01	33.19	27.82
308	2.02	4.23	7.48	6.55
309	21.17	44.88	85.64	72.49
310	5.34	11.31	19.33	17.14
311	20.14	41.47	70.69	62.79
312	9.15	19.12	33.71	29.55
313	75.70	161.32	295.55	254.35
314	27.95	59.18	109.79	93.95
315	10.20	21.49	42.45	35.38
316	17.09	35.94	60.93	54.31
317	16.99	35.46	69.26	57.91
318	1.34	2.76	5.12	4.39
319	3.82	7.91	13.62	12.06
320	3.36	7.12	13.79	11.59
321	6.56	13.57	24.62	21.29
322	1.16	2.45	4.36	3.80
323	3.31	6.93	12.35	10.77
324	26.56	55.93	107.29	90.60
325	15.41	32.34	60.09	51.44
326	97.48	208.05	398.81	336.89
327	47.07	99.15	189.56	160.20
328	70.69	150.56	295.51	247.10
329	14.87	31.12	51.42	46.36
330	14.92	31.30	60.70	51.02
331	0.59	1.28	2.22	1.97
332	3.92	8.25	15.41	13.17
333	2.05	4.24	8.36	6.97
334	9.46	19.81	36.73	31.49
335	6.76	14.22	25.39	22.13
336	1.53	3.20	5.68	4.96
337	4.74	9.79	18.94	15.93
338	1.38	2.91	5.49	4.68

339	4.27	8.92	16.31	14.07
340	12.31	26.17	50.54	42.53
341	5.02	10.64	20.96	17.50
342	11.85	25.06	50.23	41.62
343	2.73	5.71	10.82	9.19
344	5.88	12.31	23.98	20.11
345	13.24	27.84	51.56	44.23
346	7.76	16.03	28.08	24.66
347	1.12	2.37	4.48	3.81
348	6.10	12.95	25.45	21.27
349	16.45	34.64	67.53	56.59
350	1.18	2.49	4.48	3.89
351	2.57	5.26	9.64	8.29
352	9.00	18.90	35.26	30.13
353	14.30	30.10	54.95	47.40
354	3.12	6.48	11.67	10.14
355	13.60	28.54	53.75	45.67
356	4.63	9.78	18.72	15.82
357	3.85	8.04	13.97	12.32
358	1.06	2.22	3.88	3.42
359	11.33	23.72	45.44	38.37
360	0.99	2.09	3.66	3.21
361	16.79	35.47	66.00	56.43
362	2.59	5.43	9.30	8.25
363	6.72	14.04	26.80	22.64
364	11.62	24.49	46.29	39.34
365	4.92	10.16	19.50	16.44
366	8.83	18.51	34.02	29.24
367	35.78	75.84	146.15	123.13
368	14.74	31.10	60.57	50.79
369	3.41	7.23	14.18	11.86
370	14.24	30.16	58.83	49.32
371	2.49	5.09	9.32	8.02
372	0.77	1.59	2.95	2.52
373	9.37	19.88	37.96	32.11
374	0.56	1.18	2.18	1.87
375	0.94	1.97	3.70	3.16
376	4.91	10.32	18.01	15.84
377	12.19	25.70	47.66	40.82
378	9.27	19.33	36.02	30.78
379	26.87	56.51	108.41	91.50
380	3.36	7.05	12.25	10.81
381	9.93	20.64	35.32	31.36

382	3.57	7.41	14.30	12.03
383	15.28	32.14	60.82	51.65
384	4.28	9.01	16.37	14.16
385	3.23	6.86	13.32	11.19
386	2.84	5.97	11.06	9.48
387	6.80	14.42	27.24	23.15
388	2.46	5.20	9.77	8.32
389	4.82	10.04	19.39	16.30
390	0.83	1.76	3.02	2.68
391	1.04	2.11	3.80	3.29
392	5.27	10.98	19.24	16.93
393	1.71	3.54	6.28	5.50
394	2.04	4.19	7.09	6.33
395	7.98	16.59	27.66	24.85
396	7.31	15.15	25.33	22.72
397	9.89	20.67	34.22	30.84
398	4.50	9.30	15.62	13.98
399	16.68	34.80	59.28	52.76
400	6.37	13.31	22.88	20.27
401	7.16	15.03	25.96	22.93
402	1.57	3.26	5.45	4.89
403	5.09	10.58	17.64	15.86
404	5.25	10.86	18.18	16.29
405	2.95	6.06	10.27	9.17
406	1.99	4.12	6.91	6.19
407	1.33	2.71	4.59	4.09
408	5.34	11.17	19.25	17.04
409	3.89	8.06	13.49	12.10
410	1.03	2.12	3.57	3.19
411	4.37	9.13	15.16	13.65
412	1.81	3.73	6.25	5.59
413	1.85	3.85	6.43	5.77
414	1.78	3.68	6.16	5.52
415	3.00	6.22	10.38	9.32
416	1.82	3.73	6.28	5.61
417	3.50	7.24	12.11	10.86
418	4.40	9.10	15.21	13.63
419	2.35	4.84	8.79	7.60
420	3.08	6.36	10.66	9.54
421	2.88	5.98	9.98	8.96
422	1.42	2.87	4.95	4.38
423	4.46	9.24	15.45	13.86
424	2.16	4.49	7.50	6.73

425	2.53	5.26	8.75	7.87
426	5.83	12.19	20.20	18.21
427	6.87	14.40	23.84	21.51
428	6.13	12.72	21.25	19.08
429	4.09	8.45	14.16	12.68
430	2.31	4.79	8.00	7.18
431	3.76	7.84	13.06	11.75
432	1.76	3.57	6.09	5.41
433	6.16	12.79	21.36	19.18
434	7.06	14.74	24.49	22.05
435	4.11	8.49	14.91	13.07
436	2.25	4.65	7.80	6.98
437	20.02	41.41	69.39	62.19
438	4.54	9.41	15.71	14.10
439	3.96	8.31	13.71	12.37
440	6.28	12.95	21.79	19.50
441	5.41	11.21	18.74	16.82
442	3.71	7.70	12.83	11.53
443	4.35	8.96	15.04	13.46
444	4.02	8.33	13.93	12.50
445	2.04	4.20	7.09	6.33
446	2.27	4.70	7.90	7.07
447	2.47	5.11	8.57	7.68
448	3.68	7.68	12.77	11.50
449	4.40	9.12	15.25	13.68
450	5.24	10.89	18.16	16.31
451	8.44	17.57	29.23	26.29
452	8.94	18.70	32.37	28.59
453	8.24	17.16	28.54	25.67
454	7.16	15.05	27.00	23.47
455	6.32	13.18	21.88	19.70
456	4.00	8.33	13.86	12.47
457	10.95	22.52	38.14	34.09
458	16.49	34.01	57.37	51.35
459	7.73	16.05	28.50	24.88
460	6.81	14.19	23.60	21.23
461	4.32	8.92	14.95	13.38
462	3.91	8.05	13.52	12.09
463	5.45	11.39	18.89	17.01
464	16.39	34.12	56.82	51.09
465	8.42	17.69	30.64	27.05
466	2.48	5.12	8.60	7.69
467	7.65	15.88	26.53	23.82

468	1.77	3.64	6.12	5.47
469	4.92	10.26	17.05	15.34
470	25.30	53.08	87.45	78.93
471	28.82	60.39	99.67	89.91
472	30.65	63.61	113.15	98.72
473	2.64	5.50	9.14	8.22
474	2.16	4.44	7.51	6.71
475	2.59	5.40	8.99	8.08
476	23.89	50.32	88.19	77.43
477	4.20	8.73	14.58	13.10
478	2.85	5.88	9.88	8.85
479	1.08	2.23	3.76	3.36
480	33.15	69.68	120.68	106.52
481	8.82	18.46	32.11	28.30
482	0.89	1.84	3.08	2.76
483	1.85	3.83	6.40	5.75
484	1.78	3.69	6.18	5.54
485	0.94	1.94	3.26	2.92
486	0.24	0.51	0.89	0.78
487	1.66	3.42	5.74	5.14
488	3.20	6.65	11.08	9.95
489	2.30	4.80	7.97	7.17
490	1.07	2.22	3.69	3.32
491	4.98	10.49	17.14	15.51
492	2.89	5.94	10.00	8.94
493	4.78	9.97	16.46	14.82
494	3.73	7.78	13.68	12.00
495	12.68	26.54	43.88	39.56
496	4.04	8.41	14.01	12.59
497	7.16	14.87	24.83	22.30
498	4.15	8.64	14.38	12.93
499	3.42	7.09	11.84	10.62
500	3.97	8.17	13.74	12.29
501	5.36	11.08	18.59	16.65
502	6.41	13.27	22.19	19.89
503	3.36	6.94	11.63	10.42
504	30.43	63.59	105.34	94.89
505	36.08	75.29	125.05	112.57
506	17.19	35.45	59.83	53.54
507	2.13	4.45	7.39	6.65
508	1.39	2.86	4.80	4.29
509	2.36	4.90	8.17	7.34
510	1.60	3.34	5.54	4.99

511	5.05	10.66	19.43	16.77
512	2.33	4.89	8.72	7.59
513	0.22	0.45	0.75	0.68
514	1.60	3.33	5.89	5.15
515	7.01	14.75	25.89	22.75
516	6.99	14.56	24.22	21.77
517	1.73	3.51	6.01	5.33
518	9.39	19.62	34.10	30.07
519	1.33	2.71	4.58	4.08
520	2.96	6.15	10.28	9.23
521	3.62	7.55	12.56	11.30
522	7.03	14.64	24.39	21.93
523	18.83	39.53	65.09	58.76
524	2.54	5.28	8.78	7.90
525	1.86	3.85	6.42	5.77
526	8.61	17.94	29.86	26.85
527	13.19	27.14	45.71	40.86
528	6.22	12.95	21.64	19.45
529	5.42	11.37	18.95	17.03
530	1.65	3.46	5.69	5.13
531	0.83	1.73	2.89	2.60
532	10.55	22.34	36.34	32.95
533	5.23	11.00	19.28	16.94
534	1.70	3.49	5.87	5.25
535	1.32	2.72	4.57	4.09
536	21.88	45.90	79.34	70.13
537	5.17	10.72	17.94	16.10
538	26.94	56.36	93.23	84.03
539	1.54	3.22	5.34	4.81
540	2.93	6.06	10.11	9.06
541	2.25	4.70	7.81	7.03
542	10.43	21.65	36.15	32.45
543	8.92	18.41	33.04	28.69
544	9.75	20.22	33.79	30.32
545	10.07	20.69	35.03	31.29
546	10.31	21.11	35.84	31.96
547	14.16	28.91	49.23	43.85
548	7.49	15.41	25.96	23.20
549	2.28	4.75	7.89	7.10
550	10.59	21.78	36.77	32.86
551	6.13	12.63	21.26	19.02
552	11.80	24.54	40.90	36.77
553	3.94	8.23	14.33	12.63

554	7.53	15.70	26.08	23.47
555	13.11	27.23	45.55	40.92
556	9.75	20.32	33.84	30.45
557	9.52	20.15	32.89	29.82
558	4.45	9.23	15.44	13.87
559	6.85	14.27	23.73	21.35
560	12.77	26.67	44.21	39.82
561	4.72	9.85	16.35	14.72
562	3.29	6.87	11.39	10.26
563	2.59	5.40	9.45	8.31
564	2.35	4.91	8.11	7.31
565	7.85	16.36	27.22	24.48
566	11.35	23.34	39.57	35.36
567	4.57	9.44	15.89	14.24
568	6.73	13.98	23.39	21.01
569	21.65	44.98	75.08	67.44
570	24.39	51.16	90.65	79.23
571	10.17	21.02	35.37	31.70
572	7.25	15.03	25.18	22.59
573	3.40	6.93	11.84	10.53
574	2.46	5.02	8.52	7.59
575	1.69	3.52	5.88	5.28
576	2.81	5.82	9.73	8.73
577	6.57	13.58	22.73	20.36
578	1.71	3.50	5.94	5.28
579	1.99	4.07	6.93	6.17
580	6.90	14.40	23.89	21.51
581	1.29	2.65	4.45	3.98
582	1.26	2.63	4.36	3.92
583	1.14	2.35	3.96	3.53
584	3.43	7.17	11.87	10.70
585	8.26	17.19	28.63	25.74
586	15.16	31.56	56.81	49.30
587	11.91	24.64	41.30	37.01
588	8.77	18.20	30.42	27.31
589	5.05	10.51	17.52	15.75
590	3.71	7.78	13.44	11.89
591	24.93	52.60	90.63	80.14
592	5.31	11.07	18.41	16.56
593	4.71	9.82	16.30	14.67
594	2.37	4.94	8.21	7.39
595	4.90	10.21	16.98	15.28
596	34.02	70.77	117.96	106.03

597	15.89	32.83	55.09	49.35
598	4.16	8.60	14.43	12.92
599	21.64	45.22	74.94	67.50
600	4.61	9.58	16.01	14.38
601	8.45	17.58	29.28	26.33
602	8.25	17.18	28.62	25.73
603	8.41	17.50	29.17	26.21
604	2.07	4.26	7.19	6.43
605	6.39	13.31	22.14	19.92
606	29.95	62.36	103.77	93.32
607	19.46	40.61	67.41	60.69
608	32.05	66.99	111.20	100.20
609	9.09	19.19	34.21	29.80
610	1.22	2.56	4.45	3.92
611	6.69	13.92	23.20	20.86
612	1.51	3.07	5.24	4.65
613	3.06	6.39	11.09	9.78
614	9.03	18.98	31.23	28.21
615	5.94	12.36	20.59	18.50
616	8.55	17.81	29.63	26.66
617	14.59	29.89	50.88	45.39
618	29.78	62.31	103.14	92.98
619	5.22	10.79	18.10	16.21
620	4.57	9.53	15.85	14.26
621	3.77	7.85	13.07	11.76
622	5.46	11.34	18.86	16.94
623	2.05	4.26	7.10	6.38
624	3.41	7.08	11.84	10.63
625	9.75	20.14	33.89	30.36
626	38.59	81.19	142.71	125.14
627	1.66	3.43	5.75	5.16

Table Showing Resilience Index Values Calculated Using Weights from the Twenty-Five Random Groups for all the Participants

ID No.	RI -1/20	RI- 2/3/24	RI - 4	RI - 5	RI - 6	RI - 7	RI - 8/11/12	RI- 9/10	RI -13	RI - 14	RI - 15/19/23	RI-16/25	RI -17	RI -18	RI-21	RI - 22
001	2.03	2.31	2.02	4.74	2.04	2.01	2.04	2.04	4.27	4.35	2.04	2.32	4.57	3.91	2.03	4.15
002	4.09	4.82	4.09	9.32	4.14	4.11	4.10	4.11	8.49	8.52	4.14	4.83	8.85	7.43	4.08	8.25
003	3.70	4.29	3.70	8.56	3.74	3.71	3.71	3.72	7.86	7.83	3.74	4.30	8.25	7.04	3.68	7.58
004	1.51	1.74	1.50	3.49	1.51	1.49	1.51	1.51	3.18	3.19	1.51	1.74	3.34	2.86	1.50	3.07
005	2.73	3.11	2.72	6.38	2.75	2.74	2.73	2.74	5.89	5.84	2.75	3.12	6.22	5.36	2.72	5.65
006	11.29	12.89	11.28	26.32	11.41	11.35	11.31	11.33	24.06	24.16	11.41	12.91	25.62	21.92	11.25	23.25
007	1.90	2.18	1.90	4.42	1.92	1.91	1.90	1.91	4.08	4.05	1.92	2.18	4.30	3.69	1.89	3.92
008	2.75	3.11	2.73	6.45	2.76	2.72	2.75	2.76	5.91	5.90	2.76	3.12	6.27	5.44	2.74	5.68
009	0.92	1.07	0.92	2.15	0.93	0.93	0.93	0.93	2.03	1.96	0.93	1.07	2.09	1.81	0.92	1.92
010	2.95	3.35	2.93	6.92	2.97	2.92	2.96	2.97	6.30	6.34	2.97	3.35	6.72	5.81	2.94	6.08
011	1.04	1.19	1.04	2.42	1.06	1.06	1.04	1.04	2.24	2.22	1.06	1.19	2.37	2.03	1.03	2.15
012	4.20	4.78	4.17	9.79	4.22	4.15	4.21	4.22	8.83	8.97	4.22	4.79	9.45	8.09	4.18	8.58
013	4.30	4.88	4.27	10.04	4.32	4.25	4.31	4.32	9.02	9.22	4.32	4.89	9.71	8.31	4.28	8.79
014	2.70	3.06	2.69	6.36	2.72	2.67	2.71	2.72	5.83	5.82	2.72	3.06	6.20	5.38	2.69	5.60
015	1.14	1.30	1.13	2.66	1.14	1.12	1.14	1.14	2.42	2.43	1.14	1.30	2.57	2.22	1.13	2.34
016	1.62	1.86	1.63	3.79	1.65	1.65	1.62	1.63	3.54	3.47	1.65	1.86	3.72	3.20	1.61	3.38
017	8.77	10.05	8.78	20.51	8.88	8.85	8.79	8.81	19.05	18.79	8.88	10.07	20.05	17.29	8.73	18.22
018	34.91	40.36	35.45	81.99	35.82	36.17	35.05	35.16	77.89	75.13	35.82	40.49	81.06	69.90	34.70	73.71
019	6.10	6.92	6.05	14.28	6.12	6.03	6.11	6.12	13.01	13.07	6.12	6.93	13.85	11.96	6.08	12.55
020	4.85	5.53	4.85	11.32	4.91	4.88	4.86	4.87	10.34	10.40	4.91	5.54	11.03	9.44	4.83	10.00
021	13.51	15.41	13.41	31.46	13.57	13.36	13.54	13.57	28.52	28.81	13.57	15.44	30.35	26.05	13.45	27.63
022	0.66	0.76	0.66	1.56	0.67	0.67	0.67	0.67	1.44	1.43	0.67	0.76	1.52	1.32	0.66	1.38
023	3.81	4.37	3.80	8.87	3.85	3.82	3.82	3.83	8.13	8.12	3.85	4.38	8.60	7.37	3.80	7.84
024	4.06	4.61	4.03	9.52	4.08	4.02	4.07	4.08	8.70	8.71	4.08	4.62	9.23	7.99	4.04	8.37
025	4.11	4.70	4.10	9.63	4.15	4.12	4.12	4.13	8.89	8.81	4.15	4.71	9.38	8.10	4.10	8.52
026	7.63	8.70	7.64	17.93	7.73	7.69	7.65	7.67	16.66	16.42	7.73	8.72	17.57	15.21	7.60	15.91

027	3.79	4.31	3.79	8.92	3.83	3.81	3.80	3.81	8.25	8.17	3.83	4.32	8.74	7.57	3.78	7.90
028	4.11	4.71	4.09	9.55	4.14	4.09	4.12	4.13	8.71	8.74	4.14	4.72	9.23	7.91	4.09	8.42
029	0.97	1.12	0.96	2.22	0.97	0.96	0.97	0.97	1.99	2.04	0.97	1.12	2.12	1.79	0.96	1.95
030	3.65	4.14	3.66	8.61	3.70	3.68	3.66	3.67	8.02	7.90	3.70	4.15	8.48	7.37	3.63	7.65
031	3.51	4.02	3.52	8.23	3.56	3.57	3.52	3.52	7.69	7.54	3.56	4.02	8.08	6.98	3.49	7.33
032	0.86	0.98	0.86	2.02	0.87	0.85	0.87	0.87	1.84	1.85	0.87	0.99	1.95	1.68	0.86	1.77
033	4.68	5.33	4.65	10.91	4.70	4.62	4.69	4.70	9.88	9.99	4.70	5.34	10.54	9.05	4.65	9.58
034	0.56	0.64	0.56	1.32	0.57	0.56	0.57	0.57	1.21	1.21	0.57	0.64	1.29	1.11	0.56	1.16
035	2.93	3.30	2.91	6.88	2.94	2.89	2.93	2.94	6.21	6.31	2.94	3.30	6.69	5.76	2.91	6.02
036	5.12	5.83	5.13	12.03	5.18	5.16	5.14	5.15	11.12	11.02	5.18	5.85	11.77	10.17	5.10	10.65
037	2.01	2.27	2.00	4.72	2.02	1.99	2.01	2.02	4.31	4.32	2.02	2.28	4.59	3.98	2.00	4.15
038	22.54	25.76	22.49	52.69	22.76	22.63	22.59	22.62	48.74	48.24	22.76	25.80	51.39	44.34	22.48	46.69
039	3.32	3.82	3.32	7.73	3.36	3.35	3.32	3.33	7.20	7.07	3.36	3.83	7.52	6.48	3.30	6.88
040	5.02	5.69	4.99	11.68	5.05	4.97	5.04	5.05	10.38	10.74	5.05	5.70	11.26	9.56	5.00	10.20
041	1.41	1.61	1.41	3.31	1.42	1.40	1.42	1.42	3.02	3.02	1.42	1.62	3.20	2.76	1.41	2.91
042	16.85	19.11	16.71	39.47	16.92	16.66	16.89	16.92	35.97	36.14	16.92	19.14	38.31	33.10	16.80	34.69
043	13.22	15.02	13.14	30.95	13.29	13.08	13.26	13.29	28.17	28.34	13.29	15.06	29.99	25.86	13.16	27.19
044	1.73	1.98	1.73	4.05	1.75	1.75	1.73	1.74	3.76	3.71	1.75	1.99	3.95	3.41	1.72	3.60
045	6.07	6.90	6.02	14.20	6.10	6.00	6.08	6.10	12.95	13.00	6.10	6.91	13.77	11.89	6.05	12.49
046	9.55	11.07	9.64	22.20	9.75	9.82	9.58	9.60	20.76	20.36	9.75	11.09	21.73	18.55	9.51	19.86
047	0.46	0.53	0.46	1.08	0.47	0.46	0.47	0.47	0.98	0.99	0.47	0.53	1.04	0.89	0.46	0.95
048	0.45	0.51	0.45	1.05	0.45	0.44	0.45	0.45	0.96	0.96	0.45	0.51	1.02	0.88	0.45	0.93
049	3.17	3.60	3.15	7.45	3.19	3.14	3.18	3.19	6.82	6.81	3.19	3.61	7.24	6.27	3.16	6.56
050	3.06	3.50	3.04	7.13	3.08	3.03	3.07	3.08	6.47	6.52	3.08	3.51	6.87	5.90	3.05	6.26
051	8.95	10.10	8.89	21.06	9.00	8.86	8.98	9.00	19.14	19.31	9.00	10.12	20.50	17.73	8.92	18.48
052	3.47	3.98	3.47	8.10	3.51	3.48	3.48	3.48	7.51	7.41	3.51	3.99	7.88	6.79	3.45	7.18
053	1.25	1.41	1.24	2.92	1.25	1.23	1.25	1.25	2.63	2.68	1.25	1.41	2.83	2.43	1.24	2.56

054	9.01	10.20	8.95	21.16	9.05	8.91	9.03	9.05	19.31	19.38	9.05	10.22	20.57	17.81	8.97	18.60
055	1.45	1.63	1.44	3.41	1.46	1.43	1.45	1.46	3.10	3.13	1.46	1.64	3.32	2.87	1.44	2.99
056	4.97	5.61	4.94	11.70	5.00	4.92	4.99	5.00	10.62	10.73	5.00	5.62	11.39	9.85	4.95	10.27
057	3.31	3.74	3.29	7.76	3.33	3.27	3.32	3.33	7.00	7.12	3.33	3.74	7.53	6.48	3.30	6.80
058	1.98	2.24	1.96	4.64	1.99	1.96	1.98	1.99	4.23	4.25	1.99	2.25	4.51	3.90	1.97	4.08
059	3.50	4.01	3.52	8.20	3.57	3.57	3.51	3.52	7.60	7.53	3.57	4.01	8.06	6.91	3.49	7.30
060	12.75	14.66	12.64	29.47	12.80	12.60	12.78	12.80	26.64	26.97	12.80	14.68	28.25	24.10	12.71	25.88
061	14.14	16.36	14.18	32.88	14.34	14.27	14.19	14.22	30.46	30.08	14.34	16.40	31.89	27.34	14.07	29.20
062	0.77	0.91	0.77	1.76	0.78	0.77	0.78	0.78	1.58	1.61	0.78	0.91	1.66	1.39	0.77	1.55
063	0.53	0.60	0.53	1.24	0.53	0.52	0.53	0.53	1.12	1.14	0.53	0.60	1.21	1.04	0.53	1.09
064	1.91	2.23	1.93	4.40	1.95	1.96	1.91	1.92	4.06	4.04	1.95	2.23	4.27	3.60	1.90	3.92
065	7.87	8.95	7.82	18.30	7.91	7.78	7.89	7.91	16.35	16.80	7.91	8.97	17.62	15.00	7.83	16.00
066	5.69	6.53	5.68	13.27	5.75	5.70	5.71	5.72	12.18	12.15	5.75	6.54	12.86	11.05	5.67	11.72
067	0.35	0.40	0.35	0.82	0.36	0.35	0.35	0.36	0.75	0.75	0.36	0.41	0.79	0.68	0.35	0.72
068	6.21	7.08	6.18	14.52	6.26	6.19	6.22	6.23	13.37	13.30	6.26	7.09	14.14	12.21	6.18	12.83
069	5.29	6.04	5.27	12.30	5.33	5.29	5.30	5.31	11.18	11.29	5.33	6.05	11.93	10.19	5.27	10.84
070	7.82	8.98	7.84	18.19	7.93	7.92	7.84	7.85	16.71	16.69	7.93	9.00	17.70	15.11	7.79	16.12
071	1.93	2.22	1.92	4.46	1.94	1.91	1.94	1.94	4.00	4.09	1.94	2.22	4.27	3.62	1.92	3.91
072	1.47	1.67	1.47	3.47	1.49	1.48	1.48	1.48	3.23	3.17	1.49	1.68	3.40	2.96	1.47	3.08
073	3.85	4.40	3.84	9.01	3.89	3.85	3.86	3.87	8.27	8.25	3.89	4.41	8.76	7.55	3.83	7.95
074	9.81	11.19	9.83	23.07	9.94	9.90	9.84	9.86	21.49	21.12	9.94	11.22	22.62	19.60	9.76	20.49
075	3.46	3.95	3.45	8.10	3.49	3.47	3.46	3.47	7.54	7.40	3.49	3.96	7.91	6.85	3.45	7.19
076	1.81	2.09	1.79	4.15	1.82	1.79	1.81	1.82	3.70	3.80	1.82	2.09	3.95	3.33	1.80	3.63
077	1.12	1.25	1.11	2.65	1.13	1.11	1.13	1.13	2.39	2.44	1.13	1.25	2.60	2.24	1.12	2.32
078	1.22	1.39	1.22	2.83	1.23	1.22	1.22	1.22	2.54	2.61	1.23	1.39	2.74	2.32	1.21	2.49
079	9.82	11.16	9.76	22.89	9.87	9.72	9.85	9.87	20.51	21.01	9.87	11.19	22.07	18.84	9.78	20.03
080	4.14	4.71	4.13	9.69	4.18	4.14	4.15	4.16	8.91	8.88	4.18	4.72	9.45	8.15	4.12	8.56

081	3.59	4.17	3.60	8.31	3.64	3.64	3.59	3.60	7.76	7.60	3.64	4.18	8.07	6.91	3.57	7.41
082	0.75	0.86	0.75	1.75	0.75	0.75	0.75	0.75	1.62	1.60	0.75	0.86	1.70	1.47	0.74	1.55
083	3.81	4.31	3.78	8.93	3.83	3.77	3.82	3.83	8.09	8.18	3.83	4.32	8.66	7.46	3.79	7.83
084	0.73	0.83	0.73	1.73	0.74	0.73	0.74	0.74	1.60	1.59	0.74	0.83	1.70	1.48	0.73	1.53
085	6.17	6.97	6.13	14.51	6.20	6.10	6.19	6.20	13.26	13.29	6.20	6.99	14.13	12.25	6.14	12.76
086	8.87	10.06	8.82	20.82	8.92	8.78	8.90	8.92	19.00	19.07	8.92	10.08	20.23	17.49	8.82	18.31
087	2.41	2.74	2.40	5.66	2.42	2.39	2.42	2.42	5.16	5.18	2.42	2.74	5.50	4.75	2.40	4.98
088	3.91	4.44	3.89	9.14	3.93	3.87	3.92	3.93	8.23	8.39	3.93	4.44	8.84	7.58	3.90	8.01
089	7.25	8.48	7.31	16.76	7.40	7.44	7.27	7.28	15.74	15.32	7.40	8.50	16.29	13.89	7.22	15.01
090	10.29	11.67	10.22	24.12	10.34	10.18	10.32	10.34	21.96	22.09	10.34	11.70	23.40	20.21	10.24	21.19
091	1.86	2.10	1.85	4.37	1.87	1.84	1.87	1.87	3.96	4.01	1.87	2.11	4.25	3.67	1.86	3.83
092	2.02	2.30	2.02	4.73	2.04	2.02	2.02	2.03	4.36	4.33	2.04	2.31	4.61	3.98	2.01	4.18
093	8.35	9.54	8.29	19.46	8.39	8.25	8.37	8.39	17.75	17.80	8.39	9.56	18.79	16.18	8.31	17.12
094	3.70	4.23	3.68	8.64	3.72	3.66	3.71	3.72	7.91	7.90	3.72	4.24	8.35	7.21	3.69	7.61
095	4.76	5.37	4.73	11.20	4.78	4.71	4.77	4.78	10.20	10.27	4.78	5.38	10.91	9.45	4.74	9.84
096	6.34	7.24	6.34	14.88	6.42	6.37	6.36	6.37	13.77	13.63	6.42	7.25	14.54	12.56	6.31	13.18
097	4.96	5.69	4.96	11.59	5.01	4.99	4.97	4.98	10.80	10.60	5.01	5.70	11.31	9.77	4.94	10.30
098	2.67	3.12	2.68	6.17	2.72	2.72	2.68	2.68	5.79	5.64	2.72	3.12	5.99	5.13	2.66	5.52
099	7.54	8.53	7.49	17.70	7.58	7.46	7.56	7.58	16.10	16.23	7.58	8.54	17.21	14.87	7.51	15.55
100	10.54	12.19	10.60	24.58	10.72	10.74	10.57	10.59	23.10	22.49	10.72	12.22	24.04	20.71	10.49	21.97
101	2.67	3.10	2.65	6.13	2.68	2.64	2.68	2.68	5.50	5.61	2.68	3.10	5.83	4.92	2.67	5.38
102	13.86	15.79	13.80	32.48	13.95	13.72	13.91	13.95	29.62	29.72	13.95	15.83	31.45	27.14	13.79	28.56
103	3.28	3.72	3.26	7.69	3.30	3.25	3.29	3.30	6.99	7.05	3.30	3.73	7.46	6.44	3.27	6.75
104	17.45	20.02	17.50	40.83	17.70	17.67	17.50	17.53	38.05	37.39	17.70	20.06	39.95	34.46	17.38	36.32
105	1.04	1.18	1.04	2.45	1.05	1.03	1.05	1.05	2.24	2.25	1.05	1.19	2.38	2.06	1.04	2.16
106	1.35	1.55	1.35	3.15	1.37	1.36	1.35	1.36	2.89	2.89	1.37	1.55	3.06	2.62	1.34	2.78
107	4.23	4.86	4.19	9.77	4.24	4.18	4.23	4.24	8.84	8.94	4.24	4.87	9.37	8.00	4.21	8.58

108	4.52	5.15	4.49	10.56	4.54	4.47	4.53	4.54	9.60	9.67	4.54	5.16	10.21	8.79	4.50	9.28
109	15.78	17.91	15.68	37.01	15.86	15.61	15.83	15.86	33.79	33.88	15.86	17.95	35.93	31.08	15.71	32.55
110	5.31	6.01	5.27	12.45	5.33	5.25	5.32	5.33	11.35	11.40	5.33	6.03	12.09	10.45	5.29	10.94
111	15.57	17.96	15.72	36.46	15.90	16.02	15.61	15.64	34.57	33.39	15.90	18.00	35.97	31.06	15.51	32.73
112	9.30	10.64	9.23	21.61	9.33	9.19	9.32	9.33	19.64	19.77	9.33	10.66	20.81	17.86	9.26	18.99
113	4.45	5.05	4.42	10.43	4.47	4.40	4.46	4.47	9.51	9.55	4.47	5.06	10.12	8.74	4.43	9.17
114	1.40	1.59	1.39	3.26	1.40	1.38	1.40	1.40	2.98	2.99	1.40	1.60	3.16	2.72	1.39	2.87
115	2.81	3.20	2.80	6.56	2.84	2.82	2.82	2.82	5.96	6.03	2.84	3.20	6.38	5.46	2.80	5.78
116	9.08	10.41	9.07	21.25	9.18	9.12	9.10	9.12	19.81	19.42	9.18	10.43	20.73	17.95	9.04	18.87
117	4.20	4.81	4.17	9.76	4.22	4.16	4.21	4.22	8.83	8.93	4.22	4.82	9.38	8.03	4.18	8.57
118	2.55	2.86	2.54	6.04	2.57	2.55	2.55	2.56	5.63	5.54	2.57	2.87	5.97	5.23	2.54	5.36
119	8.63	9.88	8.62	20.14	8.73	8.68	8.65	8.66	18.59	18.45	8.73	9.90	19.62	16.87	8.60	17.84
120	18.34	20.88	18.33	43.06	18.54	18.41	18.39	18.43	39.81	39.45	18.54	20.93	42.11	36.41	18.25	38.13
121	5.29	6.00	5.25	12.40	5.31	5.23	5.30	5.31	11.29	11.36	5.31	6.01	12.04	10.40	5.27	10.90
122	1.08	1.24	1.08	2.52	1.09	1.09	1.08	1.08	2.34	2.31	1.09	1.24	2.46	2.11	1.07	2.24
123	5.39	6.07	5.36	12.73	5.42	5.33	5.41	5.42	11.65	11.66	5.42	6.08	12.43	10.82	5.37	11.19
124	4.39	4.99	4.36	10.28	4.41	4.34	4.40	4.41	9.41	9.40	4.41	5.01	9.97	8.63	4.37	9.05
125	7.06	7.94	7.01	16.67	7.10	6.98	7.08	7.10	15.22	15.29	7.10	7.95	16.29	14.15	7.03	14.65
126	13.98	16.00	13.90	32.46	14.06	13.83	14.02	14.06	29.22	29.75	14.06	16.04	31.20	26.62	13.92	28.46
127	2.50	2.85	2.49	5.86	2.52	2.48	2.51	2.52	5.37	5.36	2.52	2.86	5.68	4.91	2.49	5.16
128	0.91	1.03	0.90	2.13	0.91	0.90	0.91	0.91	1.95	1.95	0.91	1.03	2.07	1.79	0.91	1.88
129	3.71	4.20	3.68	8.69	3.72	3.66	3.72	3.72	7.93	7.95	3.72	4.21	8.43	7.29	3.69	7.64
130	1.55	1.78	1.54	3.59	1.55	1.53	1.55	1.55	3.28	3.28	1.55	1.78	3.46	2.97	1.54	3.16
131	19.38	22.00	19.27	45.45	19.48	19.17	19.44	19.48	41.47	41.61	19.48	22.06	44.10	38.12	19.29	39.96
132	13.69	15.44	13.71	32.25	13.87	13.81	13.73	13.76	29.40	29.68	13.87	15.47	31.70	27.24	13.63	28.45
133	3.84	4.35	3.85	9.08	3.89	3.87	3.85	3.86	8.44	8.32	3.89	4.36	8.94	7.77	3.83	8.05
134	9.32	10.63	9.33	21.82	9.44	9.37	9.35	9.37	20.03	20.02	9.44	10.66	21.29	18.29	9.27	19.29

135	4.61	5.23	4.60	10.80	4.65	4.61	4.62	4.63	9.88	9.90	4.65	5.24	10.53	9.07	4.59	9.52
136	10.64	12.12	10.56	24.85	10.69	10.52	10.66	10.69	22.63	22.74	10.69	12.14	24.04	20.71	10.59	21.84
137	1.95	2.18	1.94	4.60	1.96	1.93	1.95	1.96	4.17	4.23	1.96	2.19	4.50	3.90	1.94	4.03
138	3.21	3.70	3.24	7.51	3.27	3.29	3.22	3.23	7.07	6.88	3.27	3.71	7.38	6.36	3.20	6.72
139	7.30	8.33	7.35	17.17	7.43	7.45	7.32	7.33	16.10	15.75	7.43	8.35	16.95	14.66	7.26	15.32
140	2.14	2.47	2.13	4.95	2.15	2.12	2.15	2.15	4.51	4.53	2.15	2.47	4.75	4.06	2.13	4.36
141	23.00	26.66	23.24	53.67	23.53	23.80	23.05	23.08	51.06	49.15	23.53	26.70	52.94	45.57	22.93	48.31
142	2.29	2.61	2.30	5.41	2.33	2.34	2.29	2.30	5.12	4.96	2.33	2.61	5.36	4.67	2.28	4.84
143	1.62	1.84	1.61	3.79	1.63	1.62	1.62	1.62	3.51	3.47	1.63	1.85	3.70	3.20	1.61	3.36
144	14.95	17.09	14.96	34.95	15.14	15.07	14.99	15.02	32.22	32.04	15.14	17.12	34.11	29.32	14.89	30.96
145	1.78	2.02	1.78	4.17	1.80	1.78	1.79	1.79	3.81	3.83	1.80	2.03	4.07	3.50	1.77	3.68
146	5.78	6.68	5.83	13.51	5.89	5.91	5.80	5.82	12.68	12.37	5.89	6.70	13.24	11.39	5.76	12.07
147	4.71	5.40	4.74	11.08	4.79	4.80	4.73	4.73	10.42	10.14	4.79	5.41	10.91	9.46	4.69	9.89
148	5.48	6.27	5.47	12.75	5.54	5.50	5.49	5.50	11.59	11.70	5.54	6.28	12.37	10.55	5.46	11.24
149	10.59	12.01	10.52	24.85	10.64	10.48	10.62	10.64	22.67	22.76	10.64	12.03	24.14	20.88	10.54	21.85
150	0.73	0.83	0.73	1.71	0.73	0.73	0.73	0.73	1.60	1.56	0.73	0.83	1.68	1.46	0.72	1.52
151	1.51	1.73	1.52	3.55	1.53	1.53	1.52	1.52	3.31	3.25	1.53	1.73	3.48	3.01	1.51	3.16
152	6.77	7.79	6.81	15.76	6.89	6.90	6.78	6.80	14.64	14.46	6.89	7.81	15.41	13.19	6.74	14.04
153	1.22	1.38	1.21	2.85	1.22	1.20	1.22	1.22	2.61	2.61	1.22	1.38	2.78	2.41	1.21	2.51
154	4.93	5.59	4.89	11.55	4.95	4.88	4.94	4.95	10.52	10.58	4.95	5.60	11.21	9.68	4.91	10.15
155	1.08	1.23	1.07	2.49	1.08	1.07	1.08	1.08	2.18	2.29	1.08	1.23	2.38	2.00	1.07	2.16
156	19.06	22.20	19.29	44.33	19.50	19.66	19.12	19.16	41.85	40.59	19.50	22.25	43.42	37.19	18.97	39.79
157	4.38	5.07	4.38	10.14	4.43	4.41	4.39	4.40	9.35	9.28	4.43	5.09	9.80	8.37	4.36	9.00
158	4.21	4.89	4.20	9.68	4.25	4.21	4.22	4.23	8.73	8.86	4.25	4.90	9.25	7.80	4.19	8.52
159	0.90	1.04	0.90	2.07	0.91	0.92	0.90	0.90	1.91	1.90	0.91	1.04	2.01	1.70	0.89	1.84
160	4.04	4.59	4.01	9.39	4.05	3.99	4.05	4.05	8.43	8.62	4.05	4.60	9.06	7.73	4.03	8.22
161	19.59	22.51	19.76	45.99	19.98	20.08	19.64	19.69	43.41	42.13	19.98	22.57	45.35	39.21	19.49	41.17

162	2.26	2.60	2.26	5.26	2.29	2.28	2.26	2.27	4.87	4.82	2.29	2.60	5.12	4.40	2.25	4.67
163	10.90	12.67	11.00	25.39	11.13	11.21	10.93	10.95	24.05	23.23	11.13	12.70	24.90	21.42	10.86	22.80
164	12.20	13.87	12.12	28.52	12.26	12.07	12.23	12.26	25.89	26.13	12.26	13.90	27.60	23.76	12.14	25.04
165	7.90	8.96	7.92	18.64	8.00	7.96	7.92	7.94	17.28	17.10	8.00	8.98	18.33	15.89	7.86	16.52
166	5.82	6.65	5.79	13.63	5.86	5.76	5.84	5.86	12.51	12.46	5.86	6.67	13.20	11.42	5.79	12.01
167	1.57	1.77	1.56	3.69	1.58	1.55	1.58	1.58	3.34	3.39	1.58	1.78	3.59	3.09	1.57	3.24
168	4.73	5.38	4.70	11.07	4.76	4.68	4.75	4.76	10.06	10.14	4.76	5.39	10.72	9.24	4.71	9.72
169	8.87	10.05	8.81	20.81	8.91	8.77	8.89	8.91	18.94	19.06	8.91	10.06	20.21	17.46	8.84	18.28
170	6.91	7.85	6.87	16.20	6.95	6.84	6.93	6.95	14.76	14.83	6.95	7.86	15.72	13.58	6.89	14.24
171	8.78	10.15	8.83	20.48	8.94	8.96	8.80	8.82	19.30	18.73	8.94	10.17	20.06	17.28	8.74	18.32
172	7.40	8.42	7.35	17.31	7.44	7.32	7.42	7.44	15.78	15.85	7.44	8.44	16.77	14.47	7.37	15.22
173	27.11	31.33	27.39	63.48	27.72	27.98	27.17	27.22	60.39	58.12	27.72	31.38	62.69	54.14	27.02	57.07
174	21.28	24.36	21.36	49.97	21.61	21.60	21.33	21.38	46.87	45.76	21.61	24.41	49.13	42.55	21.19	44.55
175	4.21	4.87	4.22	9.76	4.27	4.27	4.22	4.22	9.07	8.93	4.27	4.88	9.49	8.12	4.19	8.69
176	0.45	0.52	0.45	1.06	0.46	0.45	0.45	0.45	0.98	0.97	0.46	0.52	1.04	0.90	0.45	0.94
177	0.49	0.55	0.49	1.16	0.49	0.48	0.49	0.49	1.06	1.06	0.49	0.55	1.13	0.99	0.49	1.02
178	25.58	29.11	25.57	60.12	25.84	25.57	25.67	25.74	55.27	55.08	25.84	29.19	58.64	50.68	25.44	53.08
179	0.29	0.33	0.29	0.67	0.29	0.29	0.29	0.29	0.63	0.62	0.29	0.33	0.66	0.57	0.29	0.60
180	0.66	0.75	0.66	1.56	0.67	0.67	0.66	0.66	1.49	1.42	0.67	0.76	1.54	1.35	0.66	1.39
181	1.07	1.23	1.07	2.49	1.08	1.08	1.08	1.08	2.26	2.28	1.08	1.24	2.40	2.04	1.07	2.19
182	5.63	6.40	5.60	13.20	5.66	5.57	5.65	5.66	12.06	12.09	5.66	6.42	12.81	11.07	5.61	11.61
183	2.99	3.38	2.98	7.03	3.01	2.99	2.99	3.00	6.47	6.44	3.01	3.39	6.88	5.96	2.97	6.21
184	4.92	5.57	4.88	11.53	4.94	4.86	4.93	4.94	10.52	10.56	4.94	5.58	11.20	9.69	4.90	10.14
185	20.12	23.06	20.17	47.15	20.39	20.24	20.19	20.25	43.66	43.16	20.39	23.12	45.98	39.67	20.00	41.80
186	8.09	9.24	8.10	18.95	8.19	8.15	8.11	8.13	17.56	17.36	8.19	9.27	18.52	15.99	8.05	16.81
187	12.03	13.60	11.99	28.34	12.12	11.92	12.08	12.12	25.76	25.99	12.12	13.64	27.58	23.84	11.96	24.88
188	15.44	17.54	15.36	36.22	15.53	15.28	15.49	15.53	33.04	33.16	15.53	17.58	35.14	30.37	15.37	31.84

189	9.29	10.67	9.30	21.68	9.41	9.37	9.31	9.33	20.08	19.85	9.41	10.69	21.12	18.17	9.25	19.24
190	18.64	21.29	18.63	43.63	18.84	18.72	18.69	18.73	40.29	39.96	18.84	21.34	42.56	36.71	18.55	38.64
191	32.59	37.35	32.63	76.21	33.00	32.82	32.68	32.76	70.53	69.79	33.00	37.43	74.32	64.03	32.44	67.59
192	1.92	2.18	1.91	4.50	1.93	1.90	1.92	1.93	4.11	4.12	1.93	2.18	4.37	3.78	1.91	3.96
193	0.68	0.77	0.69	1.61	0.70	0.70	0.69	0.69	1.50	1.49	0.70	0.77	1.60	1.38	0.68	1.43
194	19.57	22.70	19.76	45.62	19.99	20.15	19.62	19.66	43.08	41.77	19.99	22.74	44.78	38.47	19.49	40.92
195	1.08	1.27	1.08	2.47	1.10	1.09	1.09	1.09	2.21	2.26	1.10	1.27	2.35	1.96	1.08	2.17
196	3.52	4.05	3.54	8.22	3.58	3.58	3.53	3.54	7.60	7.54	3.58	4.05	8.03	6.88	3.51	7.30
197	1.33	1.51	1.32	3.10	1.33	1.31	1.33	1.33	2.83	2.83	1.33	1.51	2.99	2.58	1.32	2.72
198	1.56	1.79	1.54	3.59	1.56	1.54	1.56	1.56	3.24	3.29	1.56	1.80	3.44	2.93	1.55	3.15
199	2.89	3.38	2.87	6.58	2.91	2.86	2.90	2.91	5.87	6.02	2.91	3.39	6.20	5.19	2.88	5.77
200	9.95	11.57	9.95	22.97	10.06	9.99	9.98	10.00	21.09	20.99	10.06	11.60	22.07	18.80	9.91	20.34
201	1.39	1.59	1.39	3.27	1.41	1.40	1.40	1.40	3.03	2.99	1.41	1.59	3.20	2.76	1.39	2.90
202	1.17	1.32	1.16	2.74	1.17	1.15	1.17	1.17	2.50	2.51	1.17	1.33	2.66	2.30	1.16	2.41
203	1.26	1.43	1.25	2.95	1.27	1.26	1.26	1.26	2.73	2.70	1.27	1.44	2.88	2.49	1.25	2.61
204	0.67	0.75	0.67	1.60	0.68	0.68	0.67	0.68	1.47	1.47	0.68	0.75	1.59	1.38	0.67	1.41
205	0.63	0.72	0.63	1.49	0.64	0.63	0.63	0.64	1.37	1.36	0.64	0.72	1.45	1.25	0.63	1.32
206	14.70	16.65	14.60	34.50	14.77	14.54	14.74	14.77	31.48	31.59	14.77	16.69	33.52	29.00	14.63	30.33
207	1.71	2.00	1.74	3.97	1.76	1.80	1.71	1.71	3.79	3.64	1.76	2.00	3.93	3.35	1.70	3.59
208	13.81	15.73	13.82	32.47	13.98	13.91	13.85	13.88	30.16	29.75	13.98	15.76	31.84	27.58	13.75	28.81
209	13.76	15.83	13.86	32.28	14.02	14.06	13.80	13.83	30.44	29.56	14.02	15.86	31.77	27.48	13.69	28.88
210	2.83	3.29	2.89	6.63	2.92	2.99	2.84	2.84	6.39	6.08	2.92	3.30	6.61	5.69	2.82	6.02
211	15.08	17.33	15.25	35.43	15.41	15.51	15.13	15.17	33.39	32.49	15.41	17.37	34.99	30.19	15.00	31.72
212	17.21	20.16	17.51	40.05	17.72	18.04	17.25	17.29	38.56	36.65	17.72	20.20	39.57	33.97	17.14	36.30
213	14.25	16.66	14.48	33.17	14.65	14.90	14.29	14.32	31.77	30.37	14.65	16.69	32.73	28.07	14.19	30.00
214	2.88	3.32	2.89	6.69	2.93	2.93	2.88	2.89	6.19	6.14	2.93	3.33	6.53	5.57	2.86	5.95
215	8.47	9.88	8.57	19.66	8.67	8.76	8.49	8.51	18.59	18.00	8.67	9.90	19.25	16.47	8.43	17.67

216	8.79	10.10	8.84	20.64	8.94	8.95	8.82	8.84	19.46	18.88	8.94	10.12	20.30	17.59	8.75	18.45
217	2.62	3.07	2.67	6.05	2.71	2.77	2.63	2.63	5.67	5.57	2.71	3.07	5.95	5.00	2.61	5.45
218	7.21	8.29	7.25	16.90	7.34	7.37	7.23	7.24	15.95	15.47	7.34	8.30	16.64	14.39	7.18	15.12
219	0.84	0.99	0.85	1.94	0.86	0.88	0.84	0.84	1.85	1.78	0.86	0.99	1.90	1.62	0.84	1.75
220	3.87	4.46	3.89	9.06	3.94	3.94	3.88	3.89	8.55	8.29	3.94	4.47	8.90	7.70	3.86	8.10
221	4.76	5.48	4.78	11.14	4.84	4.84	4.77	4.78	10.49	10.19	4.84	5.49	10.93	9.46	4.74	9.95
222	6.24	7.21	6.32	14.64	6.40	6.48	6.26	6.27	13.97	13.42	6.40	7.22	14.51	12.53	6.22	13.19
223	9.75	11.23	9.82	22.84	9.94	9.98	9.78	9.80	21.51	20.91	9.94	11.25	22.46	19.39	9.71	20.43
224	1.45	1.67	1.46	3.42	1.48	1.48	1.46	1.46	3.22	3.13	1.48	1.67	3.36	2.92	1.45	3.05
225	0.94	1.12	0.94	2.13	0.95	0.95	0.94	0.95	1.94	1.95	0.95	1.12	2.02	1.68	0.94	1.89
226	3.73	4.40	3.82	8.65	3.86	3.96	3.74	3.75	8.36	7.93	3.86	4.41	8.56	7.30	3.72	7.88
227	1.79	2.07	1.82	4.21	1.84	1.88	1.79	1.80	4.09	3.86	1.84	2.07	4.21	3.66	1.78	3.82
228	3.46	3.91	3.45	8.14	3.49	3.46	3.47	3.47	7.50	7.47	3.49	3.92	7.98	6.91	3.44	7.19
229	1.28	1.47	1.27	2.95	1.28	1.27	1.28	1.28	2.69	2.70	1.28	1.47	2.84	2.43	1.27	2.60
230	2.29	2.67	2.29	5.27	2.32	2.32	2.29	2.30	4.87	4.82	2.32	2.67	5.08	4.32	2.28	4.69
231	13.19	15.30	13.31	30.85	13.46	13.55	13.23	13.26	29.41	28.19	13.46	15.34	30.33	26.25	13.14	27.73
232	15.30	17.79	15.42	35.57	15.60	15.68	15.34	15.37	33.50	32.54	15.60	17.82	34.76	29.83	15.24	31.86
233	16.81	19.17	16.79	39.36	16.98	16.84	16.85	16.89	36.15	36.07	16.98	19.21	38.35	33.03	16.73	34.78
234	7.18	8.19	7.18	16.85	7.27	7.24	7.20	7.21	15.68	15.43	7.27	8.21	16.52	14.29	7.16	14.97
235	1.16	1.38	1.17	2.63	1.18	1.19	1.16	1.17	2.41	2.41	1.18	1.38	2.51	2.09	1.16	2.35
236	1.10	1.27	1.11	2.59	1.12	1.13	1.11	1.11	2.44	2.37	1.12	1.27	2.55	2.20	1.10	2.31
237	1.28	1.48	1.30	2.99	1.31	1.34	1.28	1.28	2.90	2.74	1.31	1.49	2.98	2.58	1.27	2.72
238	10.13	11.54	10.12	23.76	10.24	10.17	10.15	10.17	21.99	21.76	10.24	11.57	23.23	20.09	10.08	21.05
239	10.10	11.69	10.23	23.67	10.35	10.45	10.13	10.15	22.55	21.67	10.35	11.72	23.39	20.19	10.06	21.30
240	8.08	9.36	8.18	18.93	8.28	8.37	8.10	8.12	18.07	17.33	8.28	9.38	18.71	16.16	8.05	17.05
241	2.52	2.88	2.55	5.93	2.58	2.61	2.53	2.53	5.58	5.44	2.58	2.89	5.88	5.07	2.51	5.31
242	6.82	7.89	6.91	15.98	7.00	7.09	6.84	6.85	15.29	14.64	7.00	7.91	15.84	13.67	6.80	14.42

243	3.25	3.71	3.28	7.64	3.31	3.33	3.26	3.27	7.10	7.02	3.31	3.72	7.53	6.47	3.24	6.80
244	6.30	7.29	6.36	14.72	6.43	6.46	6.32	6.33	13.89	13.48	6.43	7.31	14.45	12.45	6.26	13.19
245	3.27	3.75	3.28	7.64	3.32	3.31	3.28	3.28	7.13	6.99	3.32	3.76	7.47	6.44	3.25	6.80
246	1.40	1.57	1.40	3.31	1.41	1.41	1.40	1.40	3.04	3.04	1.41	1.57	3.27	2.83	1.39	2.92
247	1.11	1.30	1.12	2.59	1.13	1.13	1.12	1.12	2.44	2.37	1.13	1.30	2.53	2.18	1.11	2.32
248	21.61	25.07	21.96	50.62	22.20	22.51	21.68	21.73	48.38	46.38	22.20	25.14	50.11	43.18	21.50	45.67
249	18.25	20.84	18.31	42.92	18.51	18.41	18.32	18.36	39.91	39.31	18.51	20.90	42.05	36.40	18.15	38.10
250	1.17	1.31	1.16	2.75	1.17	1.15	1.17	1.17	2.52	2.52	1.17	1.32	2.69	2.34	1.16	2.42
251	0.50	0.57	0.50	1.16	0.51	0.51	0.50	0.50	1.10	1.06	0.51	0.57	1.15	0.99	0.50	1.04
252	1.47	1.68	1.49	3.47	1.51	1.53	1.47	1.47	3.31	3.19	1.51	1.68	3.47	3.01	1.46	3.12
253	0.47	0.55	0.47	1.11	0.48	0.48	0.48	0.48	1.06	1.01	0.48	0.55	1.09	0.95	0.47	0.99
254	5.10	5.99	5.15	11.80	5.21	5.23	5.12	5.13	11.20	10.77	5.21	6.00	11.48	9.84	5.08	10.61
255	6.41	7.40	6.49	15.06	6.57	6.63	6.43	6.44	14.37	13.79	6.57	7.41	14.92	12.91	6.39	13.55
256	7.87	9.07	8.00	18.54	8.09	8.24	7.89	7.90	17.89	17.00	8.09	9.09	18.53	16.07	7.85	16.78
257	9.21	10.48	9.15	21.53	9.26	9.13	9.23	9.25	19.65	19.71	9.26	10.51	20.87	17.99	9.17	18.95
258	8.69	10.04	8.79	20.38	8.89	8.96	8.71	8.73	19.41	18.65	8.89	10.06	20.13	17.41	8.64	18.32
259	1.66	1.92	1.67	3.89	1.69	1.70	1.66	1.66	3.76	3.55	1.69	1.92	3.84	3.36	1.65	3.51
260	3.19	3.66	3.20	7.44	3.24	3.24	3.20	3.21	6.87	6.82	3.24	3.67	7.26	6.21	3.18	6.60
261	4.68	5.44	4.73	10.84	4.78	4.82	4.69	4.70	10.09	9.95	4.78	5.45	10.58	8.98	4.66	9.69
262	2.06	2.36	2.06	4.83	2.09	2.09	2.06	2.07	4.52	4.42	2.09	2.36	4.74	4.10	2.05	4.30
263	8.48	9.98	8.62	19.79	8.72	8.86	8.51	8.52	19.36	18.04	8.72	10.00	19.57	16.97	8.45	18.01
264	34.15	39.57	34.69	80.15	35.08	35.59	34.25	34.33	77.02	73.40	35.08	39.66	79.57	68.81	34.00	72.43
265	17.93	20.79	18.22	42.01	18.43	18.72	17.97	18.01	40.32	38.49	18.43	20.83	41.70	35.98	17.85	37.97
266	1.79	2.06	1.81	4.17	1.83	1.84	1.80	1.80	3.85	3.83	1.83	2.07	4.08	3.47	1.78	3.71
267	4.62	5.36	4.70	10.87	4.75	4.84	4.63	4.64	10.57	9.94	4.75	5.38	10.84	9.42	4.59	9.87
268	4.78	5.50	4.77	11.14	4.83	4.79	4.79	4.80	10.33	10.18	4.83	5.51	10.82	9.33	4.76	9.88
269	4.23	4.90	4.30	9.92	4.35	4.41	4.24	4.25	9.55	9.09	4.35	4.91	9.86	8.53	4.21	8.97

270	74.98	87.28	76.54	175.44	77.44	79.20	75.17	75.32	169.20	160.93	77.44	87.46	174.78	150.21	74.68	159.25
271	7.81	8.87	7.80	18.35	7.88	7.80	7.83	7.85	16.83	16.82	7.88	8.89	17.91	15.47	7.77	16.19
272	26.63	30.70	26.89	62.47	27.20	27.42	26.69	26.75	59.41	57.19	27.20	30.76	61.73	53.42	26.52	56.12
273	0.85	1.01	0.85	1.90	0.86	0.85	0.85	0.85	1.70	1.74	0.86	1.02	1.77	1.46	0.85	1.68
274	1.18	1.37	1.20	2.77	1.21	1.23	1.18	1.18	2.71	2.53	1.21	1.37	2.76	2.41	1.17	2.52
275	34.99	40.72	35.65	82.08	36.06	36.73	35.09	35.17	79.52	75.14	36.06	40.81	81.69	70.66	34.83	74.48
276	4.75	5.38	4.73	11.11	4.78	4.74	4.76	4.77	10.09	10.20	4.78	5.39	10.81	9.28	4.73	9.77
277	0.64	0.74	0.64	1.49	0.65	0.65	0.64	0.64	1.41	1.36	0.65	0.74	1.46	1.26	0.63	1.33
278	2.92	3.46	2.95	6.68	2.99	3.01	2.93	2.93	6.26	6.11	2.99	3.47	6.44	5.44	2.91	6.00
279	1.11	1.28	1.12	2.60	1.13	1.14	1.11	1.11	2.46	2.38	1.13	1.28	2.56	2.22	1.10	2.33
280	3.64	4.29	3.71	8.48	3.76	3.85	3.65	3.65	8.32	7.75	3.76	4.29	8.42	7.27	3.62	7.74
281	20.30	23.61	20.59	47.37	20.83	21.12	20.35	20.40	45.19	43.39	20.83	23.66	46.75	40.18	20.21	42.72
282	10.48	11.99	10.49	24.47	10.62	10.59	10.50	10.52	22.61	22.44	10.62	12.02	23.90	20.53	10.44	21.71
283	1.73	2.00	1.75	4.06	1.77	1.79	1.74	1.74	3.87	3.72	1.77	2.00	4.02	3.48	1.73	3.66
284	10.93	12.54	11.05	25.75	11.18	11.28	10.96	10.99	24.47	23.61	11.18	12.56	25.56	22.15	10.89	23.13
285	8.01	9.12	8.04	18.83	8.14	8.15	8.03	8.04	17.59	17.28	8.14	9.14	18.57	16.05	7.98	16.77
286	4.21	4.84	4.23	9.87	4.28	4.28	4.22	4.23	9.31	9.03	4.28	4.85	9.69	8.40	4.19	8.82
287	3.61	4.16	3.64	8.47	3.69	3.72	3.62	3.62	8.10	7.75	3.69	4.17	8.39	7.28	3.60	7.62
288	5.36	6.16	5.40	12.59	5.47	5.48	5.38	5.39	11.87	11.53	5.47	6.18	12.40	10.72	5.34	11.26
289	2.18	2.50	2.20	5.12	2.22	2.23	2.19	2.19	4.82	4.68	2.22	2.51	5.04	4.36	2.17	4.57
290	3.04	3.47	3.04	7.14	3.08	3.06	3.05	3.06	6.62	6.54	3.08	3.48	6.98	6.04	3.03	6.33
291	25.18	29.14	25.53	59.07	25.81	26.07	25.26	25.33	56.32	54.09	25.81	29.21	58.40	50.45	25.05	53.17
292	42.30	49.03	42.93	99.21	43.42	44.00	42.43	42.52	95.14	90.83	43.42	49.14	98.32	84.99	42.11	89.56
293	6.11	7.13	6.25	14.35	6.32	6.48	6.13	6.14	14.01	13.14	6.32	7.15	14.34	12.40	6.09	13.08
294	1.71	1.95	1.73	4.06	1.74	1.75	1.72	1.72	3.85	3.72	1.74	1.95	4.04	3.53	1.70	3.63
295	0.90	1.03	0.90	2.10	0.91	0.91	0.90	0.90	2.01	1.92	0.91	1.03	2.07	1.81	0.89	1.89
296	12.76	14.90	13.01	29.83	13.15	13.42	12.79	12.82	28.86	27.31	13.15	14.93	29.62	25.53	12.70	27.08

297	5.93	6.85	6.02	13.93	6.09	6.17	5.95	5.96	13.33	12.77	6.09	6.86	13.83	11.96	5.90	12.56
298	20.50	23.84	20.87	47.98	21.11	21.49	20.56	20.60	46.16	43.96	21.11	23.90	47.64	41.03	20.40	43.44
299	5.18	6.00	5.21	12.03	5.27	5.29	5.19	5.20	11.19	11.02	5.27	6.01	11.73	10.01	5.16	10.73
300	39.01	45.06	39.52	91.61	39.96	40.34	39.14	39.23	87.31	83.89	39.96	45.17	90.63	78.38	38.82	82.41
301	5.52	6.40	5.52	12.76	5.58	5.56	5.53	5.54	11.75	11.67	5.58	6.41	12.31	10.50	5.51	11.31
302	8.61	10.15	8.74	19.86	8.84	8.95	8.64	8.66	18.77	18.18	8.84	10.18	19.35	16.42	8.56	17.89
303	12.47	14.37	12.63	29.28	12.78	12.94	12.50	12.53	27.89	26.85	12.78	14.39	29.06	25.09	12.42	26.36
304	6.88	7.96	6.92	16.08	7.00	7.00	6.90	6.92	15.17	14.69	7.00	7.98	15.72	13.60	6.84	14.38
305	27.45	32.02	27.96	64.21	28.24	28.62	27.56	27.64	61.50	58.77	28.24	32.12	63.40	54.58	27.28	57.99
306	16.10	18.94	16.40	37.28	16.60	16.95	16.14	16.17	35.70	34.15	16.60	18.97	36.72	31.28	16.04	33.79
307	7.96	9.28	8.13	18.68	8.23	8.41	7.98	8.00	18.21	17.11	8.23	9.30	18.66	16.14	7.93	17.01
308	2.01	2.32	2.02	4.69	2.04	2.04	2.02	2.02	4.35	4.30	2.04	2.32	4.57	3.92	2.00	4.17
309	21.07	24.40	21.42	49.45	21.67	22.04	21.12	21.17	47.61	45.31	21.67	24.45	49.21	42.53	20.98	44.75
310	5.30	6.06	5.32	12.47	5.38	5.34	5.32	5.34	11.61	11.42	5.38	6.08	12.21	10.58	5.27	11.07
311	20.04	23.15	19.96	46.35	20.18	19.92	20.10	20.14	42.19	42.38	20.18	23.20	44.46	37.95	19.94	40.84
312	9.11	10.42	9.12	21.31	9.23	9.20	9.13	9.15	19.66	19.54	9.23	10.44	20.82	17.89	9.08	18.89
313	75.17	86.92	76.32	176.16	77.10	77.79	75.46	75.70	166.20	161.56	77.10	87.19	173.69	149.19	74.69	158.05
314	27.79	32.24	28.19	65.08	28.49	28.80	27.88	27.95	62.10	59.58	28.49	32.33	64.27	55.45	27.64	58.62
315	10.15	11.91	10.37	23.64	10.49	10.73	10.18	10.20	22.90	21.65	10.49	11.94	23.45	20.12	10.11	21.51
316	16.99	19.32	16.98	39.92	17.16	16.99	17.05	17.09	36.72	36.58	17.16	19.37	38.97	33.68	16.90	35.26
317	16.91	19.99	17.22	39.23	17.42	17.76	16.95	16.99	38.19	35.80	17.42	20.04	38.64	33.24	16.84	35.70
318	1.33	1.55	1.34	3.06	1.36	1.36	1.34	1.34	2.77	2.81	1.36	1.55	2.95	2.47	1.33	2.71
319	3.80	4.35	3.79	8.86	3.83	3.79	3.81	3.82	8.09	8.11	3.83	4.36	8.58	7.36	3.79	7.81
320	3.34	3.89	3.41	7.84	3.45	3.52	3.35	3.36	7.61	7.18	3.45	3.89	7.81	6.76	3.33	7.12
321	6.53	7.60	6.56	15.05	6.64	6.64	6.55	6.56	13.79	13.80	6.64	7.61	14.53	12.28	6.50	13.36
322	1.15	1.31	1.16	2.72	1.17	1.17	1.16	1.16	2.56	2.49	1.17	1.32	2.69	2.34	1.15	2.43
323	3.30	3.78	3.31	7.72	3.35	3.34	3.30	3.31	7.22	7.07	3.35	3.79	7.57	6.53	3.28	6.88

324	26.44	30.76	26.86	61.71	27.18	27.62	26.51	26.56	59.01	56.55	27.18	30.82	61.06	52.44	26.33	55.75
325	15.33	17.76	15.50	35.73	15.68	15.81	15.37	15.41	33.58	32.76	15.68	17.79	35.09	30.04	15.26	32.02
326	96.97	112.31	98.89	228.31	100.00	101.95	97.25	97.48	221.28	209.21	100.00	112.57	228.17	197.71	96.51	207.18
327	46.84	54.62	47.61	109.32	48.15	48.92	46.97	47.07	104.90	100.08	48.15	54.74	108.08	92.97	46.63	98.86
328	70.34	81.98	71.94	165.24	72.77	74.55	70.53	70.69	161.58	151.33	72.77	82.16	165.41	143.19	70.03	150.68
329	14.79	16.77	14.71	34.77	14.87	14.63	14.83	14.87	31.85	31.82	14.87	16.81	33.82	29.33	14.72	30.60
330	14.86	17.36	15.11	34.54	15.28	15.56	14.89	14.92	32.95	31.65	15.28	17.39	34.07	29.12	14.80	31.21
331	0.59	0.65	0.59	1.41	0.60	0.60	0.59	0.59	1.27	1.30	0.60	0.65	1.41	1.21	0.59	1.24
332	3.91	4.50	3.95	9.17	4.00	4.04	3.92	3.92	8.73	8.40	4.00	4.51	9.08	7.85	3.89	8.24
333	2.04	2.43	2.08	4.69	2.10	2.14	2.05	2.05	4.46	4.29	2.10	2.44	4.56	3.86	2.04	4.24
334	9.41	10.87	9.50	21.95	9.61	9.69	9.44	9.46	20.56	20.13	9.61	10.90	21.55	18.46	9.38	19.64
335	6.73	7.69	6.76	15.78	6.84	6.84	6.75	6.76	14.67	14.48	6.84	7.71	15.50	13.35	6.70	14.04
336	1.52	1.75	1.53	3.57	1.55	1.54	1.53	1.53	3.37	3.26	1.55	1.75	3.51	3.04	1.52	3.19
337	4.72	5.54	4.78	10.89	4.84	4.91	4.73	4.74	10.30	9.97	4.84	5.55	10.64	9.05	4.71	9.81
338	1.37	1.58	1.39	3.21	1.41	1.42	1.38	1.38	2.99	2.95	1.41	1.59	3.16	2.69	1.37	2.87
339	4.25	4.90	4.28	9.90	4.33	4.35	4.26	4.27	9.16	9.09	4.33	4.91	9.68	8.25	4.24	8.81
340	12.24	14.26	12.49	28.73	12.63	12.89	12.28	12.31	27.91	26.31	12.63	14.29	28.64	24.77	12.19	26.11
341	5.00	5.85	5.11	11.70	5.17	5.29	5.01	5.02	11.40	10.71	5.17	5.86	11.66	10.05	4.98	10.66
342	11.80	13.87	12.09	27.56	12.23	12.56	11.83	11.85	27.03	25.23	12.23	13.89	27.51	23.71	11.76	25.20
343	2.71	3.16	2.75	6.31	2.78	2.82	2.72	2.73	5.95	5.78	2.78	3.17	6.19	5.29	2.70	5.67
344	5.86	6.87	5.96	13.57	6.03	6.14	5.87	5.88	12.88	12.44	6.03	6.88	13.33	11.34	5.83	12.25
345	13.19	15.18	13.31	30.95	13.47	13.59	13.22	13.24	29.40	28.35	13.47	15.20	30.61	26.49	13.14	27.79
346	7.72	8.93	7.72	17.89	7.81	7.75	7.74	7.76	16.38	16.37	7.81	8.94	17.25	14.71	7.69	15.82
347	1.12	1.29	1.13	2.62	1.15	1.16	1.12	1.12	2.52	2.40	1.15	1.30	2.60	2.25	1.11	2.37
348	6.08	7.09	6.21	14.25	6.28	6.43	6.09	6.10	13.91	13.05	6.28	7.10	14.24	12.32	6.05	12.99
349	16.38	19.17	16.68	38.27	16.88	17.23	16.42	16.45	37.25	35.00	16.88	19.20	38.02	32.84	16.32	34.81
350	1.18	1.35	1.18	2.76	1.20	1.20	1.18	1.18	2.58	2.53	1.20	1.35	2.71	2.33	1.17	2.46

351	2.55	3.00	2.57	5.86	2.60	2.60	2.56	2.57	5.42	5.36	2.60	3.00	5.64	4.77	2.54	5.22
352	8.96	10.36	9.06	20.98	9.17	9.26	8.98	9.00	19.97	19.21	9.17	10.38	20.72	17.89	8.93	18.87
353	14.23	16.38	14.35	33.38	14.52	14.60	14.27	14.30	31.60	30.57	14.52	16.41	32.93	28.48	14.17	29.92
354	3.11	3.57	3.12	7.26	3.15	3.15	3.12	3.12	6.73	6.66	3.15	3.57	7.10	6.10	3.10	6.45
355	13.54	15.80	13.72	31.67	13.88	14.05	13.57	13.60	30.68	28.91	13.88	15.83	31.30	27.16	13.48	28.68
356	4.61	5.34	4.68	10.80	4.74	4.82	4.62	4.63	10.42	9.89	4.74	5.35	10.74	9.29	4.59	9.78
357	3.83	4.37	3.83	8.98	3.87	3.85	3.84	3.85	8.33	8.23	3.87	4.38	8.78	7.60	3.81	7.96
358	1.06	1.21	1.06	2.48	1.07	1.06	1.06	1.06	2.30	2.27	1.07	1.21	2.43	2.10	1.05	2.20
359	11.28	13.20	11.45	26.21	11.58	11.76	11.31	11.33	25.02	23.99	11.58	13.23	25.78	22.08	11.23	23.66
360	0.99	1.12	0.99	2.32	1.00	1.00	0.99	0.99	2.18	2.13	1.00	1.12	2.29	1.99	0.98	2.07
361	16.71	19.32	16.92	39.26	17.11	17.30	16.75	16.79	37.74	35.91	17.11	19.36	38.93	33.80	16.64	35.43
362	2.58	2.94	2.57	6.05	2.60	2.58	2.58	2.59	5.59	5.54	2.60	2.94	5.90	5.11	2.56	5.35
363	6.68	7.85	6.79	15.49	6.86	6.96	6.70	6.72	14.77	14.17	6.86	7.87	15.18	12.98	6.65	13.98
364	11.57	13.42	11.73	27.03	11.87	12.03	11.60	11.62	25.71	24.78	11.87	13.44	26.71	22.95	11.52	24.35
365	4.90	5.79	4.96	11.26	5.02	5.08	4.91	4.92	10.63	10.29	5.02	5.80	10.93	9.26	4.88	10.13
366	8.78	10.17	8.87	20.53	8.97	9.03	8.81	8.83	19.46	18.78	8.97	10.19	20.18	17.41	8.75	18.42
367	35.59	41.45	36.28	83.38	36.69	37.39	35.70	35.78	80.55	76.36	36.69	41.54	82.90	71.52	35.43	75.62
368	14.68	17.15	14.95	34.31	15.13	15.44	14.71	14.74	33.28	31.40	15.13	17.18	34.09	29.41	14.62	31.18
369	3.39	3.95	3.46	7.95	3.50	3.59	3.40	3.41	7.76	7.28	3.50	3.96	7.94	6.87	3.38	7.24
370	14.17	16.52	14.46	33.20	14.63	14.94	14.21	14.24	32.25	30.41	14.63	16.55	33.09	28.58	14.11	30.19
371	2.48	2.91	2.49	5.69	2.52	2.52	2.49	2.49	5.25	5.20	2.52	2.91	5.47	4.62	2.47	5.06
372	0.77	0.89	0.77	1.77	0.78	0.78	0.77	0.77	1.65	1.62	0.78	0.90	1.72	1.46	0.76	1.58
373	9.32	10.82	9.49	21.88	9.60	9.76	9.35	9.37	21.16	20.04	9.60	10.85	21.78	18.85	9.28	19.83
374	0.56	0.64	0.56	1.31	0.57	0.58	0.56	0.56	1.25	1.20	0.57	0.65	1.29	1.12	0.56	1.18
375	0.93	1.08	0.95	2.18	0.96	0.97	0.94	0.94	2.04	2.00	0.96	1.08	2.14	1.83	0.93	1.95
376	4.88	5.59	4.90	11.46	4.95	4.93	4.90	4.91	10.65	10.50	4.95	5.60	11.22	9.69	4.86	10.18
377	12.13	14.02	12.27	28.40	12.41	12.53	12.16	12.19	26.98	26.02	12.41	14.05	28.04	24.19	12.07	25.53

378	9.23	10.74	9.32	21.47	9.43	9.51	9.25	9.27	20.35	19.64	9.43	10.76	21.06	18.09	9.19	19.29
379	26.75	31.20	27.18	62.45	27.50	27.95	26.82	26.87	60.06	57.16	27.50	31.26	61.79	53.22	26.65	56.52
380	3.35	3.81	3.35	7.87	3.39	3.37	3.36	3.36	7.27	7.21	3.39	3.81	7.71	6.67	3.34	6.97
381	9.88	11.28	9.85	23.09	9.96	9.86	9.91	9.93	21.18	21.14	9.96	11.30	22.43	19.32	9.84	20.38
382	3.56	4.19	3.61	8.21	3.65	3.70	3.56	3.57	7.83	7.51	3.65	4.20	8.03	6.85	3.54	7.42
383	15.22	17.66	15.42	35.58	15.60	15.81	15.25	15.28	34.02	32.58	15.60	17.69	35.18	30.33	15.16	32.09
384	4.26	4.89	4.29	9.98	4.34	4.36	4.27	4.28	9.31	9.16	4.34	4.90	9.81	8.43	4.24	8.90
385	3.22	3.75	3.28	7.55	3.32	3.39	3.23	3.23	7.34	6.92	3.32	3.75	7.53	6.51	3.21	6.86
386	2.83	3.26	2.85	6.63	2.89	2.91	2.83	2.84	6.30	6.07	2.89	3.27	6.55	5.67	2.82	5.96
387	6.77	7.82	6.87	15.94	6.95	7.05	6.78	6.80	15.43	14.59	6.95	7.83	15.90	13.83	6.74	14.43
388	2.45	2.84	2.49	5.76	2.52	2.55	2.46	2.46	5.51	5.27	2.52	2.84	5.70	4.93	2.44	5.19
389	4.80	5.65	4.87	11.12	4.93	5.01	4.81	4.82	10.76	10.16	4.93	5.66	10.94	9.40	4.78	10.09
390	0.83	0.94	0.83	1.95	0.84	0.83	0.83	0.83	1.82	1.79	0.84	0.94	1.92	1.67	0.82	1.73
391	1.04	1.23	1.04	2.35	1.05	1.04	1.04	1.04	2.14	2.15	1.05	1.23	2.23	1.86	1.03	2.08
392	5.24	5.98	5.24	12.22	5.30	5.27	5.26	5.27	11.09	11.23	5.30	5.99	11.88	10.13	5.22	10.77
393	1.71	1.95	1.70	3.99	1.73	1.72	1.71	1.71	3.66	3.66	1.73	1.95	3.89	3.34	1.71	3.53
394	2.03	2.33	2.02	4.71	2.04	2.01	2.04	2.04	4.24	4.31	2.04	2.33	4.52	3.86	2.02	4.13
395	7.95	9.03	7.89	18.61	7.98	7.86	7.97	7.98	17.00	17.04	7.98	9.05	18.06	15.61	7.91	16.37
396	7.28	8.29	7.22	17.01	7.31	7.20	7.29	7.31	15.54	15.56	7.31	8.30	16.47	14.22	7.25	14.97
397	9.83	11.16	9.78	23.05	9.89	9.73	9.86	9.89	20.97	21.12	9.89	11.19	22.36	19.29	9.78	20.25
398	4.48	5.13	4.45	10.43	4.50	4.43	4.49	4.50	9.47	9.55	4.50	5.14	10.05	8.63	4.46	9.16
399	16.60	18.88	16.55	38.92	16.74	16.56	16.65	16.68	35.74	35.65	16.74	18.92	37.92	32.75	16.54	34.35
400	6.34	7.23	6.33	14.87	6.40	6.35	6.36	6.37	13.75	13.61	6.40	7.25	14.51	12.55	6.31	13.16
401	7.12	8.14	7.13	16.70	7.21	7.16	7.14	7.16	15.51	15.28	7.21	8.16	16.32	14.12	7.08	14.81
402	1.57	1.78	1.55	3.66	1.57	1.55	1.57	1.57	3.33	3.35	1.57	1.78	3.55	3.06	1.56	3.22
403	5.06	5.74	5.03	11.88	5.09	5.01	5.08	5.09	10.83	10.88	5.09	5.75	11.54	9.98	5.04	10.44
404	5.22	5.97	5.19	12.19	5.25	5.17	5.24	5.25	11.14	11.14	5.25	5.98	11.77	10.15	5.20	10.73

405	2.94	3.34	2.91	6.88	2.95	2.91	2.95	2.95	6.29	6.30	2.95	3.34	6.68	5.77	2.94	6.05
406	1.98	2.26	1.97	4.62	1.99	1.96	1.99	1.99	4.18	4.23	1.99	2.27	4.45	3.82	1.98	4.05
407	1.32	1.53	1.31	3.05	1.33	1.31	1.33	1.33	2.79	2.79	1.33	1.53	2.92	2.50	1.32	2.69
408	5.31	6.06	5.31	12.47	5.37	5.33	5.33	5.34	11.53	11.42	5.37	6.07	12.18	10.53	5.29	11.04
409	3.87	4.41	3.84	9.04	3.89	3.83	3.88	3.89	8.23	8.28	3.89	4.42	8.75	7.53	3.86	7.95
410	1.03	1.19	1.02	2.36	1.03	1.02	1.03	1.03	2.13	2.16	1.03	1.19	2.25	1.91	1.02	2.08
411	4.35	4.92	4.32	10.23	4.37	4.30	4.36	4.37	9.34	9.37	4.37	4.93	9.96	8.63	4.33	8.99
412	1.80	2.06	1.78	4.20	1.81	1.78	1.80	1.81	3.86	3.83	1.81	2.06	4.06	3.51	1.79	3.70
413	1.85	2.10	1.83	4.32	1.85	1.83	1.85	1.85	3.93	3.95	1.85	2.10	4.18	3.61	1.84	3.80
414	1.77	2.01	1.75	4.13	1.78	1.75	1.77	1.78	3.76	3.78	1.78	2.01	4.00	3.45	1.76	3.63
415	2.99	3.40	2.96	6.99	3.00	2.95	2.99	3.00	6.42	6.39	3.00	3.41	6.78	5.87	2.97	6.16
416	1.81	2.08	1.79	4.21	1.82	1.79	1.81	1.82	3.88	3.84	1.82	2.09	4.05	3.51	1.80	3.72
417	3.48	3.97	3.46	8.13	3.50	3.44	3.49	3.50	7.42	7.44	3.50	3.97	7.87	6.79	3.47	7.15
418	4.37	5.03	4.35	10.14	4.40	4.33	4.39	4.40	9.19	9.28	4.40	5.04	9.74	8.32	4.35	8.91
419	2.34	2.72	2.35	5.39	2.37	2.37	2.34	2.35	4.97	4.94	2.37	2.73	5.21	4.42	2.33	4.79
420	3.07	3.52	3.05	7.14	3.08	3.03	3.08	3.08	6.53	6.52	3.08	3.53	6.87	5.92	3.05	6.29
421	2.87	3.25	2.84	6.71	2.88	2.83	2.87	2.88	6.11	6.14	2.88	3.26	6.51	5.62	2.85	5.90
422	1.42	1.66	1.41	3.22	1.42	1.40	1.42	1.42	2.87	2.95	1.42	1.66	3.03	2.53	1.41	2.82
423	4.44	5.05	4.40	10.37	4.46	4.39	4.45	4.46	9.45	9.50	4.46	5.06	10.05	8.67	4.42	9.12
424	2.15	2.45	2.14	5.04	2.16	2.13	2.16	2.16	4.62	4.61	2.16	2.46	4.89	4.23	2.15	4.44
425	2.52	2.86	2.50	5.90	2.53	2.49	2.52	2.53	5.41	5.40	2.53	2.87	5.73	4.96	2.51	5.20
426	5.80	6.55	5.76	13.66	5.83	5.74	5.82	5.83	12.47	12.51	5.83	6.56	13.31	11.54	5.78	12.00
427	6.84	7.69	6.79	16.15	6.87	6.76	6.86	6.87	14.75	14.81	6.87	7.70	15.79	13.72	6.81	14.19
428	6.10	6.94	6.06	14.28	6.13	6.03	6.12	6.13	13.01	13.07	6.13	6.95	13.83	11.94	6.08	12.55
429	4.07	4.66	4.04	9.48	4.09	4.03	4.08	4.09	8.64	8.67	4.09	4.67	9.14	7.86	4.05	8.34
430	2.30	2.63	2.29	5.38	2.31	2.28	2.31	2.31	4.94	4.92	2.31	2.63	5.21	4.51	2.29	4.74
431	3.75	4.25	3.72	8.77	3.76	3.71	3.76	3.76	7.94	8.04	3.76	4.26	8.50	7.31	3.73	7.69

432	1.75	2.03	1.74	4.01	1.76	1.73	1.75	1.76	3.63	3.67	1.76	2.03	3.82	3.24	1.74	3.53
433	6.13	6.96	6.09	14.35	6.16	6.06	6.15	6.16	13.07	13.14	6.16	6.98	13.91	12.01	6.11	12.61
434	7.03	7.94	6.98	16.55	7.06	6.95	7.05	7.06	15.14	15.16	7.06	7.96	16.13	14.01	7.01	14.56
435	4.09	4.73	4.09	9.51	4.14	4.11	4.10	4.11	8.81	8.69	4.14	4.74	9.21	7.91	4.08	8.44
436	2.24	2.58	2.23	5.21	2.25	2.22	2.25	2.25	4.76	4.76	2.25	2.58	5.01	4.31	2.23	4.59
437	19.93	22.73	19.79	46.54	20.02	19.71	19.98	20.02	42.50	42.57	20.02	22.78	45.02	38.83	19.86	40.95
438	4.52	5.14	4.48	10.57	4.54	4.47	4.53	4.54	9.68	9.67	4.54	5.15	10.25	8.86	4.50	9.31
439	3.94	4.47	3.92	9.26	3.96	3.90	3.95	3.96	8.44	8.48	3.96	4.48	8.99	7.78	3.92	8.14
440	6.25	7.12	6.20	14.60	6.28	6.18	6.27	6.28	13.31	13.36	6.28	7.13	14.13	12.18	6.23	12.84
441	5.38	6.12	5.34	12.59	5.41	5.32	5.40	5.41	11.48	11.52	5.41	6.14	12.20	10.53	5.36	11.07
442	3.69	4.20	3.66	8.63	3.71	3.65	3.70	3.71	7.89	7.90	3.71	4.21	8.37	7.23	3.67	7.60
443	4.33	4.97	4.30	10.09	4.35	4.28	4.34	4.35	9.27	9.21	4.35	4.98	9.73	8.41	4.31	8.90
444	4.00	4.55	3.97	9.34	4.02	3.95	4.01	4.02	8.48	8.55	4.02	4.56	9.03	7.77	3.98	8.20
445	2.03	2.33	2.02	4.72	2.04	2.01	2.04	2.04	4.29	4.32	2.04	2.34	4.54	3.89	2.03	4.15
446	2.26	2.58	2.25	5.27	2.27	2.24	2.27	2.27	4.76	4.83	2.27	2.59	5.09	4.36	2.26	4.63
447	2.46	2.81	2.44	5.74	2.47	2.43	2.47	2.47	5.23	5.25	2.47	2.81	5.55	4.78	2.45	5.05
448	3.66	4.13	3.64	8.59	3.68	3.62	3.67	3.68	7.78	7.89	3.68	4.14	8.35	7.20	3.65	7.54
449	4.38	4.98	4.35	10.24	4.40	4.33	4.39	4.40	9.35	9.37	4.40	4.99	9.92	8.57	4.36	9.01
450	5.22	5.94	5.18	12.22	5.24	5.16	5.23	5.24	11.19	11.18	5.24	5.95	11.86	10.26	5.20	10.76
451	8.40	9.52	8.34	19.69	8.44	8.30	8.42	8.44	17.97	18.03	8.44	9.54	19.12	16.54	8.36	17.31
452	8.89	10.15	8.89	20.87	8.99	8.93	8.92	8.94	19.33	19.11	8.99	10.17	20.40	17.64	8.86	18.49
453	8.20	9.29	8.14	19.23	8.24	8.11	8.22	8.24	17.54	17.61	8.24	9.31	18.68	16.15	8.16	16.90
454	7.13	8.18	7.17	16.73	7.25	7.26	7.15	7.16	15.72	15.32	7.25	8.20	16.45	14.22	7.10	14.93
455	6.29	7.13	6.25	14.75	6.32	6.22	6.30	6.32	13.45	13.51	6.32	7.14	14.33	12.39	6.26	12.97
456	3.98	4.52	3.96	9.34	4.00	3.94	3.99	4.00	8.53	8.55	4.00	4.53	9.07	7.84	3.96	8.21
457	10.93	12.37	10.81	25.57	10.95	10.79	10.94	10.95	23.32	23.41	10.95	12.38	24.83	21.48	10.91	22.47
458	16.45	18.62	16.28	38.50	16.49	16.24	16.47	16.49	35.12	35.26	16.49	18.64	37.40	32.34	16.41	33.85

459	7.70	8.88	7.71	17.96	7.80	7.78	7.72	7.73	16.77	16.42	7.80	8.90	17.51	15.09	7.67	15.99
460	6.78	7.68	6.73	15.90	6.81	6.70	6.80	6.81	14.51	14.56	6.81	7.70	15.45	13.36	6.75	13.98
461	4.30	4.93	4.27	9.99	4.32	4.25	4.31	4.32	9.11	9.13	4.32	4.95	9.61	8.26	4.28	8.79
462	3.89	4.48	3.86	9.01	3.91	3.85	3.90	3.91	8.19	8.23	3.91	4.49	8.64	7.40	3.87	7.93
463	5.43	6.15	5.39	12.73	5.45	5.37	5.44	5.45	11.58	11.66	5.45	6.17	12.35	10.66	5.40	11.18
464	16.32	18.49	16.20	38.27	16.39	16.14	16.36	16.39	34.91	35.05	16.39	18.53	37.17	32.15	16.25	33.64
465	8.37	9.56	8.39	19.65	8.48	8.43	8.40	8.42	18.23	18.00	8.48	9.59	19.22	16.62	8.33	17.43
466	2.47	2.83	2.45	5.76	2.48	2.45	2.48	2.48	5.28	5.26	2.48	2.84	5.56	4.80	2.46	5.08
467	7.62	8.65	7.56	17.86	7.65	7.53	7.64	7.65	16.33	16.34	7.65	8.66	17.34	15.01	7.59	15.71
468	1.77	2.03	1.75	4.11	1.77	1.75	1.77	1.77	3.82	3.75	1.77	2.04	3.97	3.45	1.76	3.64
469	4.90	5.55	4.86	11.49	4.92	4.84	4.91	4.92	10.48	10.52	4.92	5.56	11.16	9.65	4.87	10.10
470	25.15	28.52	25.03	59.08	25.30	24.89	25.23	25.30	53.89	54.10	25.30	28.60	57.38	49.63	25.01	51.93
471	28.65	32.50	28.51	67.30	28.82	28.36	28.75	28.82	61.39	61.63	28.82	32.58	65.37	56.53	28.50	59.16
472	30.54	35.12	30.56	71.33	30.93	30.85	30.60	30.65	66.73	65.22	30.93	35.18	69.68	60.22	30.44	63.52
473	2.63	2.99	2.61	6.15	2.64	2.60	2.63	2.64	5.62	5.63	2.64	3.00	5.96	5.15	2.61	5.41
474	2.16	2.45	2.13	5.05	2.16	2.13	2.16	2.16	4.63	4.61	2.16	2.45	4.90	4.25	2.15	4.44
475	2.58	2.93	2.56	6.06	2.59	2.55	2.59	2.59	5.52	5.55	2.59	2.93	5.88	5.09	2.57	5.32
476	23.75	27.19	23.85	55.74	24.11	24.05	23.83	23.89	51.92	51.06	24.11	27.26	54.63	47.18	23.63	49.56
477	4.19	4.74	4.15	9.81	4.20	4.14	4.20	4.20	8.95	8.99	4.20	4.75	9.53	8.24	4.17	8.63
478	2.84	3.23	2.81	6.63	2.85	2.80	2.84	2.85	6.06	6.06	2.85	3.23	6.42	5.55	2.83	5.83
479	1.08	1.24	1.07	2.51	1.08	1.07	1.08	1.08	2.27	2.29	1.08	1.24	2.41	2.06	1.08	2.20
480	32.96	37.66	33.02	77.39	33.39	33.21	33.06	33.15	71.87	70.87	33.39	37.75	75.74	65.50	32.80	68.67
481	8.77	10.02	8.78	20.58	8.88	8.83	8.80	8.82	19.11	18.85	8.88	10.04	20.14	17.42	8.74	18.26
482	0.88	1.00	0.88	2.06	0.89	0.87	0.88	0.89	1.86	1.88	0.89	1.01	1.99	1.70	0.88	1.80
483	1.84	2.09	1.82	4.30	1.85	1.82	1.84	1.85	3.91	3.93	1.85	2.09	4.16	3.59	1.83	3.78
484	1.77	2.03	1.76	4.13	1.78	1.76	1.78	1.78	3.74	3.78	1.78	2.04	3.98	3.41	1.77	3.63
485	0.94	1.07	0.93	2.19	0.94	0.93	0.94	0.94	2.01	2.01	0.94	1.07	2.13	1.84	0.93	1.93

486	0.24	0.28	0.24	0.57	0.25	0.24	0.24	0.24	0.53	0.52	0.25	0.28	0.56	0.48	0.24	0.50
487	1.65	1.89	1.64	3.83	1.66	1.63	1.65	1.66	3.47	3.50	1.66	1.90	3.68	3.15	1.64	3.36
488	3.18	3.62	3.16	7.45	3.20	3.15	3.19	3.20	6.80	6.82	3.20	3.62	7.22	6.24	3.17	6.55
489	2.29	2.60	2.28	5.40	2.30	2.27	2.30	2.30	4.98	4.93	2.30	2.61	5.25	4.57	2.29	4.76
490	1.06	1.21	1.06	2.49	1.07	1.05	1.06	1.07	2.28	2.27	1.07	1.21	2.41	2.09	1.06	2.19
491	4.94	5.63	4.93	11.60	4.98	4.89	4.96	4.98	10.61	10.61	4.98	5.64	11.25	9.73	4.90	10.21
492	2.87	3.29	2.85	6.70	2.89	2.84	2.88	2.89	6.15	6.12	2.89	3.29	6.48	5.60	2.86	5.91
493	4.74	5.43	4.73	11.11	4.78	4.70	4.76	4.78	10.21	10.14	4.78	5.45	10.74	9.30	4.72	9.79
494	3.71	4.28	3.72	8.66	3.76	3.75	3.72	3.73	8.02	7.93	3.76	4.29	8.43	7.24	3.70	7.69
495	12.61	14.30	12.54	29.61	12.68	12.48	12.65	12.68	27.01	27.12	12.68	14.34	28.76	24.88	12.55	26.03
496	4.02	4.56	3.99	9.43	4.04	3.98	4.03	4.04	8.61	8.64	4.04	4.57	9.16	7.92	4.01	8.29
497	7.13	8.08	7.07	16.71	7.16	7.05	7.14	7.16	15.24	15.30	7.16	8.09	16.23	14.04	7.10	14.69
498	4.13	4.68	4.10	9.69	4.15	4.08	4.14	4.15	8.84	8.87	4.15	4.69	9.41	8.14	4.11	8.51
499	3.41	3.89	3.38	7.95	3.42	3.37	3.42	3.42	7.27	7.27	3.42	3.90	7.68	6.63	3.39	7.00
500	3.95	4.52	3.92	9.20	3.97	3.90	3.96	3.97	8.43	8.41	3.97	4.53	8.88	7.66	3.93	8.10
501	5.34	6.10	5.30	12.45	5.36	5.28	5.35	5.36	11.36	11.39	5.36	6.11	12.03	10.36	5.32	10.95
502	6.38	7.28	6.33	14.89	6.41	6.31	6.39	6.41	13.61	13.61	6.41	7.30	14.39	12.42	6.35	13.11
503	3.34	3.81	3.32	7.80	3.36	3.30	3.35	3.36	7.12	7.14	3.36	3.82	7.54	6.51	3.33	6.86
504	30.27	34.32	30.09	71.05	30.43	29.95	30.36	30.43	64.81	65.07	30.43	34.40	69.02	59.69	30.12	62.46
505	35.91	40.65	35.67	84.37	36.08	35.52	36.01	36.08	77.02	77.26	36.08	40.73	82.05	71.05	35.76	74.17
506	17.15	19.41	16.98	40.15	17.19	16.94	17.17	17.19	36.62	36.76	17.19	19.44	39.00	33.72	17.11	35.29
507	2.12	2.41	2.11	4.99	2.13	2.10	2.13	2.13	4.56	4.57	2.13	2.41	4.85	4.20	2.11	4.39
508	1.38	1.58	1.37	3.20	1.39	1.36	1.38	1.39	2.91	2.93	1.39	1.59	3.08	2.64	1.37	2.82
509	2.35	2.67	2.33	5.50	2.36	2.32	2.35	2.36	5.03	5.03	2.36	2.67	5.34	4.62	2.34	4.84
510	1.59	1.80	1.58	3.73	1.60	1.57	1.60	1.60	3.41	3.42	1.60	1.81	3.63	3.14	1.58	3.28
511	5.02	5.79	5.07	11.79	5.13	5.16	5.04	5.05	11.17	10.80	5.13	5.80	11.63	10.06	5.00	10.57
512	2.31	2.66	2.33	5.43	2.35	2.36	2.32	2.33	5.10	4.97	2.35	2.67	5.33	4.61	2.30	4.84

513	0.22	0.25	0.21	0.51	0.22	0.21	0.22	0.22	0.46	0.47	0.22	0.25	0.49	0.43	0.22	0.45
514	1.59	1.84	1.60	3.72	1.62	1.61	1.60	1.60	3.48	3.40	1.62	1.84	3.62	3.12	1.59	3.31
515	6.98	7.93	6.99	16.43	7.08	7.05	7.00	7.01	15.24	15.07	7.08	7.95	16.16	13.98	6.96	14.58
516	6.96	7.92	6.92	16.29	6.99	6.88	6.98	6.99	14.87	14.91	6.99	7.93	15.79	13.64	6.93	14.33
517	1.72	2.00	1.71	3.94	1.73	1.70	1.72	1.73	3.52	3.60	1.73	2.00	3.73	3.14	1.71	3.45
518	9.34	10.67	9.34	21.90	9.45	9.39	9.37	9.39	20.26	20.06	9.45	10.69	21.39	18.47	9.31	19.40
519	1.32	1.54	1.31	3.07	1.33	1.31	1.33	1.33	2.87	2.79	1.33	1.55	2.94	2.55	1.32	2.72
520	2.95	3.34	2.93	6.88	2.96	2.91	2.95	2.96	6.20	6.31	2.96	3.35	6.65	5.70	2.93	6.03
521	3.61	4.09	3.58	8.46	3.62	3.57	3.62	3.62	7.72	7.75	3.62	4.10	8.22	7.11	3.59	7.44
522	7.00	7.93	6.95	16.41	7.03	6.92	7.02	7.03	14.93	15.03	7.03	7.95	15.92	13.75	6.97	14.41
523	18.72	21.23	18.63	43.97	18.83	18.53	18.78	18.83	40.11	40.27	18.83	21.29	42.71	36.94	18.61	38.65
524	2.53	2.87	2.51	5.92	2.54	2.50	2.53	2.54	5.41	5.41	2.54	2.88	5.74	4.96	2.51	5.21
525	1.85	2.11	1.84	4.32	1.86	1.83	1.85	1.86	3.96	3.95	1.86	2.11	4.19	3.62	1.84	3.81
526	8.57	9.72	8.51	20.11	8.61	8.48	8.60	8.61	18.35	18.42	8.61	9.74	19.54	16.89	8.54	17.68
527	13.14	15.05	13.03	30.60	13.19	12.99	13.17	13.19	28.02	27.95	13.19	15.07	29.52	25.46	13.09	26.95
528	6.19	7.00	6.15	14.50	6.22	6.12	6.21	6.22	13.04	13.31	6.22	7.01	14.06	12.06	6.17	12.69
529	5.39	6.10	5.37	12.69	5.43	5.35	5.41	5.42	11.61	11.62	5.43	6.11	12.37	10.72	5.36	11.17
530	1.64	1.88	1.63	3.82	1.65	1.62	1.64	1.65	3.46	3.50	1.65	1.88	3.68	3.15	1.63	3.36
531	0.83	0.95	0.83	1.93	0.83	0.82	0.83	0.83	1.74	1.77	0.83	0.95	1.86	1.60	0.83	1.70
532	10.47	11.89	10.45	24.64	10.55	10.37	10.51	10.55	22.47	22.56	10.55	11.93	23.93	20.70	10.39	21.66
533	5.21	5.94	5.22	12.23	5.28	5.26	5.22	5.23	11.37	11.21	5.28	5.95	12.00	10.38	5.18	10.86
534	1.69	1.94	1.68	3.93	1.70	1.67	1.69	1.70	3.59	3.59	1.70	1.94	3.78	3.26	1.68	3.46
535	1.31	1.50	1.30	3.06	1.32	1.30	1.32	1.32	2.79	2.80	1.32	1.51	2.95	2.54	1.31	2.69
536	21.77	24.81	21.78	51.12	22.03	21.88	21.83	21.88	47.28	46.84	22.03	24.86	50.01	43.22	21.68	45.28
537	5.15	5.85	5.11	12.06	5.17	5.09	5.16	5.17	11.03	11.04	5.17	5.86	11.71	10.13	5.13	10.61
538	26.79	30.38	26.65	62.91	26.94	26.52	26.88	26.94	57.39	57.61	26.94	30.46	61.11	52.85	26.66	55.30
539	1.53	1.73	1.52	3.60	1.54	1.52	1.54	1.54	3.29	3.30	1.54	1.74	3.51	3.04	1.53	3.17

540	2.91	3.34	2.89	6.80	2.93	2.88	2.92	2.93	6.26	6.21	2.93	3.35	6.57	5.69	2.90	6.00
541	2.24	2.54	2.23	5.26	2.25	2.22	2.25	2.25	4.80	4.82	2.25	2.55	5.11	4.42	2.23	4.63
542	10.39	11.81	10.31	24.33	10.43	10.27	10.41	10.43	22.27	22.26	10.43	11.83	23.61	20.43	10.35	21.42
543	8.89	10.29	8.90	20.68	9.01	8.99	8.91	8.92	19.41	18.88	9.01	10.30	20.13	17.37	8.86	18.45
544	9.71	11.04	9.64	22.73	9.75	9.60	9.73	9.75	20.81	20.80	9.75	11.06	22.05	19.09	9.67	20.01
545	10.04	11.40	9.94	23.46	10.07	9.92	10.06	10.07	21.42	21.47	10.07	11.41	22.75	19.65	10.02	20.63
546	10.29	11.72	10.18	23.99	10.31	10.16	10.30	10.31	22.00	21.92	10.31	11.73	23.22	20.09	10.26	21.13
547	14.13	16.13	13.97	32.91	14.16	13.95	14.14	14.16	30.21	30.07	14.16	16.14	31.83	27.53	14.10	29.00
548	7.46	8.54	7.40	17.40	7.49	7.37	7.48	7.49	15.98	15.89	7.49	8.55	16.81	14.54	7.44	15.34
549	2.27	2.58	2.25	5.32	2.28	2.24	2.27	2.28	4.86	4.86	2.28	2.58	5.16	4.46	2.26	4.68
550	10.56	12.02	10.46	24.65	10.59	10.43	10.57	10.59	22.57	22.54	10.59	12.04	23.87	20.64	10.53	21.70
551	6.10	6.97	6.05	14.23	6.13	6.03	6.12	6.13	12.98	13.01	6.13	6.98	13.74	11.84	6.08	12.52
552	11.74	13.31	11.66	27.54	11.80	11.61	11.77	11.80	25.12	25.22	11.80	13.33	26.75	23.14	11.70	24.21
553	3.92	4.47	3.92	9.20	3.97	3.94	3.93	3.94	8.53	8.42	3.97	4.48	8.99	7.78	3.91	8.16
554	7.49	8.49	7.44	17.59	7.53	7.41	7.51	7.53	16.06	16.10	7.53	8.51	17.09	14.79	7.46	15.46
555	13.07	14.74	12.95	30.77	13.11	12.92	13.09	13.11	28.21	28.17	13.11	14.76	30.03	26.12	13.04	27.07
556	9.71	10.95	9.63	22.86	9.75	9.60	9.73	9.75	20.90	20.95	9.75	10.97	22.30	19.36	9.68	20.10
557	9.46	10.64	9.42	22.42	9.52	9.37	9.49	9.52	20.57	20.54	9.52	10.67	21.95	19.14	9.41	19.72
558	4.43	5.01	4.39	10.44	4.45	4.38	4.44	4.45	9.60	9.55	4.45	5.01	10.19	8.88	4.42	9.19
559	6.82	7.73	6.77	15.99	6.85	6.74	6.83	6.85	14.59	14.64	6.85	7.74	15.53	13.43	6.79	14.06
560	12.70	14.39	12.62	29.82	12.77	12.57	12.74	12.77	27.19	27.31	12.77	14.43	28.97	25.05	12.64	26.21
561	4.70	5.33	4.67	11.02	4.72	4.65	4.71	4.72	10.06	10.10	4.72	5.34	10.71	9.26	4.68	9.69
562	3.28	3.70	3.25	7.73	3.29	3.24	3.28	3.29	7.14	7.07	3.29	3.71	7.56	6.60	3.27	6.82
563	2.58	2.94	2.58	6.03	2.61	2.59	2.59	2.59	5.53	5.53	2.61	2.95	5.88	5.04	2.57	5.33
564	2.33	2.64	2.32	5.48	2.35	2.31	2.34	2.35	5.02	5.02	2.35	2.65	5.33	4.62	2.32	4.82
565	7.82	8.86	7.76	18.34	7.85	7.73	7.84	7.85	16.73	16.79	7.85	8.88	17.81	15.40	7.78	16.12
566	11.33	12.82	11.21	26.49	11.35	11.19	11.34	11.35	24.09	24.27	11.35	12.84	25.71	22.19	11.31	23.27

567	4.55	5.14	4.51	10.67	4.57	4.50	4.56	4.57	9.71	9.78	4.57	5.15	10.38	8.97	4.54	9.37
568	6.71	7.57	6.65	15.81	6.73	6.63	6.73	6.73	14.52	14.47	6.73	7.58	15.43	13.43	6.70	13.92
569	21.56	24.46	21.40	50.51	21.65	21.31	21.61	21.65	46.08	46.25	21.65	24.50	49.03	42.38	21.47	44.41
570	24.27	27.82	24.36	56.93	24.64	24.61	24.34	24.39	53.24	52.12	24.64	27.88	55.85	48.29	24.17	50.70
571	10.15	11.44	10.04	23.86	10.17	10.02	10.16	10.17	21.92	21.84	10.17	11.45	23.29	20.27	10.13	21.01
572	7.22	8.18	7.16	16.93	7.25	7.14	7.24	7.25	15.44	15.51	7.25	8.20	16.45	14.22	7.20	14.88
573	3.40	3.88	3.36	7.90	3.40	3.35	3.40	3.40	7.23	7.21	3.40	3.88	7.62	6.58	3.39	6.95
574	2.45	2.81	2.43	5.67	2.46	2.42	2.45	2.46	5.16	5.18	2.46	2.82	5.44	4.66	2.44	4.99
575	1.69	1.91	1.67	3.96	1.69	1.67	1.69	1.69	3.61	3.62	1.69	1.92	3.84	3.32	1.68	3.48
576	2.79	3.18	2.77	6.54	2.81	2.76	2.80	2.81	5.97	5.99	2.81	3.18	6.34	5.47	2.78	5.75
577	6.54	7.49	6.50	15.28	6.57	6.47	6.56	6.57	14.08	13.95	6.57	7.51	14.78	12.80	6.52	13.48
578	1.71	1.98	1.69	3.93	1.71	1.69	1.71	1.71	3.57	3.59	1.71	1.98	3.75	3.20	1.70	3.46
579	1.99	2.29	1.97	4.60	1.99	1.96	1.99	1.99	4.17	4.20	1.99	2.29	4.41	3.77	1.98	4.04
580	6.86	7.78	6.82	16.11	6.90	6.79	6.88	6.90	14.69	14.75	6.90	7.80	15.65	13.53	6.83	14.16
581	1.28	1.47	1.27	2.98	1.29	1.27	1.28	1.29	2.72	2.72	1.29	1.47	2.87	2.47	1.27	2.62
582	1.26	1.44	1.25	2.94	1.26	1.24	1.26	1.26	2.70	2.69	1.26	1.44	2.85	2.46	1.25	2.59
583	1.14	1.31	1.13	2.64	1.14	1.13	1.14	1.14	2.41	2.41	1.14	1.32	2.53	2.17	1.13	2.32
584	3.41	3.86	3.39	8.02	3.43	3.38	3.42	3.43	7.34	7.35	3.43	3.87	7.81	6.78	3.40	7.06
585	8.22	9.32	8.16	19.28	8.26	8.13	8.24	8.26	17.59	17.66	8.26	9.34	18.73	16.20	8.19	16.95
586	15.09	17.42	15.15	35.16	15.33	15.34	15.13	15.16	32.80	32.19	15.33	17.45	34.32	29.48	15.03	31.34
587	11.86	13.52	11.77	27.71	11.91	11.73	11.89	11.91	25.29	25.35	11.91	13.55	26.81	23.13	11.82	24.37
588	8.73	9.90	8.66	20.46	8.77	8.63	8.75	8.77	18.68	18.74	8.77	9.92	19.87	17.19	8.70	17.99
589	5.03	5.70	4.99	11.80	5.05	4.97	5.04	5.05	10.76	10.80	5.05	5.71	11.46	9.91	5.01	10.37
590	3.70	4.20	3.69	8.67	3.74	3.71	3.71	3.71	7.98	7.95	3.74	4.21	8.47	7.31	3.68	7.67
591	24.77	28.31	24.85	58.21	25.11	24.97	24.86	24.93	54.05	53.30	25.11	28.39	56.96	49.26	24.63	51.65
592	5.29	5.99	5.25	12.41	5.31	5.23	5.30	5.31	11.32	11.36	5.31	6.01	12.05	10.42	5.27	10.90
593	4.68	5.33	4.66	10.96	4.71	4.63	4.70	4.71	9.96	10.04	4.71	5.34	10.61	9.14	4.66	9.63

594	2.36	2.67	2.34	5.52	2.37	2.33	2.36	2.37	5.01	5.06	2.37	2.68	5.36	4.62	2.35	4.85
595	4.88	5.53	4.84	11.44	4.90	4.82	4.89	4.90	10.44	10.48	4.90	5.54	11.11	9.61	4.86	10.06
596	33.87	38.38	33.62	79.43	34.02	33.49	33.95	34.02	72.45	72.74	34.02	38.46	77.15	66.72	33.73	69.82
597	15.83	18.04	15.70	36.98	15.89	15.65	15.86	15.89	33.84	33.82	15.89	18.07	35.80	30.94	15.77	32.55
598	4.15	4.73	4.11	9.69	4.16	4.10	4.16	4.16	8.89	8.86	4.16	4.73	9.39	8.13	4.13	8.54
599	21.53	24.41	21.40	50.54	21.64	21.30	21.59	21.64	46.10	46.28	21.64	24.47	49.09	42.46	21.43	44.43
600	4.59	5.21	4.56	10.77	4.61	4.54	4.61	4.61	9.83	9.86	4.61	5.22	10.46	9.05	4.58	9.47
601	8.41	9.53	8.35	19.72	8.45	8.31	8.43	8.45	17.99	18.06	8.45	9.55	19.16	16.57	8.37	17.34
602	8.22	9.31	8.16	19.27	8.25	8.13	8.24	8.25	17.58	17.65	8.25	9.33	18.72	16.19	8.18	16.94
603	8.37	9.50	8.31	19.63	8.41	8.28	8.40	8.41	17.90	17.98	8.41	9.51	19.06	16.48	8.34	17.26
604	2.06	2.35	2.04	4.80	2.07	2.04	2.07	2.07	4.34	4.39	2.07	2.35	4.63	3.97	2.05	4.21
605	6.36	7.19	6.31	14.93	6.39	6.29	6.37	6.39	13.61	13.67	6.39	7.21	14.51	12.56	6.33	13.12
606	29.80	33.81	29.61	69.88	29.95	29.48	29.88	29.95	63.75	63.98	29.95	33.89	67.84	58.65	29.68	61.44
607	19.36	21.93	19.24	45.46	19.46	19.15	19.42	19.46	41.49	41.63	19.46	21.98	44.19	38.24	19.28	39.97
608	31.92	35.93	31.67	75.28	32.05	31.56	32.00	32.05	68.89	68.97	32.05	36.00	73.54	63.94	31.81	66.19
609	9.04	10.38	9.10	21.23	9.21	9.22	9.07	9.09	19.95	19.44	9.21	10.41	20.88	18.06	9.00	18.96
610	1.22	1.38	1.22	2.86	1.23	1.22	1.22	1.22	2.66	2.62	1.23	1.39	2.81	2.44	1.21	2.54
611	6.66	7.53	6.61	15.64	6.69	6.58	6.68	6.69	14.26	14.32	6.69	7.55	15.21	13.16	6.63	13.74
612	1.50	1.74	1.49	3.44	1.51	1.48	1.50	1.51	3.07	3.15	1.51	1.74	3.26	2.75	1.49	3.01
613	3.04	3.49	3.04	7.12	3.08	3.06	3.05	3.06	6.61	6.51	3.08	3.49	6.94	6.00	3.03	6.32
614	8.98	10.15	8.93	21.12	9.03	8.88	9.01	9.03	19.25	19.35	9.03	10.18	20.55	17.79	8.93	18.56
615	5.92	6.71	5.87	13.87	5.94	5.85	5.93	5.94	12.68	12.69	5.94	6.73	13.47	11.66	5.89	12.20
616	8.51	9.63	8.45	19.98	8.55	8.42	8.53	8.55	18.23	18.30	8.55	9.65	19.42	16.81	8.47	17.56
617	14.57	16.48	14.39	34.06	14.59	14.38	14.58	14.59	31.07	31.19	14.59	16.49	33.08	28.61	14.55	29.94
618	29.64	33.49	29.44	69.78	29.78	29.32	29.72	29.78	63.84	63.90	29.78	33.56	68.00	59.02	29.51	61.37
619	5.20	5.95	5.16	12.12	5.22	5.14	5.21	5.22	11.06	11.08	5.22	5.96	11.69	10.07	5.18	10.66
620	4.55	5.16	4.52	10.68	4.57	4.50	4.56	4.57	9.74	9.78	4.57	5.17	10.37	8.97	4.53	9.39

621	3.75	4.25	3.73	8.79	3.77	3.71	3.76	3.77	7.99	8.06	3.77	4.26	8.53	7.36	3.74	7.72
622	5.43	6.20	5.40	12.69	5.46	5.37	5.44	5.46	11.61	11.60	5.46	6.21	12.27	10.60	5.40	11.17
623	2.04	2.31	2.02	4.78	2.05	2.01	2.04	2.05	4.36	4.38	2.05	2.31	4.64	4.01	2.03	4.20
624	3.40	3.85	3.37	7.96	3.41	3.36	3.40	3.41	7.26	7.29	3.41	3.86	7.74	6.69	3.39	7.00
625	9.72	11.00	9.63	22.76	9.75	9.60	9.73	9.75	20.76	20.84	9.75	11.02	22.11	19.12	9.69	20.01
626	38.38	43.95	38.53	90.11	38.97	38.88	38.50	38.59	84.13	82.52	38.97	44.05	88.38	76.43	38.20	80.18
627	1.65	1.87	1.64	3.87	1.66	1.63	1.65	1.66	3.53	3.54	1.66	1.87	3.76	3.25	1.65	3.40

Table Showing Resilience Index Values (RI) Computed Using the Weights Considered as part of the Model viz., from the Randomly Selected group from the 25 random groups, Randomly selected region from the four regions, Maximum Weights from regions and Random Groups for all the Participants

ID No.	RI- Random Group 22	RI- West India	RI- Maximum weights (Regions)	RI- Maximum weights (Random Groups)
001	4.15	6.36	2.04	2.04
002	8.25	12.95	4.11	4.11
003	7.58	11.79	3.72	3.72
004	3.07	4.68	1.51	1.51
005	5.65	8.75	2.74	2.74
006	23.25	36.39	11.33	11.33
007	3.92	6.11	1.91	1.91
008	5.68	8.59	2.76	2.76
009	1.92	2.95	0.93	0.93
010	6.08	9.25	2.97	2.97
011	2.15	3.43	1.04	1.04
012	8.58	13.14	4.22	4.22
013	8.79	13.49	4.32	4.32
014	5.60	8.48	2.72	2.72
015	2.34	3.55	1.14	1.14
016	3.38	5.36	1.63	1.63
017	18.22	28.40	8.81	8.81
018	73.71	118.31	35.16	35.16
019	12.55	19.07	6.12	6.12
020	10.00	15.68	4.87	4.87
021	27.63	42.17	13.57	13.57
022	1.38	2.13	0.67	0.67
023	7.84	12.15	3.83	3.83
024	8.37	12.70	4.08	4.08
025	8.52	13.13	4.13	4.13
026	15.91	24.68	7.67	7.67
027	7.90	12.22	3.81	3.81
028	8.42	12.96	4.13	4.13
029	1.95	3.00	0.97	0.97
030	7.65	11.88	3.67	3.67
031	7.33	11.51	3.52	3.52
032	1.77	2.70	0.87	0.87
033	9.58	14.62	4.70	4.70
034	1.16	1.77	0.57	0.57
035	6.02	9.21	2.94	2.94

036	10.65	16.56	5.15	5.15
037	4.15	6.30	2.02	2.02
038	46.69	72.23	22.62	22.62
039	6.88	10.70	3.33	3.33
040	10.20	15.77	5.05	5.05
041	2.91	4.42	1.42	1.42
042	34.69	52.68	16.92	16.92
043	27.19	41.38	13.29	13.29
044	3.60	5.60	1.74	1.74
045	12.49	18.97	6.10	6.10
046	19.86	31.88	9.60	9.60
047	0.95	1.45	0.47	0.47
048	0.93	1.41	0.45	0.45
049	6.56	9.93	3.19	3.19
050	6.26	9.55	3.08	3.08
051	18.48	28.12	9.00	9.00
052	7.18	11.10	3.48	3.48
053	2.56	3.92	1.25	1.25
054	18.60	28.24	9.05	9.05
055	2.99	4.56	1.46	1.46
056	10.27	15.64	5.00	5.00
057	6.80	10.40	3.33	3.33
058	4.08	6.19	1.99	1.99
059	7.30	11.60	3.52	3.52
060	25.88	39.59	12.80	12.80
061	29.20	45.57	14.22	14.22
062	1.55	2.39	0.78	0.78
063	1.09	1.67	0.53	0.53
064	3.92	6.36	1.92	1.92
065	16.00	24.66	7.91	7.91
066	11.72	18.12	5.72	5.72
067	0.72	1.10	0.36	0.36
068	12.83	19.70	6.23	6.23
069	10.84	16.90	5.31	5.31
070	16.12	25.46	7.85	7.85
071	3.91	6.02	1.94	1.94
072	3.08	4.73	1.48	1.48
073	7.95	12.25	3.87	3.87
074	20.49	31.80	9.86	9.86
075	7.19	11.08	3.47	3.47
076	3.63	5.61	1.82	1.82
077	2.32	3.55	1.13	1.13
078	2.49	3.93	1.22	1.22

079	20.03	30.80	9.87	9.87
080	8.56	13.21	4.16	4.16
081	7.41	11.67	3.60	3.60
082	1.55	2.38	0.75	0.75
083	7.83	11.94	3.83	3.83
084	1.53	2.30	0.74	0.74
085	12.76	19.35	6.20	6.20
086	18.31	27.82	8.92	8.92
087	4.98	7.56	2.42	2.42
088	8.01	12.27	3.93	3.93
089	15.01	23.96	7.28	7.28
090	21.19	32.24	10.34	10.34
091	3.83	5.85	1.87	1.87
092	4.18	6.47	2.03	2.03
093	17.12	26.03	8.39	8.39
094	7.61	11.54	3.72	3.72
095	9.84	14.95	4.78	4.78
096	13.18	20.42	6.37	6.37
097	10.30	15.94	4.98	4.98
098	5.52	8.73	2.68	2.68
099	15.55	23.65	7.58	7.58
100	21.97	34.57	10.59	10.59
101	5.38	8.28	2.68	2.68
102	28.56	43.44	13.95	13.95
103	6.75	10.28	3.30	3.30
104	36.32	56.76	17.53	17.53
105	2.16	3.27	1.05	1.05
106	2.78	4.33	1.36	1.36
107	8.58	13.12	4.24	4.24
108	9.28	14.13	4.54	4.54
109	32.55	49.41	15.86	15.86
110	10.94	16.61	5.33	5.33
111	32.73	52.07	15.64	15.64
112	18.99	28.94	9.33	9.33
113	9.17	13.93	4.47	4.47
114	2.87	4.36	1.40	1.40
115	5.78	9.02	2.82	2.82
116	18.87	29.07	9.12	9.12
117	8.57	13.10	4.22	4.22
118	5.36	8.20	2.56	2.56
119	17.84	27.77	8.66	8.66
120	38.13	58.96	18.43	18.43
121	10.90	16.57	5.31	5.31

122	2.24	3.48	1.08	1.08
123	11.19	16.94	5.42	5.42
124	9.05	13.72	4.41	4.41
125	14.65	22.22	7.10	7.10
126	28.46	43.67	14.06	14.06
127	5.16	7.82	2.52	2.52
128	1.88	2.85	0.91	0.91
129	7.64	11.59	3.72	3.72
130	3.16	4.81	1.55	1.55
131	39.96	60.71	19.48	19.48
132	28.45	44.71	13.76	13.76
133	8.05	12.49	3.86	3.86
134	19.29	30.09	9.37	9.37
135	9.52	14.74	4.63	4.63
136	21.84	33.24	10.69	10.69
137	4.03	6.15	1.96	1.96
138	6.72	10.66	3.23	3.23
139	15.32	24.17	7.33	7.33
140	4.36	6.65	2.15	2.15
141	48.31	77.51	23.08	23.08
142	4.84	7.59	2.30	2.30
143	3.36	5.19	1.62	1.62
144	30.96	48.33	15.02	15.02
145	3.68	5.71	1.79	1.79
146	12.07	19.08	5.82	5.82
147	9.89	15.53	4.73	4.73
148	11.24	17.59	5.50	5.50
149	21.85	33.19	10.64	10.64
150	1.52	2.34	0.73	0.73
151	3.16	4.91	1.52	1.52
152	14.04	22.30	6.80	6.80
153	2.51	3.80	1.22	1.22
154	10.15	15.43	4.95	4.95
155	2.16	3.38	1.08	1.08
156	39.79	63.79	19.16	19.16
157	9.00	14.05	4.40	4.40
158	8.52	13.32	4.23	4.23
159	1.84	2.95	0.90	0.90
160	8.22	12.63	4.05	4.05
161	41.17	65.18	19.69	19.69
162	4.67	7.27	2.27	2.27
163	22.80	36.26	10.95	10.95
164	25.04	38.19	12.26	12.26

165	16.52	25.65	7.94	7.94
166	12.01	18.19	5.86	5.86
167	3.24	4.94	1.58	1.58
168	9.72	14.81	4.76	4.76
169	18.28	27.79	8.91	8.91
170	14.24	21.64	6.95	6.95
171	18.32	28.90	8.82	8.82
172	15.22	23.14	7.44	7.44
173	57.07	91.06	27.22	27.22
174	44.55	69.67	21.38	21.38
175	8.69	13.67	4.22	4.22
176	0.94	1.46	0.45	0.45
177	1.02	1.54	0.49	0.49
178	53.08	81.67	25.74	25.74
179	0.60	0.93	0.29	0.29
180	1.39	2.13	0.66	0.66
181	2.19	3.44	1.08	1.08
182	11.61	17.64	5.66	5.66
183	6.21	9.58	3.00	3.00
184	10.14	15.39	4.94	4.94
185	41.80	64.82	20.25	20.25
186	16.81	26.13	8.13	8.13
187	24.88	37.91	12.12	12.12
188	31.84	48.39	15.53	15.53
189	19.24	29.99	9.33	9.33
190	38.64	59.86	18.73	18.73
191	67.59	105.08	32.76	32.76
192	3.96	6.01	1.93	1.93
193	1.43	2.27	0.69	0.69
194	40.92	65.35	19.66	19.66
195	2.17	3.46	1.09	1.09
196	7.30	11.56	3.54	3.54
197	2.72	4.14	1.33	1.33
198	3.15	4.83	1.56	1.56
199	5.77	8.93	2.91	2.91
200	20.34	31.65	10.00	10.00
201	2.90	4.49	1.40	1.40
202	2.41	3.66	1.17	1.17
203	2.61	4.03	1.26	1.26
204	1.41	2.20	0.68	0.68
205	1.32	2.03	0.64	0.64
206	30.33	46.06	14.77	14.77
207	3.59	5.93	1.71	1.71

208	28.81	44.67	13.88	13.88
209	28.88	45.51	13.83	13.83
210	6.02	9.92	2.84	2.84
211	31.72	50.54	15.17	15.17
212	36.30	59.13	17.29	17.29
213	30.00	48.76	14.32	14.32
214	5.95	9.48	2.89	2.89
215	17.67	28.44	8.51	8.51
216	18.45	28.87	8.84	8.84
217	5.45	9.16	2.63	2.63
218	15.12	23.84	7.24	7.24
219	1.75	2.85	0.84	0.84
220	8.10	12.70	3.89	3.89
221	9.95	15.59	4.78	4.78
222	13.19	21.19	6.27	6.27
223	20.43	32.29	9.80	9.80
224	3.05	4.75	1.46	1.46
225	1.89	2.99	0.95	0.95
226	7.88	13.09	3.75	3.75
227	3.82	6.18	1.80	1.80
228	7.19	11.11	3.47	3.47
229	2.60	4.02	1.28	1.28
230	4.69	7.40	2.30	2.30
231	27.73	43.79	13.26	13.26
232	31.86	50.59	15.37	15.37
233	34.78	53.83	16.89	16.89
234	14.97	23.26	7.21	7.21
235	2.35	3.81	1.17	1.17
236	2.31	3.65	1.11	1.11
237	2.72	4.41	1.28	1.28
238	21.05	32.54	10.17	10.17
239	21.30	34.08	10.15	10.15
240	17.05	27.32	8.12	8.12
241	5.31	8.54	2.53	2.53
242	14.42	23.21	6.85	6.85
243	6.80	10.84	3.27	3.27
244	13.19	20.91	6.33	6.33
245	6.80	10.65	3.28	3.28
246	2.92	4.57	1.40	1.40
247	2.32	3.63	1.12	1.12
248	45.67	73.75	21.73	21.73
249	38.10	59.13	18.36	18.36
250	2.42	3.66	1.17	1.17

251	1.04	1.66	0.50	0.50
252	3.12	5.03	1.47	1.47
253	0.99	1.51	0.48	0.48
254	10.61	16.80	5.13	5.13
255	13.55	21.64	6.44	6.44
256	16.78	27.18	7.90	7.90
257	18.95	28.91	9.25	9.25
258	18.32	29.17	8.73	8.73
259	3.51	5.48	1.66	1.66
260	6.60	10.42	3.21	3.21
261	9.69	15.66	4.70	4.70
262	4.30	6.72	2.07	2.07
263	18.01	28.85	8.52	8.52
264	72.43	116.69	34.33	34.33
265	37.97	61.46	18.01	18.01
266	3.71	6.01	1.80	1.80
267	9.87	15.90	4.64	4.64
268	9.88	15.24	4.80	4.80
269	8.97	14.49	4.25	4.25
270	159.25	262.13	75.32	75.32
271	16.19	24.90	7.85	7.85
272	56.12	89.17	26.75	26.75
273	1.68	2.66	0.85	0.85
274	2.52	4.06	1.18	1.18
275	74.48	120.88	35.17	35.17
276	9.77	15.13	4.77	4.77
277	1.33	2.09	0.64	0.64
278	6.00	9.67	2.93	2.93
279	2.33	3.70	1.11	1.11
280	7.74	12.65	3.65	3.65
281	42.72	69.00	20.40	20.40
282	21.71	34.05	10.52	10.52
283	3.66	5.84	1.74	1.74
284	23.13	36.87	10.99	10.99
285	16.77	26.44	8.04	8.04
286	8.82	13.79	4.23	4.23
287	7.62	12.10	3.62	3.62
288	11.26	17.75	5.39	5.39
289	4.57	7.21	2.19	2.19
290	6.33	9.79	3.06	3.06
291	53.17	85.08	25.33	25.33
292	89.56	144.00	42.52	42.52
293	13.08	21.45	6.14	6.14

294	3.63	5.70	1.72	1.72
295	1.89	2.91	0.90	0.90
296	27.08	44.15	12.82	12.82
297	12.56	20.22	5.96	5.96
298	43.44	70.70	20.60	20.60
299	10.73	17.08	5.20	5.20
300	82.41	131.62	39.23	39.23
301	11.31	17.66	5.54	5.54
302	17.89	29.06	8.66	8.66
303	26.36	42.38	12.53	12.53
304	14.38	22.48	6.92	6.92
305	57.99	93.67	27.64	27.64
306	33.79	55.65	16.17	16.17
307	17.01	27.82	8.00	8.00
308	4.17	6.55	2.02	2.02
309	44.75	72.49	21.17	21.17
310	11.07	17.14	5.34	5.34
311	40.84	62.79	20.14	20.14
312	18.89	29.55	9.15	9.15
313	158.05	254.35	75.70	75.70
314	58.62	93.95	27.95	27.95
315	21.51	35.38	10.20	10.20
316	35.26	54.31	17.09	17.09
317	35.70	57.91	16.99	16.99
318	2.71	4.39	1.34	1.34
319	7.81	12.06	3.82	3.82
320	7.12	11.59	3.36	3.36
321	13.36	21.29	6.56	6.56
322	2.43	3.80	1.16	1.16
323	6.88	10.77	3.31	3.31
324	55.75	90.60	26.56	26.56
325	32.02	51.44	15.41	15.41
326	207.18	336.89	97.48	97.48
327	98.86	160.20	47.07	47.07
328	150.68	247.10	70.69	70.69
329	30.60	46.36	14.87	14.87
330	31.21	51.02	14.92	14.92
331	1.24	1.97	0.59	0.59
332	8.24	13.17	3.92	3.92
333	4.24	6.97	2.05	2.05
334	19.64	31.49	9.46	9.46
335	14.04	22.13	6.76	6.76
336	3.19	4.96	1.53	1.53

337	9.81	15.93	4.74	4.74
338	2.87	4.68	1.38	1.38
339	8.81	14.07	4.27	4.27
340	26.11	42.53	12.31	12.31
341	10.66	17.50	5.02	5.02
342	25.20	41.62	11.85	11.85
343	5.67	9.19	2.73	2.73
344	12.25	20.11	5.88	5.88
345	27.79	44.23	13.24	13.24
346	15.82	24.66	7.76	7.76
347	2.37	3.81	1.12	1.12
348	12.99	21.27	6.10	6.10
349	34.81	56.59	16.45	16.45
350	2.46	3.89	1.18	1.18
351	5.22	8.29	2.57	2.57
352	18.87	30.13	9.00	9.00
353	29.92	47.40	14.30	14.30
354	6.45	10.14	3.12	3.12
355	28.68	45.67	13.60	13.60
356	9.78	15.82	4.63	4.63
357	7.96	12.32	3.85	3.85
358	2.20	3.42	1.06	1.06
359	23.66	38.37	11.33	11.33
360	2.07	3.21	0.99	0.99
361	35.43	56.43	16.79	16.79
362	5.35	8.25	2.59	2.59
363	13.98	22.64	6.72	6.72
364	24.35	39.34	11.62	11.62
365	10.13	16.44	4.92	4.92
366	18.42	29.24	8.83	8.83
367	75.62	123.13	35.78	35.78
368	31.18	50.79	14.74	14.74
369	7.24	11.86	3.41	3.41
370	30.19	49.32	14.24	14.24
371	5.06	8.02	2.49	2.49
372	1.58	2.52	0.77	0.77
373	19.83	32.11	9.37	9.37
374	1.18	1.87	0.56	0.56
375	1.95	3.16	0.94	0.94
376	10.18	15.84	4.91	4.91
377	25.53	40.82	12.19	12.19
378	19.29	30.78	9.27	9.27
379	56.52	91.50	26.87	26.87

380	6.97	10.81	3.36	3.36
381	20.38	31.36	9.93	9.93
382	7.42	12.03	3.57	3.57
383	32.09	51.65	15.28	15.28
384	8.90	14.16	4.28	4.28
385	6.86	11.19	3.23	3.23
386	5.96	9.48	2.84	2.84
387	14.43	23.15	6.80	6.80
388	5.19	8.32	2.46	2.46
389	10.09	16.30	4.82	4.82
390	1.73	2.68	0.83	0.83
391	2.08	3.29	1.04	1.04
392	10.77	16.93	5.27	5.27
393	3.53	5.50	1.71	1.71
394	4.13	6.33	2.04	2.04
395	16.37	24.85	7.98	7.98
396	14.97	22.72	7.31	7.31
397	20.25	30.84	9.89	9.89
398	9.16	13.98	4.50	4.50
399	34.35	52.76	16.68	16.68
400	13.16	20.27	6.37	6.37
401	14.81	22.93	7.16	7.16
402	3.22	4.89	1.57	1.57
403	10.44	15.86	5.09	5.09
404	10.73	16.29	5.25	5.25
405	6.05	9.17	2.95	2.95
406	4.05	6.19	1.99	1.99
407	2.69	4.09	1.33	1.33
408	11.04	17.04	5.34	5.34
409	7.95	12.10	3.89	3.89
410	2.08	3.19	1.03	1.03
411	8.99	13.65	4.37	4.37
412	3.70	5.59	1.81	1.81
413	3.80	5.77	1.85	1.85
414	3.63	5.52	1.78	1.78
415	6.16	9.32	3.00	3.00
416	3.72	5.61	1.82	1.82
417	7.15	10.86	3.50	3.50
418	8.91	13.63	4.40	4.40
419	4.79	7.60	2.35	2.35
420	6.29	9.54	3.08	3.08
421	5.90	8.96	2.88	2.88
422	2.82	4.38	1.42	1.42

423	9.12	13.86	4.46	4.46
424	4.44	6.73	2.16	2.16
425	5.20	7.87	2.53	2.53
426	12.00	18.21	5.83	5.83
427	14.19	21.51	6.87	6.87
428	12.55	19.08	6.13	6.13
429	8.34	12.68	4.09	4.09
430	4.74	7.18	2.31	2.31
431	7.69	11.75	3.76	3.76
432	3.53	5.41	1.76	1.76
433	12.61	19.18	6.16	6.16
434	14.56	22.05	7.06	7.06
435	8.44	13.07	4.11	4.11
436	4.59	6.98	2.25	2.25
437	40.95	62.19	20.02	20.02
438	9.31	14.10	4.54	4.54
439	8.14	12.37	3.96	3.96
440	12.84	19.50	6.28	6.28
441	11.07	16.82	5.41	5.41
442	7.60	11.53	3.71	3.71
443	8.90	13.46	4.35	4.35
444	8.20	12.50	4.02	4.02
445	4.15	6.33	2.04	2.04
446	4.63	7.07	2.27	2.27
447	5.05	7.68	2.47	2.47
448	7.54	11.50	3.68	3.68
449	9.01	13.68	4.40	4.40
450	10.76	16.31	5.24	5.24
451	17.31	26.29	8.44	8.44
452	18.49	28.59	8.94	8.94
453	16.90	25.67	8.24	8.24
454	14.93	23.47	7.16	7.16
455	12.97	19.70	6.32	6.32
456	8.21	12.47	4.00	4.00
457	22.47	34.09	10.95	10.95
458	33.85	51.35	16.49	16.49
459	15.99	24.88	7.73	7.73
460	13.98	21.23	6.81	6.81
461	8.79	13.38	4.32	4.32
462	7.93	12.09	3.91	3.91
463	11.18	17.01	5.45	5.45
464	33.64	51.09	16.39	16.39
465	17.43	27.05	8.42	8.42

466	5.08	7.69	2.48	2.48
467	15.71	23.82	7.65	7.65
468	3.64	5.47	1.77	1.77
469	10.10	15.34	4.92	4.92
470	51.93	78.93	25.30	25.30
471	59.16	89.91	28.82	28.82
472	63.52	98.72	30.65	30.65
473	5.41	8.22	2.64	2.64
474	4.44	6.71	2.16	2.16
475	5.32	8.08	2.59	2.59
476	49.56	77.43	23.89	23.89
477	8.63	13.10	4.20	4.20
478	5.83	8.85	2.85	2.85
479	2.20	3.36	1.08	1.08
480	68.67	106.52	33.15	33.15
481	18.26	28.30	8.82	8.82
482	1.80	2.76	0.89	0.89
483	3.78	5.75	1.85	1.85
484	3.63	5.54	1.78	1.78
485	1.93	2.92	0.94	0.94
486	0.50	0.78	0.24	0.24
487	3.36	5.14	1.66	1.66
488	6.55	9.95	3.20	3.20
489	4.76	7.17	2.30	2.30
490	2.19	3.32	1.07	1.07
491	10.21	15.51	4.98	4.98
492	5.91	8.94	2.89	2.89
493	9.79	14.82	4.78	4.78
494	7.69	12.00	3.73	3.73
495	26.03	39.56	12.68	12.68
496	8.29	12.59	4.04	4.04
497	14.69	22.30	7.16	7.16
498	8.51	12.93	4.15	4.15
499	7.00	10.62	3.42	3.42
500	8.10	12.29	3.97	3.97
501	10.95	16.65	5.36	5.36
502	13.11	19.89	6.41	6.41
503	6.86	10.42	3.36	3.36
504	62.46	94.89	30.43	30.43
505	74.17	112.57	36.08	36.08
506	35.29	53.54	17.19	17.19
507	4.39	6.65	2.13	2.13
508	2.82	4.29	1.39	1.39

509	4.84	7.34	2.36	2.36
510	3.28	4.99	1.60	1.60
511	10.57	16.77	5.05	5.05
512	4.84	7.59	2.33	2.33
513	0.45	0.68	0.22	0.22
514	3.31	5.15	1.60	1.60
515	14.58	22.75	7.01	7.01
516	14.33	21.77	6.99	6.99
517	3.45	5.33	1.73	1.73
518	19.40	30.07	9.39	9.39
519	2.72	4.08	1.33	1.33
520	6.03	9.23	2.96	2.96
521	7.44	11.30	3.62	3.62
522	14.41	21.93	7.03	7.03
523	38.65	58.76	18.83	18.83
524	5.21	7.90	2.54	2.54
525	3.81	5.77	1.86	1.86
526	17.68	26.85	8.61	8.61
527	26.95	40.86	13.19	13.19
528	12.69	19.45	6.22	6.22
529	11.17	17.03	5.42	5.42
530	3.36	5.13	1.65	1.65
531	1.70	2.60	0.83	0.83
532	21.66	32.95	10.55	10.55
533	10.86	16.94	5.23	5.23
534	3.46	5.25	1.70	1.70
535	2.69	4.09	1.32	1.32
536	45.28	70.13	21.88	21.88
537	10.61	16.10	5.17	5.17
538	55.30	84.03	26.94	26.94
539	3.17	4.81	1.54	1.54
540	6.00	9.06	2.93	2.93
541	4.63	7.03	2.25	2.25
542	21.42	32.45	10.43	10.43
543	18.45	28.69	8.92	8.92
544	20.01	30.32	9.75	9.75
545	20.63	31.29	10.07	10.07
546	21.13	31.96	10.31	10.31
547	29.00	43.85	14.16	14.16
548	15.34	23.20	7.49	7.49
549	4.68	7.10	2.28	2.28
550	21.70	32.86	10.59	10.59
551	12.52	19.02	6.13	6.13

552	24.21	36.77	11.80	11.80
553	8.16	12.63	3.94	3.94
554	15.46	23.47	7.53	7.53
555	27.07	40.92	13.11	13.11
556	20.10	30.45	9.75	9.75
557	19.72	29.82	9.52	9.52
558	9.19	13.87	4.45	4.45
559	14.06	21.35	6.85	6.85
560	26.21	39.82	12.77	12.77
561	9.69	14.72	4.72	4.72
562	6.82	10.26	3.29	3.29
563	5.33	8.31	2.59	2.59
564	4.82	7.31	2.35	2.35
565	16.12	24.48	7.85	7.85
566	23.27	35.36	11.35	11.35
567	9.37	14.24	4.57	4.57
568	13.92	21.01	6.73	6.73
569	44.41	67.44	21.65	21.65
570	50.70	79.23	24.39	24.39
571	21.01	31.70	10.17	10.17
572	14.88	22.59	7.25	7.25
573	6.95	10.53	3.40	3.40
574	4.99	7.59	2.46	2.46
575	3.48	5.28	1.69	1.69
576	5.75	8.73	2.81	2.81
577	13.48	20.36	6.57	6.57
578	3.46	5.28	1.71	1.71
579	4.04	6.17	1.99	1.99
580	14.16	21.51	6.90	6.90
581	2.62	3.98	1.29	1.29
582	2.59	3.92	1.26	1.26
583	2.32	3.53	1.14	1.14
584	7.06	10.70	3.43	3.43
585	16.95	25.74	8.26	8.26
586	31.34	49.30	15.16	15.16
587	24.37	37.01	11.91	11.91
588	17.99	27.31	8.77	8.77
589	10.37	15.75	5.05	5.05
590	7.67	11.89	3.71	3.71
591	51.65	80.14	24.93	24.93
592	10.90	16.56	5.31	5.31
593	9.63	14.67	4.71	4.71
594	4.85	7.39	2.37	2.37

595	10.06	15.28	4.90	4.90
596	69.82	106.03	34.02	34.02
597	32.55	49.35	15.89	15.89
598	8.54	12.92	4.16	4.16
599	44.43	67.50	21.64	21.64
600	9.47	14.38	4.61	4.61
601	17.34	26.33	8.45	8.45
602	16.94	25.73	8.25	8.25
603	17.26	26.21	8.41	8.41
604	4.21	6.43	2.07	2.07
605	13.12	19.92	6.39	6.39
606	61.44	93.32	29.95	29.95
607	39.97	60.69	19.46	19.46
608	66.19	100.20	32.05	32.05
609	18.96	29.80	9.09	9.09
610	2.54	3.92	1.22	1.22
611	13.74	20.86	6.69	6.69
612	3.01	4.65	1.51	1.51
613	6.32	9.78	3.06	3.06
614	18.56	28.21	9.03	9.03
615	12.20	18.50	5.94	5.94
616	17.56	26.66	8.55	8.55
617	29.94	45.39	14.59	14.59
618	61.37	92.98	29.78	29.78
619	10.66	16.21	5.22	5.22
620	9.39	14.26	4.57	4.57
621	7.72	11.76	3.77	3.77
622	11.17	16.94	5.46	5.46
623	4.20	6.38	2.05	2.05
624	7.00	10.63	3.41	3.41
625	20.01	30.36	9.75	9.75
626	80.18	125.14	38.59	38.59
627	3.40	5.16	1.66	1.66

Categorization of Resilience Index (RI) Scores Based on Non-Resilient, Potentially Resilient and Resilient grouping of all the Participants

S. No.	Non-Resilient RI Scores	Potentially Resilient RI Scores	Resilient RI Scores
1	2.04	35.16	75.32
2	4.11	27.22	75.70
3	3.72	32.76	97.48
4	1.51	34.33	47.07
5	2.74	26.75	70.69
6	11.33	35.17	
7	1.91	42.52	
8	2.76	39.23	
9	0.93	27.64	
10	2.97	27.95	
11	1.04	26.56	
12	4.22	35.78	
13	4.32	26.87	
14	2.72	28.82	
15	1.14	30.65	
16	1.63	33.15	
17	8.81	30.43	
18	6.12	36.08	
19	4.87	26.94	
20	13.57	34.02	
21	0.67	29.95	
22	3.83	32.05	
23	4.08	29.78	
24	4.13	38.59	
25	7.67		
26	3.81		
27	4.13		
28	0.97		
29	3.67		
30	3.52		
31	0.87		
32	4.70		
33	0.57		
34	2.94		
35	5.15		
36	2.02		
37	22.62		
38	3.33		
39	5.05		
40	1.42		
41	16.92		
42	13.29		
43	1.74		

44	6.10		
45	9.60		
46	0.47		
47	0.45		
48	3.19		
49	3.08		
50	9.00		
51	3.48		
52	1.25		
53	9.05		
54	1.46		
55	5.00		
56	3.33		
57	1.99		
58	3.52		
59	12.80		
60	14.22		
61	0.78		
62	0.53		
63	1.92		
64	7.91		
65	5.72		
66	0.36		
67	6.23		
68	5.31		
69	7.85		
70	1.94		
71	1.48		
72	3.87		
73	9.86		
74	3.47		
75	1.82		
76	1.13		
77	1.22		
78	9.87		
79	4.16		
80	3.60		
81	0.75		
82	3.83		
83	0.74		
84	6.20		
85	8.92		
86	2.42		
87	3.93		
88	7.28		
89	10.34		

90	1.87		
91	2.03		
92	8.39		
93	3.72		
94	4.78		
95	6.37		
96	4.98		
97	2.68		
98	7.58		
99	10.59		
100	2.68		
101	13.95		
102	3.30		
103	17.53		
104	1.05		
105	1.36		
106	4.24		
107	4.54		
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Research Paper

Child's Understanding of the Mother: A Quantitative Index

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Roshni Monteiro⁴

ABSTRACT

Over the years, the parental role or the process of parenting has transformed reflective in the way parents view and understand their children. Conversely, the way children understand their parents is also very crucial in exalting the rights of children and empowering their agency. An instrument was specially constructed to compare children's understanding of their mothers with factual information provided by their mother. The research instrument accounted for six aspects of their mother's life viz. personal information, health knowledge, likes and dislikes, emotion related, and achievements and aspirations. Data was collected from 162 pairs of mothers and children and was analyzed using descriptive statistics and regression analysis. It was inferred that children's understanding of their mothers was high only on obvious aspects related to them compared to other aspects. The quantitative index provided an insight into the present-day mother child bonding along with its implication for the future geriatric population.

Keywords: *Mother-Child Bond, Family Relationships, Similarity Index, Quantitative Analysis*

Around the turn of the 21st century, the relationship Indian parents share with their children has undergone substantial changes owing to globalization and industrialization. Though the changes started creeping in from early 1990's they took a drastic turn and became very glaring marking a significant generation gap in 2000's. Over the years, the parental role or the process of parenting has transformed extensively reflective in the way parents view and understand their children. Conversely, the way children understand their parents is also very crucial in exalting the rights of children (Skelton, 2007) and empowering their agency (Monteiro & Hariharan, 2019). Parenting and child socialization practices have garnered widespread public attention wherein the processes have been scrutinized, criticized and discussed thoroughly (Ambert, 2001; Kuczynski, Harach, & Bernardini, 1999; Knafo & Galansky, 2008). This can be particularly said about the maternal bond which provides security and attachment powerful enough even in case of father bereavement (Shapiro, Howell, & Kaplow, 2014) or absence (Freeman,

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2017). The shift from joint to nuclear family systems demands even more concentration upon this dyadic process, where mothers expand in the provider role to raise children (Sear, 2021). There are studies which explored mother's role in the interpersonal relationship with the children, but there are hardly any studies which explored the relationship from the child's perspective. While the mother's perspective is important, it is as significant to examine the role played by the child in relating to mother because relationships sustain on mutuality. Exploring children's understanding of their parents gives them their right to participate and empowers them in influencing their own relationship with their parents (Neale, 2002).

Relationships and bonding do not 'happen' automatically. They need to be worked for by both the parties involved. "Relationships" are explained in terms of "exchanges" existing between people (Aoki, 2003). The nature and course of the parent-child relationship is one of the most crucial factors underlying the growth and development of a healthy child irrespective of various theoretical bearings (Malone, Westen, & Levensky, 2011; Toth, Rogosch, Manly, & Cicchetti, 2006). Communication patterns are the markers of family identity (Galvin, Braithwaite, & Bylund, 2015). It is through communication that family members manage their everyday lives and construct their collective identity, create a relational culture and an exclusive system of understanding that takes shape as attitude, action, and self-concepts in the participants of the relationship (Wood, 2007). Families, considered the primary agents of socialization for children are the first powerful communication connections for the child. This powerful familial communication contributes significantly to developing emotional intelligence in the child which paves the path for successful social competence (Chan & Koo, 2011).

The parent-child relationship is a significantly powerful relationship in an individual's life. The interaction between parents and children lays the foundation for children to discover and understand other relationships and directly has an effect on the bond parents and children share. This dyadic interaction has a critical influence on children's overall functioning and is also considered as an important element for a child's general development and behavior. This also influences the children's physical growth, early language formation, behavioural patterns, social-emotional development, literacy and academic outcomes (achievement) and the child's personality characteristics (Moretti & Peled, 2004). It has been observed by many parents that from the perspective of the child, the bonding with the mother that happens as a single point attachment from birth gradually expands to the father, the other family members, and peers as the child grows. As a result, the time spent with mother gradually declines. By the onset of adolescence and the avenue of new social roles, there is a precipitous drop in the waking time spent between parents and children (Smart, Sanson, & Toumbourou, 2008). However, the question is about the quality of interaction and relationship. There are certain aspects the child would understand by observing the mother while certain aspects will be known to the child only when the mother shares the information with him/her. For this there should be a match between the willingness to share by the mother and also the interest to know in the child. Does the child invest the effort, energy, and time to observe the mother as keenly as the mother does for the child to have an understanding about the antecedents of her emotions such as happiness, distress, annoyance, frustrations, and regrets or her likes and dislikes? Does the mother volunteer to share certain personal information like academic performance in the past, the nature of job, the pay packet, regrets in life or the crisis encountered with the child?

Rationale of the study

Parent-child relationship is a valuable and important resource for parents and children alike throughout their lives, understanding the complexities of this important family dyad is very crucial. Mother and child emotion communication behaviours have also explained significant variance in child anxiety (Brumario & Kerns, 2012). A lot of review has been conducted to understand the mother child relationship from the narratives of the mother but there has not been enough emphasis in literature to understand the interaction of this dyad from the child's perspective. It is imperative to look at the relationship from a child's point of view because of the mutuality involved. It will also enhance the understanding of the changes in the relationship across time. While the role of the parents and mother in particular has received due emphasis both from scientific explorations as well as sociocultural expectations, there has been a vacuum about the role of child for sustenance of this relationship. The reason for this vacuum is the silence of scientific research in this area. Unless the role of the child in understanding the parent receives focus, re-invoked, nurtured and groomed as a sociocultural practice, it is difficult to find a solution for progressive increase in institutionalization of the elderly because of lack of or inadequacy in children's responsibility, willingness and active participation in the care of the elderly. This is particularly true in an affiliated country like India. The objective of this study is to initiate a scientific exploration into the intensity to which the children understand their mothers from a multidimensional perspective, which plays a crucial role in the sustenance of the relationship and acceptance of playing a reciprocal role to the parents in later life.

METHODOLOGY

Sample

The sample was recruited following snowballing to meet sample size targets. The sample for this study consisted of pairs of children (age-group between 10 to 21 years) and their mothers. The data were collected from 167 mother-child pairs residing in Andhra Pradesh, and Telangana, India. Due to incomplete forms or voluntary exit from the study, the final sample size dropped to 162 mother-child pairs (Total $N=324$). Among the children 69 were boys (42.6%) and 93 were girls (57.4%) with a mean age of 16.16 years ($SD = 3.58$). Among the mothers, mean age found was 40.73 years ($SD = 6.41$). Amongst the 162 children, 76.5 % children had a sibling, 13.6% children had two siblings, 0.6 % had three siblings and 9.3% were single children. Taking the birth order into account, 51.2 % children in the sample were first born while 46.9% children were second born and 1.9% children were third born. It was noted that 29% children had grandparents living with them, 24.1% children had their grandparents visit them frequently while 21% children had their grandparents visit them occasionally. Also, 25.9% children had no grandparents. It was found that 43.2 % children were visiting their native place two-three times a year, 18.5% children were visiting their native place once a year and 19.1% children visited their native place rarely, and 18.5% children stay in their native place. Out of the total sample 38.9% children were engaged in attending classes such as music, swimming, sports and the like outside their school hours. Students who attended these activities once a week and twice a week were 8.6% while 21.6% attended the same more than twice a week. On the other hand, 61.1 % children were not engaged in any such activities.

Instruments (Tool)

For the purpose of this study, a questionnaire titled *Children's understanding about their Mothers* was specifically developed by the authors. The questionnaire was a combination of open-ended questions and close-ended questions. It aimed at gathering subjective

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information of a child's understanding of his/her parents. This paper presents the children's understanding of mothers.

In order to confirm the child's responses for each of the questions, a parallel questionnaire was constructed for the mothers to fill in their responses. The responses of the mother were considered the real self-identity of the mother because here the mother who was reporting about the facts, likes/dislikes, emotions and aspirations and frustrations are self-reports and hence considered the reference point of the mother's reality about herself. The forms comprised of 3 sections. The first section sought the demographic details. The second and third section had 37 items. Each of it sought inputs on the child's knowledge of the mother that relates to the aspects normally known to a person sharing a close bond. These 37 items were grouped under six broad dimensions viz. health (e.g. does your mother have any health problems?), factual (e.g. what is your mother's date of birth), likes-dislikes (e.g. her favourite singer), leisure (for e.g. her favourite way to relax), achievement-aspiration (e.g. her aim in life) and emotions (e.g. her greatest frustration).

Tool Development Process

The development of the tool took place in two phases.

- **Phase 1 Item writing**

We considered two major sources of information for item development. The items were developed based on the available recent literature that highlighted on children's understanding of their parents in various areas of life. The items were also made in consultation with field experts regarding the various aspects of parents' lives that the children may or may not be aware of. The total number of holistically brewed items was 51.

- **Phase 2 Content Evaluation**

We presented the 51-item form to a panel of 10 experts comprising of researchers and psychologists to assess its content validity. Each expert was asked to read the 51 items under 6 dimensions (health, likes-dislikes, factual, leisure, emotional and achievement-aspiration) and indicate if the items was relevant or not relevant under a particular dimension. The content validity ratio (CVR) was calculated using Lawshe's formula. Finally, 37 items were retained in the final tool.

Procedure

About 200 families residing in gated communities, townships, apartment complexes were approached to participate in the study. They were explained about the study in detail. Those families willing to participate in the study were enlisted, following which the children of these parents were also explained about the study. Mothers and their children willing to participate in the study gave their written informed consent/assent respectively by signing the Informed Consent Form (ICF). The administration of the questionnaire was scheduled at the individual residence of the participants at a mutually convenient time. The children and mothers were requested to fill the questionnaires at the same time without any discussion between them. During the process the investigator was present to provide clarifications to the participants where necessary.

Responses of the participants were manually coded by matching the children's responses with the mothers' responses. Each perfectly matching response of the child with the mothers' response was given a score of 1 (e.g., if the mother mentioned her favourite dish and the child's response to 'mother's favourite dish' perfectly matched that of the mother's response, score of 1 was given. Responses that were incompatible were given a score of

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zero. A partial score was given if there was an overlap in the response of the child and mother (e.g., if the mother mentioned 5 talents and the child's responses match with 3 out of those 5 talents, then a partial score was allotted by computing a fraction 3/5 and a score of 0.6 was given). The scores ranged between zero and one. The average time taken by the children to complete the questionnaire varied between 40 to 60 minutes. The average time taken by parents was 30 minutes.

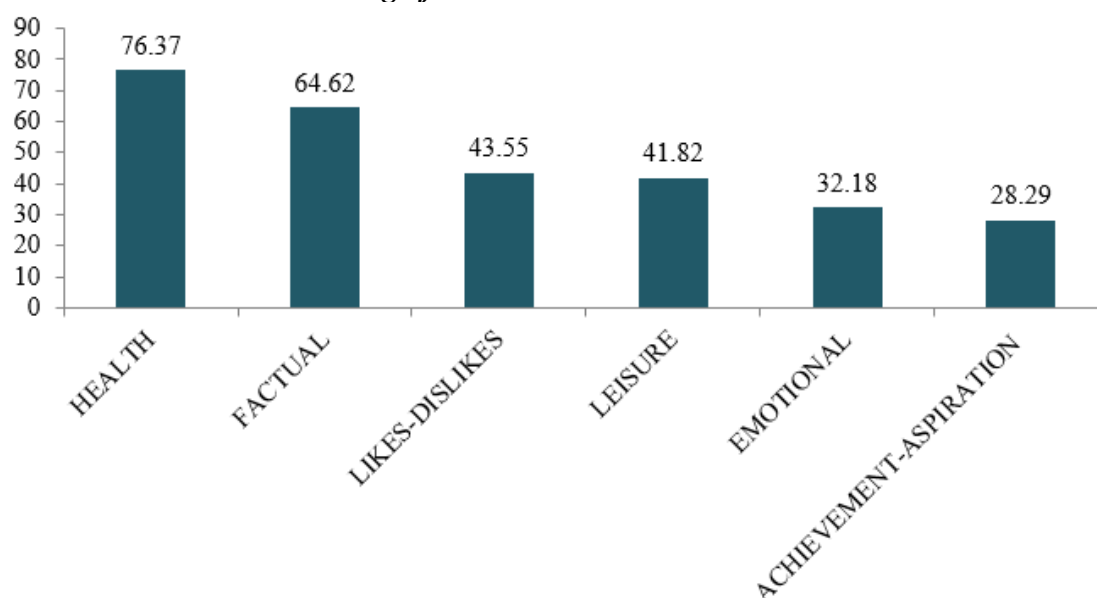
RESULTS

A formula was evolved and applied to derive the dimension wise percentage of understanding of the mothers by the children. For this, the scores of understandings (ranging from zero to one) were summed up for the items under that dimension. The following formula was applied:

$$\frac{\text{Totalscoreofthedimension/Numberofitemsinthedimension}}{\text{Totalnumberofpairs}} \times 100$$

The percentages so arrived are plotted as bar diagrams in figure 1. This computation reflects a quantitative analysis of children's understanding of their mothers in various dimensions of life.

Figure 1. Children's understanding of mothers on various dimensions



The figure is shown in descending order of the categories that can be observed as 'most understood' to 'least understood' areas. It is observed that the children displayed maximum understanding about their mothers on the health dimension (76.37 %), followed by their knowledge on factual dimension (64.62 %) and likes-dislikes dimension (43.55 %). The children had less than 50% knowledge on leisure dimension (41.82 %) and emotional dimension (32.18 %). The children had minimum knowledge regarding their mothers on the achievement-aspiration dimension (28.29 %).

The obtained data were further analyzed in terms of descriptive statistics, Pearson's product-moment correlation coefficient (Pearson's *r*), and multiple regression analysis using IBM SPSS Statistics 20. The predictors of the study include socio-demographic variables of children such as their visit to native place, admission into classes outside the school, staying

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or not staying with grandparents under the same roof, and having more than one sibling. The criterion variables include the six dimensions of mother's self-identity viz. health, factual, likes-dislikes, emotions, leisure and achievement-aspiration.

Main effects

Using the enter method, regression analyses were conducted to find out the combined contribution of significantly correlated socio-demographic variables of children for each of the dimensions of the mother's self-identity. Prior to this, Pearson's *r* was computed to find a linear relationship between the predictors and criterions. The predictors which significantly correlated with the criterion were entered into the model. The values of Pearson's *r* are presented in Table 1. The results of regression analysis are presented from Table 2 to Table 6.

Table 1. Summary of correlations between the demographic variables of the child and dimensions of mother's self-identity for mother-child pairs

Predictors	Criterions					
	H	F	LD	L	E	AA
1. Gender						
a. Male	-.066	.030	.156*	-.086	.041	.077
b. Female	.066	-.030	-.156*	.086	-.041	-.077
2. Age						
Group 1 (10-13 years)	-.039	-.047	.007	-.161*	-.101	-.077
Group 2(14-16 years)	.059	-.041	-.039	-.028	-.030	-.031
Group 3(17-18 years)	.014	.023	-.005	.153	.091	-.029
Group 4(19-21 years)	-.028	.064	.033	.056	.051	.127
3. No. of siblings						
One sibling	.080	-.099	.041	-.014	-.012	-.044
Two siblings	.025	.145	.014	.085	-.038	-.074
Three siblings	.066	.055	.166*	.017	.212**	.189*
No siblings	-.165*	-.041	-.120	-.085	.005	.101
4. Birth order of the child						
First born	-.154	-.051	-.052	-.152	-.112	-.013
Second born	.149	.050	.049	.129	.127	.021
Third born	.018	.005	.009	.089	-.054	-.028
5. Presence of grandparents in the house						
Permanent residents	-.033	.039	.055	.048	-.001	-.074
Frequent visitors	.024	.013	-.038	-.154	-.026	.030
Occasional visitors	.077	.085	.114	.088	.003	-.124
Not present	-.060	-.132	-.125	.182*	.024	.162*
6. Times you visited native place						
Two-three times a year	.084	.063	.045	.048	-.033	.084
Once a year	.145	.043	.179*	-.127	.025	-.114
Less than once a year	-.203**	-.150	-.051	-.060	.060	.221**
Staying in native place	-.018	.023	-.167*	.123	-.045	-.203**
Not applicable	-.138	.026	-.86	.017	.004	-.074
7. Any classes regularly attended outside school hours	.157*	.049	.045	-.020	-.060	-.154*
8. How frequently were the classes attended						
Once a week	.063	.073	-.001	.152	.058	.076
Twice a week	.019	-.022	-.002	.023	-.054	-.144
More than twice a week	.131	.024	.055	-.143	-.073	-.137
Not attending any classes	-.157*	-.049	-.045	.020	.060	.154*

Note. *N* = 162. All analyses are two tailed. **p* < .05, ***p* < .01. H = Health, F = Factual, LD = Likes-dislikes, L = Leisure, E = Emotion, AA = Achievement-Aspiration

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Pearson's product-moment correlation was run to determine the relationship between all the demographic variables of the child (*gender, age, number of siblings, birth order of the child, presence of grandparents in the house, frequency of visiting native place, any classes regularly attended by the children outside school hours and the frequency of attending these classes*) and the 6 dimensions of mother's self-identity (*health, factual, likes-dislikes, emotional, leisure and achievement-aspiration*) considered under the study for all the mother-child pairs.

From the table 1 following significant correlations were noted: gender and likes-dislikes of mother [$r = .156, n = 162, p < .05$]; age (10-13 years) and leisure activities of mother, [$r = -.161, n = 162, p < .05$]; number of siblings (three siblings) and likes-dislikes of the mother, [$r = .166, n = 162, p < .05$]; number of siblings (three siblings) and emotions of the mother, [$r = .212, n = 162, p < .01$]; number of siblings (three siblings) and achievement-aspirations of the mother, [$r = .189, n = 162, p < .05$]; absence of siblings (single child) and health of the mother, [$r = -.165, n = 162, p < .05$]; absence of grandparents and leisure activities of mother ($r = .182, n = 162, p < .05$); absence of grandparents and achievement-aspirations of mother ($r = .162, n = 162, p < .05$); frequency of visiting native place (once a year) and likes-dislikes of mother, ($r = .179, n = 162, p < .05$); frequency of visiting native place (less than once a year) and health of the mother, ($r = -.203, n = 162, p < .01$); frequency of visiting native place (less than once a year) and achievement-aspirations of the mother, ($r = .221, n = 162, p < .01$); frequency of visiting native place (staying in native place) and likes-dislikes of mother, ($r = -.167, n = 162, p < .05$); frequency of visiting native place (staying in native place) and achievement-aspirations of the mother, ($r = -.203, n = 162, p < .01$); any classes regularly attended outside school hours and health of the mother, ($r = .157, n = 162, p < .05$); any classes regularly attended outside school hours and achievement-aspirations of the mother, ($r = -.154, n = 162, p < .05$).

Based on the findings of the above analysis, four multiple regression analyses and one simple regression analysis were run for the children's understanding of their mothers' self-identity. The results of these five separate regression analysis are presented in Table 2 to Table 6.

Table 2. Standard multiple regression analysis showing children's socio-demographic variables predicting of Likes & Dislikes of Mother (N=162)

Predictors	B	SEB	β	T	P
Gender: Boys	0.49	.86	.13	.58	.56
Girls	0.01	.87	.003	.01	.99
Having three siblings	4.18	1.89	.17	2.21	.03
Rare Visits to native place:	-0.62	.39	-.13	-1.61	.11
Staying in native place	-0.83	.39	-.17	-2.13	.03
R^2	0.08				
C	3.01				
F	2.86	$p=0.02$			

Note. Dependent variable: Likes and dislikes of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level

Table 2 shows results of regression analysis for socio-demographic variables that were found to have correlation with the likes and dislikes knowledge of the mothers. All the predictors were entered into equation simultaneously. It was observed that all the variables—gender, presence of three siblings, visit to native place (less than once a year, and staying in

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native place) (together as a model) explained significant 8% of variance in understanding of likes and dislikes of mothers, ($R^2 = 0.08$, adjusted $R^2 = 0.06$, $F(5, 156) = 2.86$, $p = 0.02$). Among them, presence of three siblings and staying in native place uniquely predicted their understanding of mothers' likes and dislikes.

Table 3. Standard multiple regression analyses of children's socio-demographic variables predicting of knowledge about Mother's health condition (N=162)

Predictors	B	SEB	β	T	P
Classes attended outside school hours	0.40	0.65	0.14	0.61	0.54
Not having siblings	-0.79	0.38	-0.16	-2.07	0.04
Rare Visit to native place	-0.69	0.28	-0.19	-2.47	0.02
Not attending classes outside school hours:	0.00	0.65	0.00	0.00	1.00
R^2	0.09				
C	3.87				
F	3.69	$P=0.007$			

Note. Dependent variable: Health status of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level.

Similarly, standard multiple regression analysis was conducted to find out the combined contribution of significantly correlated socio-demographic variables of children on the knowledge about their mother's health. Table 3 presents the results. It was observed that all the variables—classes attended outside school hours, absence of siblings, rare visits to native place (less than once a year), and not attending any classes outside school hours (together as a model) explained 9% of variance in understanding of mothers' health status, $R^2 = 0.09$, adjusted $R^2 = 0.06$, $F(4, 157) = 3.69$, $p = 0.01$. Among them, absence of siblings and rare visit to native place uniquely predicted their understanding of mothers' health status.

Table 4. Standard multiple regression analyses children's socio-demographic variables predicting Achievements & Aspirations of Mother (N=162)

Predictors	B	SEB	β	T	P
Attending Classes outside school hours	-0.15	0.41	-0.08	-.37	0.72
Having three siblings	1.62	0.89	0.14	1.81	0.07
Absence of grandparents:	0.26	0.17	0.13	1.54	0.13
Rare Visit to native place	0.28	0.19	0.12	1.48	0.14
Staying in native place	-0.43	0.18	-0.19	-2.35	0.02
Not attending classes outside school hours:	0.07	0.40	0.04	0.17	0.87
R^2	0.13				
C	0.82				
F	3.79	$p=0.001$			

Note. Dependent variable: Achievement & Aspiration(s) of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level

Again, standard multiple regression analysis was conducted to find out the combined contribution of significantly correlated socio-demographic variables of children, shown in Table 4. It was observed that all the variables—attending classes outside school hours, presence of three siblings, grandparents not being present in the house along with them, rare visits to native place, and not attending any classes outside school hours (together as a model) explained 13% of variance in understanding of achievement-aspirations of mothers, $R^2 = 0.13$, adjusted $R^2 = 0.09$, $F(6, 155) = 3.79$, $p = .001$. Out of all the variables, staying in native place uniquely predicted their understanding of mothers' achievement-aspirations.

Table 5. Standard multiple regression analysis of children's socio-demographic variables predicting understanding of leisure activities of Mother (N=162)

Predictors	B	SEB	β	T	P
Being in the Age group: 10 to 13 years	-0.21	0.14	-0.13	-1.57	.12
Absence of grandparents	0.27	0.14	0.15	1.92	.06
R^2	0.05				
C	0.83				
F	4.01	$p = 0.002$			

Note. Dependent variable: Understanding of leisure activities of mothers; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level

Table 5 shows the standard multiple regression analyses conducted to find out the combined contribution of significantly correlated socio-demographic variables of children on the knowledge about the mother's leisure activities. It was observed that all the variables—children being in the age group of 10 to 13 years and grandparents not being present in the house along with them (together as a model) explained significant (5%) proportion of variance in understanding of mothers' leisure activities, $R^2 = 0.05$, adjusted $R^2 = 0.04$, $F(2, 159) = 4.01$, $p = 0.02$.

Table 6. Simple linear regression analysis of children's socio-demographic variable predicting understanding of emotions of Mother (N=162)

Predictors	B	SEB	β	t	P
Having Three siblings	6.24	2.27	.21	2.74	.007
R^2	0.05				
C	2.86				
F	7.53	$p = 0.007$			

Note. Dependent variable: Understanding of emotions of Mother; B = unstandardized beta coefficient, SEB = standardized error of beta, β = standardized beta coefficient, t = t values of beta, p = significance level

It is revealed from Table 6 that having three siblings explained statistically significant (5%) proportion of the variance in understanding of emotions of mothers, $R^2 = 0.05$, adjusted $R^2 = 0.04$, $F(1, 160) = 7.53$, $p < .01$. The relationship between these two variables was positive, $\beta = .21$, $p < .01$, having three siblings in the family is associated with increase in understanding of emotions of mothers.

DISCUSSION

The few glaring indicators of the findings are —

- Children's understanding of their mothers are high only on obvious aspects such as health problems and facts such as age, birthday, qualifications etc.
- The least understanding is about the achievements and aspirations of the mother, followed by mother's emotions, leisure and her likes and dislikes

The findings ring an alarm related to family bonding and the withering strength of family as an institution, particularly in affiliation-oriented countries like India. It may be mentioned here that facts about the health and aspects related to qualification, designation and birth dates etc. refer to 'knowing about a person'. This is possible even in the context where two people are in formal relations such as colleagues, lawyer and client, doctor and patient etc. The 'understanding' that strengthens the attachment, bonding in informal and lifelong relationships requires deeper involvement of the persons in partnership. To elaborate, understanding the mother's achievements, aspirations, emotions, leisure and likes and dislikes calls for a quality time together, accurate perceptions preceded by intense

observation with concern for the mother backed by the motivation and interest to draw inferences from the behaviour of the mother, and the desire to reciprocate the love and care to her. The findings clearly indicate that the contemporary Indian society is at the risk of this aspect fading in the children who are busily occupied in pursuit of academic achievement and career building (Whiteman, McHale, Crouter, 2011). This is in fact over-emphasized by the very child rearing process adopted by the parents. The family values shifting from emotional bonding, originating from the cultural roots of affiliation orientation to academic performance, and career building, based on the achievement orientation, perhaps created a mismatch between the cultural ethos and life goals. Such errors in judgements may be at a heavy cost of moving away from the very tradition on which the national character is built. At individual level, this may lead to a state of parental disappointment and frustration with children in later life when the children grow into adults and the parents into senior citizens and expect their children to 'understand' and care for them. What the children had not learned from their childhood cannot be expected from them in later life. In parent-child relationship, when the parents provide all nurturance to their children with expression of love and concern, but the children are not provided an opportunity either for observational learning or the training in the skill to observe in order to perceive and understand intricate details about the parents, (the way parents do for the children) it is unlikely that they learn it by themselves because the parental expectation is focused on academics and achievement.

The results of the regression analyses suggested that the contribution of various demographic factors and visit to native place, children's admission into classes outside the school or grandparents stay or absence under the same roof and having more than one sibling are some of the common factors contributing to the child's understanding of mother. However, in case of the dimensions, the model's contribution ranged between 8% to 13% only. This indicates that there are factors not included in this study design play a major role in children's understanding of their mother. It is necessary to identify these factors and re-introduce them in the family system and child rearing process in order to protect and preserve the cultural roots of the country where parents are considered next to God. The traditional Indian system expects the children to show veneration and take care of them and serve them with commitment and dedication in a process of role reversal once the parents get old (Buch, 2015; Chang & Chang, 2010; Chou, Kröger, & Pu, 2015; Datta, 2017; De Silva, 2017; Hsieh, Huang, Lan, & Ho, 2017; Ramamurti, Liebig, & Jamuna, 2015; Samanta, Chen, & Vanneman, 2015; Watt et al., 2014). The gradual change in child rearing due to the shift from joint family to nuclear family system took the attention away from preparing children in this important aspect. Over-emphasis on academics and career perhaps held the parents as facilitating agents to help children reach this single goal. Thus, in the partnership of parent-child relationship, children were found always in the receiving end and parents confined their roles to that of 'providers' and 'need-satisfiers' with no reciprocal expectations from the children. As a consequence, the children seem to have restricted their roles in fulfilling parental aspirations for them in academic performance and career building, so much so that there are neither expectations from parents nor efforts from the children to understand the parents beyond knowing about the mundane aspects.

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Conflict of Interest

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Research Article

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Effect of Illness Duration and Gender on Coping Skills Deficiency among Chronic Illness Patients

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Abstract

Keywords

coping skills
deficiency,
illness duration,
gender,
ANOVA

This quantitative study examines the coping skills deficiency among chronic illness patients based on their illness duration and gender, and the interaction between the two. A clinical sample of 1198 patients were recruited using purposive sampling technique. The data were analyzed using two-way ANOVA. Results showed a significant difference in coping skills deficiency with respect to illness duration. On the dimensions of anxiety and frustration, no significant difference was found between men and women. Further, no interaction effect was observed. Coping skills deficiency was exhibited more by individuals who were recently diagnosed with their chronic condition and had been living with it for less than 4 years compared to individuals who had it for more than 4 years. Recommendations for future research may include a qualitative understanding of individualized perceptions rather than collective perceptions related to chronic illness-related coping mechanisms.

Introduction

Medical technology has been developing rapidly. Despite the advancements in medical technology, human beings are not free from chronic illnesses and associated negative consequences, both physical and psychological. One of the major contributing factors towards an individual's chronic illness is their lifestyle. A chronic illness is understood as any illness sustaining for a period of more than 6 months and with a prolonged dormancy of clinical course; of multi-factorial aetiology; with no certain cure. Non-communicable diseases contribute towards 60% of the total deaths in India (Nethan, Sinha & Mehrotra, 2017). According to WHO (2021), the leading chronic illnesses are cardiovascular diseases, cancers, respiratory diseases and diabetes. Global disability adjusted life years for several non-communicable diseases increased by 40.1% as on 2017 (Kyu et al., 2017).

The risk factors for developing chronic illnesses may include environmental factors, cultural factors, political factors, and socioeconomic factors. Besides these heredity, age, and familial factors may also contribute to the development of certain chronic diseases. Furthermore, the urbanization and globalization have also been contributing to the risk factors for NCDs as these phenomena influence the lifestyle and health behaviour of people immensely.

Larsen and Lubkin(2006)define chronic illness as the lived experience of the individual and family diagnosed with chronic disease. The values of individual and family impact the perceptions and beliefs of the health behaviours. These values are influenced by demographic, technological, cultural, and environmental factors. Thus, it can be argued that the chronic illness affects the individuals in their totality including biological domain such as physiological status and physical symptoms; psychological domain such as perception and beliefs about illness, emotional well-being, self-efficacy, coping mechanisms; and social domain including interpersonal relationships and perceived social support.

Coping with Chronic Illness

Coping is a dynamic process involving the interaction and influence between the individuals and their environment. People differ in the way they handle or cope with any chronic illness and the associated problems they face (Sarafino & Smith, 2014). Coping is the action by which individuals try to handle any perceived discrepancy that they appraise in a stressful situation, between the demands presented and the available resources (Sarafino & Smith, 2014). These individual differences in coping with chronic illness are attributed to typical coping strategies people adopt. These strategies include information seeking, avoidance, selective ignoring, learning about illness-related aspects and seeking comfort from others (Felton & Revenson, 1984).

Crisis theory (Moos, 1982) focuses on the factors influencing the coping process such as illness-related factors (treatment regimen, use of artificial devices), background and personal factors (personality traits, age, gender) and social factors (health facilities, interpersonal relationships, and nature of social support). These factors are mutually interrelated and affect the coping process collectively. The coping process starts with an individual's cognitive appraisal of the health problem or perception of the illness. This cognitive appraisal facilitates the person to devise adaptive tasks and to exercise numerous coping skills in order to manage these tasks. Two main types of adaptive tasks involve 'tasks related to the illness or treatment' (managing illness symptoms and adjusting to the illness-related procedures) and 'tasks related to general psychosocial functioning' such as controlling negative affect, maintaining healthy interpersonal relationships, and retaining a positive sense of self (Sarafino & Smith, 2014).

Chronic illnesses have adverse psychological consequences which are seldom addressed in clinical settings. Individuals often rely on their internal and external resources for coping by

managing the stress related to their chronic illness. Coping strategies differ in their type and style across chronic conditions. Individual differences highly affect the nature and types of coping strategies used. Personality traits are an important predictor of coping as they operate in almost all situations unlike coping styles which come into play only when encountered with a stressful situation (Taylor, 2015).

The individuals diagnosed with chronic conditions often experience a high level of frustration and anxiety due to fear and the inability to deal with symptoms and consequences of the illness. Maladaptive coping is correlated with poorer quality of life, depressive and anxiety symptoms in individuals with diabetes (Burns et al., 2016; Clarke & Goosen, 2009; Smari & Valtysdottir, 1997; Zhang et al., 2009). Rheumatoid arthritis patients engaging in dysfunctional coping were found to be suffering from depression (Ziarko et al., 2014). Another study found that emotion-focused coping results in adverse consequences while problem-focused coping results in beneficial consequences in relation to anxiety and depression in an adult sample with Crohn's disease (Knowles et al., 2011). Maladaptive coping acts as a mediator between illness perception and depression and anxiety in chronic illness patients. (Hagger et al., 2017; Knowles et al., 2017). This maladaptive coping is reflected in individuals with chronic illnesses through their coping skills deficiency.

In the current study, coping skills deficiency is measured on the dimensions of anxiety, frustration, disappointment, rejection and disapproval; which are some of the negative emotions, an individual suffering from a chronic illness experiences. Coping with these dimensions is very important in adapting successfully to a chronic condition. Anxiety as a resultant of fear is often seen in patients diagnosed with a chronic condition, especially in patients awaiting test results. Frustration is caused due to the inability of an individual in being able to deal with the symptoms of the disease and hassles that come along with it. Also, frustration is often

experienced as a resultant of reduced mental and physical abilities which can be as incapacitating as the chronic illness itself. Disappointment when occurring due to a minor issue pertaining to our everyday lives is easier to cope with rather than in the context of a more severe situation such as a disabling or threatening chronic condition. Rejection is often experienced by chronically ill individuals during the course of their treatment from their families, friends and spouses which affects their adjustment patterns.

Therefore, it is imperative to investigate the existing level of coping skills in individuals with chronic illness and which individuals experience higher coping skills deficiency.

Coping in individuals with chronic illness is affected by several clinical, demographic and psychosocial factors. Illness duration and gender are two such factors that have been sparingly explored in relation to coping with chronic illnesses.

Illness Duration and Coping in Chronic Illness

The amount of time that passes after the diagnosis of any chronic illness has an impact on the individual's experience of the chronic illness. Illness duration has been positively associated with adherence, sleep problems and quality of life (Bhandari, 2016; Jankowska-Polańska et al., 2017; Uchmanowicz et al., 2019) across various chronic illnesses. Most research on chronic illnesses study participants who have a long illness duration. Thus, there is less knowledge available about those who are in the nascent stages of their illness (Kneck et al., 2011).

Out of the limited studies that have assessed the correlation between illness duration and coping behaviour, one study (Rassart et al, 2014) found a positive correlation between duration of illness and two ways of coping – passive resignation and avoidant coping – in diabetic individuals from Belgium. In another study; Brown, Brown and Jason (2010) found that participants with a longer illness duration had greater use of coping strategies like planning and acceptance, positive

reframing, active coping, and lower use of behavioural disengagement than those in the shorter illness duration group. Such findings demonstrate a need for researchers to explore the effect of illness duration on coping in individuals with chronic illness.

Gender and Coping in Chronic Illness

“Gender” is a multi-faceted variable including biological, social and psychological differences (Moller-Leimkuhler, 2007). Literature related to the role of gender in physical morbidities is limited in comparison to understanding the differences in mortality (Read & Gorman, 2010). Gender differences related to chronic illnesses can be reflected in individuals’ illness perception, health-seeking behaviour, perceived stigma, support system, coping mechanisms and psychological adjustment amongst others.

Gender related differences are reflected in the usage of coping skills at the physical and psychological level attributed to sexual dimorphism in the brain, physiological make up of sex hormones, hormonal differences etc. (Sinha & Latha, 2018).

Gender differences were reported among individuals suffering with Type-2 diabetes where men showed increased adjustment, coping, integration, quality of life, and wellbeing in comparison to women (Sridhar et al., 2007). Though elevated symptoms of anxiety were observed in both men and women in a diabetic sample, prevalence of the symptoms were more among the women compared to men (Grigsby et al., 2002) and additionally, the type of coping strategy employed was seen to affect the individual’s anxiety and depression levels differently among men and women (Duangdao & Roesch, 2008).

A study by Farcas and Nastasa (2011) also showed gender plays a significant role in selecting a coping mechanism. In their study, women frequently used seeking social and emotional support, denial and positive thinking, venting of emotions and on the other hand men employed, mental and behavioural disengagement, and seeking instrumental social support as coping mechanisms. In older (65-79 years), depressive, anxious or patients with multiple comorbidities venting of emotions was used as a passive type of coping.

Living with chronic illness is often challenging. Every individual experiences a unique combination of life events, processes, and outcomes underlying their adjustment to a chronic illness. Based on the literature discussed above, the following objectives were made:

Objective 1: To find out the effect of illness duration on coping skills deficiency.

Objective 2: To find out the difference between men and women on coping skills deficiency.

Objective 3: To find out the interaction effect of illness duration and gender on chronic illness deficiency.

Based on the objectives, the following hypothesis were formulated:

Hypothesis 1: There would be an effect of illness duration on coping skills deficiency.

Hypothesis 2: There would be a difference between men and women on coping skills deficiency.

Hypothesis 3: There would be an interaction effect of illness duration and gender on coping skills deficiency.

Materials and Methods

The objective of this causal comparative study is to determine chronic illness patients' coping skills deficiency based on illness duration as well as gender. The research design employed in this study is a 3 (Illness Duration) X 2 (Gender) independent groups factorial design with unequal cell sizes. The independent variables are illness duration (Group 1: 1 month-4 years; Group 2: above 4 years-9 years; Group 3: above 9 years to 20 years) and gender (men and women). The dependent variable is coping skills deficiency. A two-way ANOVA will be utilized to compare the independent groups based on the dependent variable.

Participants

The participants considered for this study were persons with chronic illness (es) from different parts of India. Purposive sampling technique was used to employ a total of 1198 chronic illness patients (589 men and 609 women). The age range was 25-75 years ($M = 51.07$, $SD = 11.61$). The sample consisted of participants with different chronic illnesses such as cardiovascular diseases, arthritis, asthma, cancer, diabetes, and thyroid disorders with the illness duration ranging from 1 month to 20 years, and were categorized into three groups based on the illness duration (Group 1: 1 month - 4 years; Group 2: above 4 years - 9 years; Group 3: above 9 years - 20 years). Group 1 consisted of 404 (190 male, 214 female;

33.7%), Group 2 consisted of 396 (192 male, 204 female; 33.1%), and Group 3 consisted of 398 (207 male, 191 female; 33.2%) participants respectively. Levene's test of equality of variances indicated the homogeneity of variances across the three groups.

Measure

The coping skills deficiency scale (Sharoff, 2004) was used for this study to measure the level of coping skills deficiency of the participants. The scale consists of 18 items in the form of questions. These items measure 4 dimensions of coping skills deficiency which are anxiety, frustration, disappointment, rejection and disapproval. It is a 6-point Likert scale with options ranging from 0 (none at all) to 5 (an exceptional amount). A high score reflects a high level of coping skills deficiency i.e. a low score shows higher coping ability. Similarly, a low score reflects a low level of coping skills deficiency i.e. a high score shows lower coping ability. The maximum score that could be obtained is 90 and the minimum score that could be obtained is 0. Cronbach's alpha for the scale for this study is .81.

Results

This multivariate study used a two-way ANOVA (Analysis of Variance) to test the hypotheses. The independent variables were illness duration and gender. The dependent variable was coping skills deficiency.

Table 1: *Group Descriptive Statistics Dependent Variable: anxiety, Frustration, Disappointment, Rejection and disapproval*

Illness Duration	Anxiety		Frustration		Disappointment		Rejection and disapproval			
	Gender	M	SD	M	SD	M	SD	M	SD	N
1	M	6.64	2.20	7.53	2.22	14.21	4.47	13.92	5.52	190
	F	7.04	2.44	7.75	2.15	15.07	4.77	15.06	5.34	214
	Total	6.85	2.34	7.52	2.19	14.66	4.65	14.52	5.45	404
2	M	6.34	2.18	6.74	2.09	12.29	4.91	11.45	5.28	192
	F	6.57	2.56	7.24	2.34	13.55	5.27	12.91	6.08	204
	Total	6.46	2.38	7.00	2.23	12.93	5.13	12.21	5.74	396
3	M	6.16	2.23	6.99	2.01	12.55	4.90	12.03	5.63	207
	F	6.31	2.36	7.04	2.22	14.17	4.96	13.45	6.07	191
	Total	6.24	2.29	7.01	2.11	13.33	4.99	12.71	5.87	398
Total	M	6.37	2.21	7.08	2.13	13.00	4.83	12.45	5.57	589
	F	6.66	2.47	7.27	2.24	14.28	5.04	13.84	5.89	609
	Total	6.52	2.35	7.18	2.19	13.65	4.98	13.16	5.77	1198

The assumption of homogeneity of variances was determined using Levene's test which is given in Table 2. No violations to Levene's test were

found and the assumption of homogeneity of variances was met. See Table 1 for Levene's Test of Equality of Error Variances.

Table 2: *Levene's Test of Equality of Error Variances*

Dependent variable	F	Df1	Df2	Significance
Anxiety	1.87	5	1192	.10
Frustration	1.31	5	1192	.25
Disappointment	1.67	5	1192	.14
Rejection and disapproval	1.45	5	1192	.21

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

As Levene's test of equality of error variances tests homogeneity of variances, the non-significant results indicate that there is

homogeneity of variances across groups in all four dimensions.

Table 3 ANOVA performed on Anxiety score of the participants' illness duration and gender

Anxiety					
Sources	SS	df	MS	F	Effect size
Illness Duration (A)	74.09	2	37.04	6.76**	.01
Gender (B)	20.47	1	20.47	3.74	
A x B	3.41	2	1.71	0.31	
Error	6531.165	1192	5.48		

** p = .001

Anxiety (dimension of coping skills deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on anxiety (dimension of coping skills deficiency). Participants were divided into three groups according to the illness duration (Group 1: 1 month-4 years; Group 2: above 4 years-9 years; Group 3: above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = .31, p > .05$. There was a statistically significant main effect for illness duration $F(2,$

1192) = 6.76, $p < .01$; however, the main effect was small (partial eta squared = .01). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the participants from group 1 ($M = 6.85, SD = 2.34$) was significantly different from group 2 ($M = 6.46, SD = 2.39$) and group 3 ($M = 6.24, SD = 2.30$) in terms of anxiety ($MD=0.39, p<0.05$), ($MD=0.62, p<0.01$) respectively. Group 2 did not statistically differ from Group 3 in terms of anxiety. The main effect for type of gender was not statistically significant $F(1, 1192) = 3.74, p > .05$.

Table 4. ANOVA performed on Frustration score of the participants' illness duration and gender

Frustration					
Sources	SS	Df	MS	F	Effect size
illness duration (A)	71.24	2	35.62	7.51***	.01
Gender (B)	9.14	1	9.14	1.93	
A x B	15.58	2	7.79	1.64	
Error	5654.16	1192	4.74		

*** p = .001

Frustration (dimension of coping skills deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on frustration (dimension of coping skills deficiency). Participants were divided into three groups according to the illness duration (group 1: 1 month-4 years; group 2: above 4 years-9 years; group 3: above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = 1.64, p > .05$. There was a statistically

significant main effect for illness duration $F(2, 1192) = 7.51, p < .01$; however, the main effect was small (partial eta squared = .01). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the participants from group 1 ($M = 7.52, SD = 2.19$) was significantly different from group 2 ($M = 7.0, SD = 2.23$) and group 3 ($M = 7.02, SD = 2.12$) in terms of frustration ($MD=0.52, p<0.01$), ($MD=0.50, p<0.01$) respectively. The group 2 did not statistically differ from group 3. The main effect for type of gender was not statistically significant $F(1, 1192) = 1.93, p > .05$.

Table 5 ANOVA performed on Disappointment score of the subjects in illness duration and gender

<i>Disappointment</i>					
Sources	SS	df	MS	F	Effect size
Illness Duration (A)	634.022	2	317.01	13.25***	.02
Gender (B)	465.709	1	465.71	19.46***	.02
A x B	28.72	2	14.36	.60	
Error	28522.14	1192	23.93		

*** p = .000

Disappointment (dimension of coping skills deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on disappointment (dimension of coping skills deficiency). Participants were divided into three groups according the illness duration (group 1: 1 month-4 years; group 2: above 4 years-9 years; group 3: above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = .60, p > .05$. There was a statistically significant main effect for illness

duration $F(2, 1192) = 13.25, p < .001$; however, the main effect was small (partial eta squared = .02). Post-hoc comparisons using the Tukey HSD test indicated that the mean score for the participants from group 1 ($M = 14.66, SD = 4.65$) was significantly different from group 2 ($M = 12.94, SD = 5.13$) and group 3 ($M = 13.33, SD = 4.99$) in terms of disappointment ($MD=1.72, p<0.001$), ($MD=1.33, p<0.001$). The group 2 did not statistically differ from group 3. The main effect for type of gender was statistically significant $F(1, 1192) = 19.46, p < .001$; with a small effect (partial eta squared = .02).

Table 6: ANOVA performed on Rejection and disapproval score of the participants' illness duration and gender

<i>Rejection and disapproval</i>					
Sources	SS	df	MS	F	Effect size
Illness Duration (A)	1155.50	2	577.75	18.03***	.03
Gender (B)	535.28	1	535.28	16.71***	.01
A x B	5.68	2	2.84	.09	
Error	38188.98	1192	32.04		

*** p = .000

Rejection and disapproval (dimension of coping skill deficiency)

A two-way between groups analysis of variance was conducted to explore the impact of illness duration and gender on levels of rejection and disapproval (dimension of coping skill deficiency). Participants were divided into three groups according to the illness duration (**Group 1**

= 1 month-4 years; **Group 2** = above 4 years-9 years; **Group 3** = above 9 years). The interaction effect between illness duration and gender was not statistically significant $F(2, 1192) = .09, p > .05$. There was a statistically significant main effect for illness duration $F(2, 1192) = 18.03, p < .001$; however, the main effect was small (partial eta squared = .03). Post-hoc comparisons using the Tukey HSD test indicated that the mean score

for the participants from group 1 (M = 14.52, SD = 5.45) was significantly different from group 2 (M = 12.21, SD = 5.74) and group 3 (M = 12.71, SD = 5.88) in terms of rejection and disapproval (MD=2.32, $p<0.001$), (MD=1.81, $p<0.001$) The

group 2 did not statistically differ from group 3. The main effect for type of gender was statistically significant $F(1, 1192) = 16.71$, $p < .001$; with small effect size (partial eta squared = .01).

Table 7: Table showing mean comparisons using Tukey's HSD between the three groups of illness duration for the variables under study

Variables	Duration of Disease		
	Group I- Group II	Group I-Group III	Group II- Group III
Anxiety	.39*	.62**	.22
Frustration	.52**	.50**	.02
Disappointment	1.72***	1.33***	.39
Rejection and disapproval	2.32***	1.81***	.51

Note. Group I – One month –4years, Group II – Above 4-9 years, Group III – Above 9 years – 20 years
 $*p<0.05$, $**p<0.01$, $***p<0.001$

Discussion

The study aimed to explore the coping skills deficiency in chronic illness patients and examine the effect of illness duration and gender on their coping skills deficiency. The first hypothesis posited that there would be a difference in the level of anxiety, frustration, disappointment, rejection and disapproval among the three groups of chronic illness patients categorized on the basis of their illness duration.

This hypothesis was accepted as the results showed a difference in the level of the above-mentioned variables with respect to illness duration. It was seen that Group I (below 4 years) had higher coping skills deficiency than Group II (above 4 - 9 years) and Group III (Above 9 years). However, no significant differences were found between Group II and Group III in their overall coping skills deficiency. This indicates that duration of disease plays a considerable role in increasing patients' coping level. This finding is in tandem with a previous study that reported higher use of adaptive coping strategies among

patients with longer duration of disease (Brown, Brown & Jason, 2010).

The lower coping skills deficiency as duration increased, may be attributed to an increased knowledge of the chronic condition. Cecily (2016) found a significant relationship between illness duration and level of knowledge in Indian adults with diabetes and hypertension. Disease knowledge is further positively associated with coping ability (Moradkhani et al., 2011; Najjar et al., 2020) and adherence (Sweileh et al., 2014; Mandpe et al., 2014) in individuals with different chronic illnesses. Jankowska-Polańska et al. (2017) found a direct positive relationship between illness duration and adherence to pharmacological treatment in hypertensive individuals. One rare study by Dietrich (1996) reported that individuals newly diagnosed with diabetes find it difficult to adhere to a treatment plan and are in need of knowledge about self-management. Therefore, it can be said that as illness duration increases, patients' knowledge and adherence to their health care regimen also increases which in turn increases their coping skills.

Dealing with a chronic illness is quite challenging. Immediately post the diagnosis of a chronic illness, people realise the condition will accompany them for the rest of their lives and they might have to adhere to a prescribed medical regimen. The very thought of restrictions in diet, modifications in lifestyle and adherence to pharmacological treatment creates havoc in them. Acceptance of a disease condition is closely linked to treatment adherence. A higher acceptance of a disease state is linked to greater treatment adherence (Jankowska-Polańska, 2016). Baczewska et al. (2015) found a significant association between illness duration and acceptance of a disease indicating that an increase in illness duration is linked to an increase in illness acceptance. Further, a longer illness duration provides more time for psychological adaptation with the illness (Pinquart & Shen, 2011). Therefore, it can be observed that increased illness duration is associated with increased disease-specific knowledge, adherence to prescribed treatment and acceptance of illness; which in turn share a positive relationship with coping.

The second hypothesis postulated that there would be a difference in the level of anxiety, frustration, disappointment, rejection and disapproval between men and women. According to the results obtained for the difference between two groups, it can be inferred that men and women had a significant difference with respect to different dimensions of coping skills deficiency (disappointment, rejection and disapproval). The possible reasons for significant differences between men and women on coping skills might be attributed to the difference in their approach towards illness reflected in the way they respond to illnesses, acknowledge illnesses, their health behaviour and treatment received from their families and society (Vlasoff, 2007).

The mean scores of men and women in this study indicate that women experienced a higher amount of anxiety, frustration, disappointment and rejection compared to men. These differences in coping skills and the level of coping have been reported in previous literature as well (Frey, 2000;

Porter et al., 2000; Matud, 2004). However, no significant differences were found between the two genders on the dimensions of anxiety and frustration in the present study.

The third hypothesis stated that there would be an interaction effect of illness duration and gender on chronic illness deficiency. This hypothesis was rejected, indicating that the combined effect of illness duration and gender was not statistically higher than the sum of both the effects individually.

Implication

The knowledge of coping skills deficiency will be useful in helping individuals to cope well with chronic illnesses. This study would help design appropriate interventions to negate the detrimental effects of coping deficiencies. Illness duration and gender must be taken into account while providing interventions. It emphasizes that the differences among individuals must be focused on. Hence, the present study has the potential to improve the lives of people affected by chronic illnesses. Overall, these results indicate that illness duration and gender are important factors that relate independently to the coping skills in chronic illness patients.

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Flourishing: Role of Perseverance and Passion for Long-Term Goals in Relation to Subjective Vitality

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ABSTRACT

Several psychosocial factors contribute to flourishing which is a state of optimal human functioning. The objectives of this study were to explore the relationship between grit, vitality and flourishing; and to assess the impact of grit and vitality on flourishing. A correlational design was used to collect data from 449 participants (211 women and 238 men) aged between 18-57 years. The Flourishing Scale, the Grit Scale and the Subjective Vitality Scale were administered. The obtained data were scored and analyzed suitably. Results revealed positive relationships between all the variables. Further, hierarchical multiple regression analyses showed that grit and vitality significantly predicted flourishing. Results from this study indicate the need to further investigate the impact of grit and vitality on an important positive psychological construct like flourishing.

Keywords: flourishing, grit, vitality, regression, correlation, well-being

INTRODUCTION

Flourishing is a key indicator of well-being. It is a state of optimal human functioning as opposed to languishing and mental illness (Baumgardner & Crothers, 2015).^[1] Flourishing is associated with several aspects of mental as well as physical health. Fostering human flourishing is important to improve the quality of life of people. Therefore, the need arises for research to look into the correlates of flourishing. Not much research has been carried out to understand the relationship between important positive psychological variables like grit and vitality with flourishing. This calls for exploring flourishing by researchers cross-culturally.

Research previously focused on the importance of cognitive traits as indicators of success, specifically in the case of academic success. It was only recently that Duckworth et al. (2007)^[2] contributed to

the paradigm shift in research related to non-cognitive traits such as grit, concluding the effect of these traits on an individual's life and character. The non-cognitive traits are essentially understood as those variables associated with an individual's motivation, attitude and temperament among others rather than intellect (Stoffel & Cain, 2018).^[3]

The American Psychological Association (2020)^[4] defined grit as "a personality trait characterized by perseverance and passion for achieving long-term goals and grit entails working strenuously to overcome challenges and maintaining effort and interest over time despite failures, adversities, and plateaus in progress." Though grit and resilience have been used interchangeably across literature, they are completely different constructs. Masten (2014)^[5] defined resilience as the capacity of a dynamic system to adapt

successfully to disturbances that threaten the viability, the function, or the development of that system; grit is explained as passion and perseverance towards long-term goals and having the stamina to stick with one's future to persist and pursue hard to turn that future into a reality for oneself (Duckworth et al., 2007).^[2]

Grit is also associated with other variables such as consistency of interest, perseverance of effort and ambition.

Consistency of interests refers to an individual's inclination towards cultivating and maintaining a specific range of interests regularly, over a long period of time. In other words, it refers to the uniformity in nurturing all of an individual's interest areas. Although strongly associated with grit in western studies, consistency of interests was not found to be relevant to collectivistic cultural groups. People in collectivist societies have demonstrated a lower need for consistency of interests (Datu et al., 2016).^[6]

In line with grit, the construct of perseverance of effort refers to the persistence and determination of an individual towards a goal. It indicates the hard work and sustained effort an individual shoulders, in spite of challenges, to achieve the desired goal. Gritty individuals are generally found to experience high levels of perseverance of effort (Datu et al., 2016).^[7]

Ambition is one of those variables closely associated with grit in the field of psychology (NKP & Shobanah, 2017).^[8] While grit is defined as a stable trait not requiring any immediate positive feedback to sustain a goal (Duckworth et al., 2007),^[2] ambition is understood as an intrinsic desire to gain recognition, power or success for one's achievements (Maltby et al., 2008).^[9]

Vitality has been associated with better psychological and cognitive functioning. Subjective vitality is defined as a feeling of liveliness and a sensation of personal energy (Ryan & Fredrick, 1997).^[10] Ryan and Deci (2001)^[11] considered vitality to be an aspect of eudaimonic well-being. It essentially refers

to the state of organismic well-being, feeling alive and alert, as being vital and energetic contributes to a fully functioning and psychologically sound individual. Ancient Eastern practices like tai chi, yoga, and meditation are also known to result in the experience of vitality. And vitality is seen to enhance problem-solving, concentration, performance, and greater readiness for new challenges. Vitality is distinct from happiness and subjective well-being in that it constitutes higher levels of experienced activation or energy as well as positive affect (Lopez, Pedrotti & Snyder, 2018).^[12]

The growing interest in positive psychology has led to increased research in the area of flourishing. Conceptualized by Keyes (2002)^[13] and further developed by Fredrickson and Losada (2005),^[14] flourishing can be defined as living "within an optimal range of human functioning" (Fredrickson & Losada, 2005).^[14] It is a descriptor of well-being and positive mental health. Flourishing individuals experience a high level of positive emotions, psychological functioning and social functioning (Keyes, 2002).^[13] It is the opposite of mental illness and has been contrasted with languishing over a long period of time (Baumgardner & Crothers, 2015).^[1]

Languishing is a state described by people as being 'hollow', 'empty' or 'stagnant'. The languishing state creates a division in the illness-wellness continuum with respect to an individual's psychological health. The languishing state is characterized by few symptoms of mental illness and few symptoms of mental health (wellness) as well. Therefore, languishing individuals have few symptoms of pathology but not enough to be diagnosed as being mentally ill. Flourishing, in other words, is a state of complete mental health. Flourishing individuals experience both positive and negative emotions but have more adaptive coping strategies than those who are languishing (Keyes, 2002;

Fredrickson & Losada, 2005; Baumgardner & Crothers, 2015).^[13, 14, 1]

Grit has been related to academic success (Hodge et al., 2018)^[15]; happiness (Singh & Jha, 2008)^[16]; satisfaction and a sense of belongingness (Bowman et al., 2015)^[17]; psychological well-being (Goodman et al., 2017)^[18]; value and self-efficacy (Muenks et al., 2017, 2018)^[19-20]; and self-esteem (Weisskirch, 2018)^[21] etc. It is important to understand the relationship between grit and psychological variables such as self-control, resilience and perceived stress amongst others (Kannagara et., 2018).^[22]

The construct of subjective vitality refers to the feeling of being alert, alive and full of energy (Ryan & Fredrick, 1997)^[10]. Although it has been studied in relation to different constructs, very limited research has examined the link between subjective vitality and flourishing. However, as subjective vitality is an aspect of well-being (Ryan & Deci, 2001; McMahan & Estes, 2011)^[11, 23] and flourishing is a measure of psychological well-being, it may be said that vitality and flourishing are connected to each other. The relationship between grit, vitality and flourishing has not been explored extensively yet and this study attempts to examine the same.

The current study aimed at assessing the impact of grit and vitality on flourishing.

MATERIALS AND METHODS

A correlational design was used in the study.

Participants

Purposive sampling technique was adopted to recruit participants for the study. The sample consisted of 449 participants (211 women and 238 men) across various socioeconomic groups, occupations and levels of education. The age range of the participants was 18-57 years ($M = 24.39$, $SD = 8.99$).

Tools

Three psychological tools have been used to collect data along with the demographic data sheet and informed

consent form of the participants. Demographic details such as age, gender, education level, occupation, marital status, and the duration of illness were collected from each participant. A brief description of the tools used in the study is given below:

The Flourishing Scale developed by Diener et al. (2010)^[24] consists of eight items describing important aspects of human functioning viz. positive relationships, feelings of competence, having meaning and purpose in life. The response of each item is on a 7-point Likert scale ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). This measure has a high internal consistency with Cronbach's alpha of 0.87. Cronbach's alpha for this study was 0.89.

Grit Scale developed by Duckworth et al. (2007)^[2] consists of 17 items that measure the perseverance and passion for long-term goals. The response of each item is on a 5-point Likert scale ranging from 1 (Not like me at all) to 5 (Very much like me). In addition to grit, the scale consists of consistency of interest subscale, the perseverance of effort subscale and ambition subscale. This measure has a high internal consistency with Cronbach's alpha of 0.85. Cronbach's alpha for this study was 0.69.

The Subjective Vitality Scale was validated at both levels by Ryan and Frederick (1997).^[10] This was the original scale consisting of 7 items. Bostic, Rubio, and Hood (2000)^[25] using confirmatory factor analysis deduced a 6-item version of the scale from the original measure. This scale has a high internal consistency with Cronbach's alpha of 0.96 (Fini et al, 2010).^[26] Cronbach's alpha for this study was 0.73.

Procedure

The participants were approached and the purpose of the study was explained to them. The participants were assured of the confidentiality of their personal details and responses. Informed consent was obtained from those participants willing to

be a part of the study. Subsequently, the demographic details were collected and the participants were given the questionnaires.

Statistical Analysis

The quantitative data were analyzed using SPSS 23. The statistics used to analyze the data were descriptive statistics. Pearson's Product Moment Correlation (r) and multiple hierarchical regression were

performed. In the analysis, the predictors were grit, consistency of interest, ambition, perseverance of effort and vitality. The criterion was flourishing. Prior to hierarchical regression analysis, Pearson's r was computed to find a linear relationship between the predictors and criterion; and to identify the suitable predictors to be entered into the model.

RESULT

Table 1. The values of Pearson's r along with descriptive statistics (M and SD) (N=449)

	M	SD	1	2	3	4	5	6
1.Grit	37.68	6.63	1	.75**	.38**	.73**	.36**	.30**
2.Consistency of Interest	17.96	4.55		1	.07	.10*	.08	.06
3.Ambition	17.20	3.35			1	.51**	.44**	.45**
4.Perseverance of Effort	19.73	4.39				1	.46**	.39**
5.Vitality	28.81	7.25					1	.53**
6.Fourishing	41.17	9.49						1

$p < .05$ * $p < .01$

Hierarchical multiple regression was performed to investigate the ability of grit, ambition, and perseverance of effort to predict levels of flourishing, after controlling for vitality. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, and homoscedasticity. Additionally, the correlations amongst the predictor variables included in the study were examined and these are presented in Table 1. All correlations between predictor variables and the criterion variable were moderate,

ranging between $r = .30$, $p < .01$ and $r = .53$, $p < .01$. This indicates that multicollinearity was unlikely to be a problem. All predictor variables were statistically correlated with flourishing which indicates that the data were suitably correlated with the dependent variable for examination through multiple hierarchical regression to be reliably undertaken. Only one predictor variable-consistency of interest subscale was not correlated with flourishing. Hence it was not included in the model.

Table 2: Hierarchical Regression Analysis for Grit and its dimensions and subjective vitality predicting flourishing

Model	B	SE	β	Adjusted R^2	R^2	ΔR^2
Model 1 (C=14.64, F=46.91***)				.24	.24	
Grit	.04	.09	.03			
Ambition	.97	.14	.34***			
Perseverance	.43	.14	.20**			
Model 2 (C=11.05, F=58.06***)				.34	.34	.10
Grit	.01	.08	.00			
Ambition	.68	.13	.24***			
Perseverance	.20	.13	.09			
Vitality	.49	.06	.38***			

Table 2 shows the summary of hierarchical regression. In the first step of hierarchical multiple regression the predictor variables grit, ambition, and perseverance of effort were entered. This model was statistically significant $F(3,445) = 46.91$, $p < .001$ and explained 24% of variance in flourishing. In the next step, vitality was entered and the results indicated

that the model was statistically significant $F(4,444) = 58.06$, $p < .001$ and explained 34 % of total variance in flourishing. The introduction of vitality explained an additional 10% of flourishing when controlling for grit, ambition, and perseverance of effort where R^2 change = 0.10. In the final adjusted model two out of four predictor variables were statistically

significant, with vitality recording a higher Beta value ($\beta = .38, p < .001$) than ambition ($\beta = .24, p < .001$).

DISCUSSION

The study was designed to determine the impact of grit and vitality on flourishing. Statistical analyses revealed a significant positive correlation between grit and consistency of interest, ambition, perseverance of effort, vitality and flourishing; between consistency of interest and perseverance of effort; between ambition and perseverance of effort, vitality and flourishing; between perseverance of effort and vitality and flourishing; and between vitality and flourishing. All the significant predictors (grit, ambition, perseverance of effort, vitality) of flourishing were entered into a hierarchical regression model.

Keyes (2005) [27] operationalized flourishing as elevated emotional, psychological, and social well-being. Though there is literature supporting the relationship between grit and well-being (Reed & Jeremiah, 2017) [28] and well-being and flourishing (Keyes, 2002; Diener et al., 2010) [13, 24] that suggest a plausible relationship between grit and flourishing, not many studies attempted to empirically establish the same. The findings of this study are supported by previous literature. A study on a sample of 240 participants (NCC Cadets and Non-NCC Cadets) revealed a relationship between grit and flourishing (Jain & Sunkarapalli, 2019) [29] and in another study conducted on 101 Indian postgraduate students, grit along with resilience and meaningfulness emerged as a strong predictor of flourishing (Aswini & Deb, 2017). [30]

Also, variables closely associated with grit have predicted flourishing. Ambition is an adaptive personality trait and can foster the state of flourishing in individuals. It is also seen to have a potential influence on the cognitive and everyday functioning of patients living with HIV (Moore et al., 2018). [31] Previous

literature has supported the relationship between perseverance of effort and flourishing. A study conducted on 606 Filipino students revealed that perseverance of effort positively predicted flourishing (Datu et al., 2016). [7] In two separate studies on Japanese undergraduate students and Filipino employees, Datu et al. (2021) [32] examined the link between grit and wellbeing outcomes. Their findings showed that perseverance of effort correlated with flourishing.

Vitality, being an aspect of well-being, is a strong indicator of an individual's complete functioning (Ryan & Deci, 2001). [11] Vitality has been associated with well-being in previous research. Toner et al. (2012) [33] observed a relationship between vitality and well-being in adolescents (N=501). Another study revealed the mediating role of subjective vitality between diet quality and subjective well-being in college students (Jackson & DiPlacido, 2019). [34] This may explain the relationship between subjective vitality and flourishing, as flourishing is a descriptor of well-being and is also used as a measure of well-being (Diener, et al., 2010). [24]

Based on the objective of this study, positive associations between grit and vitality; grit and flourishing and vitality and flourishing were established. The associations between these variables can be understood based on the role of character strengths in an individual's flourishing experience. A high level of grit ensures people to pursue their goals and never give up on the same, ultimately resulting in positive outcomes. Further, feeling energetic, vital and activated may help such individuals to sustain/persevere towards their goals. Both grit and vitality are variables that operate intrinsically, hence, individuals high on grit and vitality have better flourishing outcomes.

CONCLUSION AND IMPLICATIONS

Vitality, grit and flourishing are important variables in the context of positive psychology. Grit and vitality,

largely understood as components of character strengths need to be explored in order to see their impact on flourishing. Not much research has been conducted on these variables, especially in the Indian context. The results of this study establish the role of grit and vitality in predicting flourishing, which indicates the need to investigate these links further. It is important to foster flourishing across domains and life stages to ensure optimal functioning. In this regard, it is important to understand the variables associated with flourishing. Further, the results of this study will also contribute towards the development of positive psychological interventions (PPIs) beyond clinical settings.

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Management of Chronic Illness through Music Therapy: A Review

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Abstract

Chronic illnesses result in several undesirable physiological and psychological outcomes in patients which are seldom addressed in clinical settings. The transition from the biomedical model to the biopsychosocial model has led to the development of novel interventions for chronic illness management. Music therapy is a non-pharmacological intervention used to address patient needs in the aftermath of treatment. This review highlights the application of music therapy across chronic illnesses. Both, active and receptive music therapy have shown positive results across chronic illnesses; on physiological, physical and psychological parameters. The efficacy of music therapy interventions is enhanced when used in combination with other non-pharmacological interventions. However, contradictory results have also emerged and there is an urgent need to execute well-designed randomized studies with an adequate sample size to arrive at a definite conclusion.

Keywords: music therapy, chronic illness, Indian classical music, noncommunicable disease

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Chronic illnesses or non-communicable diseases (NCDs) account for the main cause of death globally. According to estimates by the World Health Organization, approximately 71% (41 million) deaths occur due to NCDs globally each year (WHO, 2018). In India alone, 5.8 million people die annually as a result of a non-communicable disease. As stated by Patel et al. (2011), non-communicable diseases will give rise to almost three quarters of total deaths in India by the 2030s. Cardiovascular diseases, diabetes, cancers and respiratory illnesses constitute 80% of all premature NCD deaths (WHO, 2018). This gruesome statistic is hard hitting as most NCDs are manageable through simple lifestyle changes (Bennett et al., 2010).

The term 'chronic illness' is often used interchangeably with the term 'chronic disease' (Martin, 2007). Chronic disease is defined based upon the physical health status of the individual requiring medical attention; chronic illness refers to the subjective experience of the human living with the condition. This distinction is very important as it highlights the need for a holistic health management approach.

Any chronic condition cannot be managed only through a pathophysiological approach, but rather requires a management plan that is moderated through cognitive, emotional and interpersonal factors (Larsen & Lubkin, 2009). Medical, surgical and pharmacological treatments can only work to an extent and require the provision of continuous care and treatment in order to manage them. The psychological dimensions of chronic illnesses are often left unnoticed when medical care is considered (Turner & Kelley, 2000). Contemporary research is making efforts to address the psychological needs of individuals with chronic illnesses and has revealed that music is a powerful stimulator of socioemotional processes, thus, positively affecting emotional states and resulting in profitable health outcomes (Dileo & Bradt, 2009; Koelsch et al., 2006).

It is a hard fact that there is no absolute cure for chronic health diseases although several treatment approaches can effectively aid management and keep the deterioration in check. The inclusion of non pharmacological options along with pharmacological based treatment has taken advent, especially with the acceptance of the transitional shift from the biomedical model to the biopsychosocial model of health (Lehman et al., 2017). Physical exercise, biofeedback, neurofeedback, cognitive behavioural therapy, lifestyle modification, guided imagery, mindfulness-based stress reduction, movement therapy, behavioural activation and bright-light therapy are some examples of non-pharmacological interventions used in the management of various chronic illnesses (Goodill, 2018; Bozcuk et al., 2017; Blaskovits et al., 2017; Holvast et al., 2017; Oza & Garcellano, 2015; Chang et al., 2015; Ambrose & Golightly, 2015). Music Therapy is one such non-pharmacological intervention that has also been used in the management of chronic illnesses (Pothoulaki et al., 2012).

The Connection of Music and the Human Body

The connection between music and the human body dates back to the 5th century BCE when Greek philosophers used music as a medium to stimulate emotions and bring a sensation of relaxation to the body. The Greek philosopher Plato was of the opinion that different forms of music had various health benefits on an individual's body (Grocke & Wigram, 2007). The use of music has been prevalent in traditional Indian healing systems since ancient times. Certain Indian rituals that are practiced even now make use of musical sounds in order to alter states of consciousness and reduce pain perception. For example, *Thimithi*, a fire-walking festival originating in Tamil Nadu, India; requires devotees to walk on red hot fire made of coal. Another Indian festival – *Thaipusam* – requires devotees to pierce silver or steel pins and skewers in different sizes all over the body through the skin, back, cheeks and tongue. This ritual signifies that all human desires and evils are destroyed by the pins and the mind is

purified. Surprisingly, the devotees do not feel any sensation of pain in their bodies while doing this. These rituals are preceded by the loud beats of drums and shouts with religious fervor “*arohara*” and religious songs to take the devotees to an altered state of consciousness. It is this auditory environment that changes the state of consciousness in the devotees and eliminates the sensation of pain (Sundar, 2007).

India has a rich representation of various kinds of classical music. Contemporary music therapy practice in India makes use of Vedic verses (*archika*, *gathika* and *samika* verses) to improve focused attention, concentration and to enter deep meditative and relaxed states. These recitals are called *proto-ragas* and have shown improvement in the cognitive development and behaviours of children with special needs in educational settings. It has been observed that children with special needs respond readily to *proto-ragas* and fast rhythmic music when compared to moderately-paced ragas. (Sairam, 2006).

Any chronic illness is not only manifested in its disease specific symptoms but also accounts for invisible symptoms like pain, mood disturbances, fatigue, etc. Putting the need of music in context, it may be a useful way of tackling pain and the overdependence on pain medications that have severe side effects and may even trigger addiction (Schieffer et al, 2005).

Music has been used as a treatment modality for several years. There is a growing body of evidence-based research showing the beneficial effects of music therapy, as an intervention, on physiological and psychological health outcomes (Fotakopoulos & Kotlia, 2018; Hegde et al., 2017). Past research has shown that music has stress-reducing abilities and also alleviates depressive symptoms in those experiencing acute and chronic pain (Cepeda et al., 2006) as it helps to counteract helplessness and anxiety that arise through clinic visits or during hospitalization (Phipps et al., 2010). Music has its obvious linkage to the emotions of a person and can help reverse brain chemistries and activate neural pathways that get dampened due to

the effects of endogenous opioids (anti stress mechanisms in the body) and release oxytocin that mediate positivity in the person (Panksepp & Bernatzky, 2002; Uvnas-Moberg, 1998).

According to the American Music Therapy Association (2006), “music therapy is the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program”. The therapeutic relationship between a music therapist and a client involves a variety of music making methods. Music therapists are recruited in several sectors including health and disability, community care, geriatric care and private practice. Music as a therapeutic intervention is applicable to various branches of medicine such as neurology, surgery, oncology, cardiology, palliative medicine, etc. (Mofredj et al., 2016). The therapeutic use of music differs from its use for entertainment purposes and music education.

Music therapy lays emphasis on the healing purpose of music and contributes towards the healthy functioning and wellbeing of an individual. Music therapists work with people irrespective of their age, ability, musical skills, culture and background (Australian Music Therapy Association, 2012). Music therapy uses interventional modules based on music and musical experiences in order to address non-musical treatment goals. Such interventions concentrate on improving the quality of life of individuals throughout the lifecycle. It is administered to the normal population as well as to individuals with disabilities and/or illnesses (Earl E. Bakken Center for Spirituality & Healing, 2016; Hagemann et al., 2018).

Similar to music therapy is another form of treatment called *music medicine* which does not engage the patients actively. Rather a pre-recorded music chosen by the therapist may be used as a means for listening (Bradt, Dileo, & Shim, 2013). In this treatment modality, interventions are provided via listening devices and patients may or may not be involved in the selection of the music.

Primarily, music therapy can be divided into two types: *Receptive Music Therapy* and *Active Music Therapy*. In Receptive Music Therapy the client engages in listening to live or pre-recorded music as guided by a music therapist. It helps in alleviating stress, improving mood, pain reduction, relaxation and minimizing anxiety. Further, it also helps with improving the coping skills of clients (Li et al., 2015). Also known as ‘expressive music therapy’ Active Music Therapy requires clients to create vocal or instrumental music through singing, instrument playing or music composition. A study by Yinger and Gooding (2014) showed that active music therapy activates a greater number of areas in the brain than receptive music therapy. Bernatzky et al. (2011) remarked that “the alleviation of pain and the reduction of anxiety which can exacerbate pain appear to be the most promising use of music therapy.”

The Bonny Method of Guided Imagery and Music (BMGIM) was established in the 1970s by Helen Bonny. It is a music-centered approach to imagery where selected sequences of classical music are used to facilitate the client in narrating their journey and experiences (Hayes School of Music, 2021; Association for Music and Imagery, 2021).

Music therapy has been used to address several health outcomes in patients. Apart from its widespread application in neurological disorders, music therapy is being increasingly used as one of the treatment modalities for chronic illnesses (Gallagher, 2011). Research in this area indicates the beneficial effects of music therapy with respect to psychological distress, anxiety, sleep quality, depressive symptoms, pain and various physical symptoms in persons with cardiovascular diseases, cancer, chronic respiratory diseases, diabetes, etc. (Bradt, Dileo & Potvin, 2013; Li et al., 2011; Canga et al., 2015; Mandel et al., 2013).

This paper is a comprehensive review of music therapy: its aspects, efficiency, outcomes, when it is administered to individuals suffering with various chronic illnesses (hypertension, diabetes, cancer, chronic obstructive pulmonary disease, arthritis). It aims to

outline aspects of music therapy application in chronic illness care. Studies conducted in the past 12 years have been discussed to understand the evolution of music in healthcare. Literature was gathered from Google Scholar, PubMed, EBSCO and ScienceDirect using the search strings ‘music therapy and chronic illness’, ‘music therapy and hypertension’, ‘music therapy and diabetes’, ‘music therapy and cancer’, ‘music therapy and COPD’ and ‘music therapy and arthritis’. Snowball referencing was also utilized to gather more information.

The studies have been organized by the application of music therapy for highly prevalent NCDs such as hypertension, diabetes, cancer, COPD, and arthritis, but its efficiency may not be restricted to these physical conditions only.

Music Therapy in Alleviation of the Chronic Illness Experience

Hypertension

Hypertension is a highly prevalent clinical condition characterized by elevated blood pressure i.e., a blood pressure reading above 140/90 mmHg. This condition does not pose any specific manifestation of symptoms though it may have some warning signs like headaches, chest pain, and breathing difficulty. Its major threat is to the cardiovascular functioning of the body leading to a stroke, heart attack, heart failure, vision loss or kidney disease (World Health Organization, 2021; American Heart Association, 2021). Current treatment plans usually comprise of lifestyle modification (diet, smoking cessation and physical activity) and medications and may be optimally managed by the same.

Music interventions have been found to have significant effects on vital parameters like systolic blood pressure (SBP), diastolic blood pressure (DBP), heart rate and respiratory rate (Chatterjee & Mukherjee 2020; Loomba et al., 2012). A meta-analytic review by do Amaral et al (2016) found that music significantly improved systolic blood pressure when compared with

the control group. Chatterjee and Mukherjee (2020) investigated the impact of a 30-day music therapy intervention on healthy males in the age group 50-60 years. Selected participants were assigned to two groups: the experimental group was exposed to a 20-minute session of listening to Raga Todi (instrumental) of Hindustani Classical Music and the control group was kept at rest for the same duration. Results showed a significant reduction in BP reading, pulse rate and respiratory rate in the experimental group, but no significant change in the control group. Further, Loomba et al. (2012), in a meta-analytic study also found a significant reduction in SBP, DBP and heart rate.

Numerous studies have documented the positive results of music therapy and music-related interventions on hypertensive individuals (Sari & Rekawati, 2019; Kuhlmann et al, 2016). Zanini et al. (2009) noted an improvement in blood pressure control and quality of life in hypertensive patients who took part in music therapy sessions on a weekly basis. Participants belonged to both genders (men and women) and were aged above 50 years with stage 1 hypertension. In this controlled clinical study, participants were allotted to two groups and the experimental group was exposed to a combination of active and receptive music therapy intervention. In a literature review carried out between 2008-2018, Sari and Rekawati (2019) identified 15 studies that found the efficacy of music therapy in reducing blood pressure in elderly individuals. Further, Kuhlmann et al. (2016) conducted a meta-analytic study of 10 randomized controlled trials (between 1990 – 2014) which revealed a significant decreasing trend in SBP and DBP in adult hypertensive samples.

Different types of music have been used for therapeutic purposes in hypertensive patients. A randomized controlled trial by Im-oun et al. (2018) exposed participants (in stage-2 hypertension) in the experimental group to Thai instrumental folk music once a day, for thirty days. The home blood pressure and office blood pressure of all participants were recorded.

Findings showed a significant reduction in home SBP and home DBP in the experimental group as compared to the control group, however no difference was found with respect to office blood pressure.

Certain Indian studies have utilized Indian classical music or *ragas* for therapeutic purposes (Hegde et al., 2017; Deshmukh et al., 2009; Balan et al., 2009). Godbole and Basavaraj (2014) performed a randomized controlled trial to assess the effect of Indian classical music on 120 geriatric hypertensive patients aged between 60-85 years. Only the experimental group was exposed to four 20-minute sessions of pre-recorded Indian classical music. In comparison with the control group, statistically significant reductions in blood pressure levels, respiratory rate, pulse rate and state anxiety were observed in the experimental group.

In a study on 40 hypertensive Indian educators aged 30 and above, Angeline (2018) found a reduction in the mean SBP and DBP of the participants after listening to Abhibhairav raga for 20-30 minutes for five sessions. Another study attempted to study the impact of Bhimpalas raga on the autonomic functions of hypertensive individuals (Kunikullayaa, 2015). One hundred participants (30-60 years) were randomly allotted to one experimental and one control group. The music therapy intervention was provided to the experimental group for 15 minutes daily (5 days/week) for a period of 3 months along with lifestyle modifications. Participants in the control group only received lifestyle modifications. Findings indicated a significant decrease in stress levels, SBP and DBP in both the groups. There was a rise in heart rate variability indicators in both the groups as well. As there was no significant difference between the results of the two groups, it is unclear whether the music intervention played a role in the study.

In a contradictory study, Bekiroglu et al. (2013) did not find any significant differences between the experimental and control groups with respect to blood pressure and anxiety after

being exposed to Turkish classical music. Although, there was a higher reduction in mean systolic and diastolic blood pressure in the experimental group in comparison to the control group, the difference was not statistically significant. This result may be attributed to the type of music chosen for the intervention (Turkish classical music) as different types of music affect blood pressure levels differently. Further, participants in this trial were not given the option to choose their preferred music type, which in turn may have reduced the efficacy of this intervention.

Music therapy has been used in combination with progressive muscular relaxation (PMR) to examine its effects on hypertension. Astuti et al. (2019) recorded a decrease in systolic BP and diastolic BP in hypertensive individuals who engaged in progressive muscle relaxation and music therapy. This study followed a quasi-experimental design and divided a sample of 100 hypertensive adults (employed through stratified random sampling) into an experimental and control group. The experimental group received the intervention for 11 sessions (15 minutes each). However, it is difficult to point out the efficacy of a combined intervention (PMR + Music Therapy) over a PMR only / Music Therapy only intervention.

A combination of lifestyle modification intervention and music listening resulted in lower anxiety, lower systolic and diastolic BP (Kunikullaya et al., 2015). In another study, 100 hypertensive adults were assigned to two groups: one received a combined intervention of device-guided slow breathing exercises along with music listening; the other was exposed only to the music listening intervention. Results showed a decline in SBP and DBP in the first group that received a combined intervention (Nord, 2012). Another study by Purnomo et al. (2020) assessed the effect of a combined intervention of self-hypnosis and instrumental music on the blood pressure levels of hypertensive individuals. A sample of 46 hypertensive adults was divided into two groups. The experimental group received self-hypnosis and music therapy for

three days in addition to standard pharmacological treatment whereas the control group received pharmacological treatment only. The experimental group showed significant decreases in SBP and DBP.

Although a large amount of literature points towards the beneficial effects of music and music therapy on improving physiological parameters (SBP, DBP, pulse rate, respiratory rate) in hypertensives, the focus on psychological parameters has been minimal suggesting the need for clinically stringent music based trials. Most studies have roughly considered the same outcome measures. Moreover, the 24-hours ambulatory blood pressure measurement should be used to study the changes in blood pressure on a day/night basis in hypertensive individuals receiving music therapy interventions.

Psychosocial factors like health-related quality of life, perceived stress, mood, sleep quality, anger, optimism, social support, etc. should be explored in future research. Some studies do not have an adequate sample size for generalizability of results. A majority of the studies have used receptive music therapy with music-listening being the prominent form of intervention. Further, considering that music choices are specific to cultural backgrounds, a specific form of music may not bring about the same results when applied to individuals from different cultures (Good et al, 2000).

Diabetes

Diabetes mellitus is a metabolic disease, causing high glucose levels in the body, either due to the inability of the pancreas to produce insulin or the inability of the body to use the produced insulin (World Health Organization, 2021). There are different types of diabetes conditions. Type 1 diabetes refers to an autoimmune condition in which the immune system attacks the pancreatic cells rendering them unable to produce insulin. Type 2 diabetes is a more prevalent chronic condition in which the body becomes resistant to insulin. Gestational diabetes

is another kind found in pregnant women, in which the placenta produces insulin resistant hormones thereby increasing glucose levels.

Commonly reported symptoms in a diabetic condition include excessive hunger, fatigue, lethargy, frequent urination, weight loss, etc. At an early stage these are mild and may go unnoticed. Type 2 diabetes is caused by a combination of factors such as a genetic predisposition, obesity, stress, poor nutrition, lack of exercise, and may be managed with medication and lifestyle modifications like changes in diet, exercise and stress management. If left untreated, diabetes can affect the nerves, kidneys, eyes and other important organs of the body (Watson, 2020). This condition can be debilitating in daily life and is often associated with distress, negative emotions, depression, anxiety and delirium (Kalra et al., 2018). Studies assessing the effect of music therapy on diabetes are scarce, however, most of them point towards its beneficial effects either in terms of disease management or impact on associated psychosocial factors.

A study by Cioca (2013) aimed to find the effect of music on variations in glycaemia. This experimental study recruited 120 adults divided into 3 groups of forty each: an experimental group of diabetic adults, a control group of diabetic adults and another control group of healthy adults. The mean age of all participants ranged between 56-60 years. Except the control group of diabetics, participants from both the groups were exposed to joyful and relaxing music and it was observed that blood glucose levels significantly decreased for the experimental diabetic group. No significant changes were observed in the control groups. Additionally, it was found that relaxing music and joyful music had no differential impact in lowering blood glucose levels.

Another study in India, compared the difference between silent music interventions (writing the experiences of music, likes and dislikes of music, listening to music) and active

music interventions (singing devotional songs in 'lead and follow' manner) in achieving autonomic balance in 29 diabetic patients (Rao & Nagendra, 2014). The participants (mean age = 56 years) received both silent and active music interventions, each for a period of 45 minutes. Active music intervention was found to have a superior effect to silent music intervention although both the interventions showed a significant change in their Gas Discharge Visualisation (GDV) parameters which is an indicator of autonomic balance.

The combined effect of music therapy and a non-pharmacological intervention on diabetes have also been assessed. Mandel et al. (2013) examined the impact of a diabetes self-management education / training (DSME/T) programme implemented along with music therapy facilitated by a board-certified music therapist (MT) on the health outcomes of diabetic patients. The sample included 199 diabetics (30-85 years) who had either type 1, type 2 or pre diabetes and were divided into 3 groups: DSME/T group, DSME/T plus MT group and DSME/T plus music-assisted relaxation and imagery via CD recording (MARI CD) group. The MARI CD group was exposed to music selected by the researcher and verbal suggestions, while the MT group was exposed to relaxing and energizing music selected by the participants. This study illustrated that DSME/T correlated with all measured outcomes such as blood pressure, glycosylated hemoglobin (A1C), body mass index (BMI), trait anxiety, state anxiety, and stress. The music intervention groups (MT and MARI CD) had significantly larger reductions in SBP and DBP. The study highlighted that music therapy facilitated by a board-certified music therapist along with patient education may help elevate diabetes management.

Music media therapy has also been used along with lower extremity exercise in a study by Ji et al. (2015) to find its effects on diabetic patients' adherence to exercise. A sample of 72 diabetic adults were allotted to an intervention group ($N=34$) and a control group ($N=38$). Participants in the intervention group were exposed to a composed instrumental piano song of

4/4 beat from the 'soothing aesthetic' genre (selected by participants) while engaging in 15 minutes of lower extremity exercise daily for 6 months. The intervention group showed higher adherence to the exercise regimen even after three months in comparison to the control group. After six months, the intervention group showed improvements in physiological indicators of blood circulation as well.

Contradictory evidence has also been found by Groener et al. (2015) in their investigation of group singing as a therapeutic technique for insulin-dependent diabetic patients. Thirty-five diabetic adults were selected to participate in the trial, 18 were allocated to the experimental group and 17 were allocated to the control group. Both groups completed a diabetes education programme; the experimental group further participated in a group singing intervention (led by a trained music teacher) for 3 days after attending the education program. The study found a weak effect of group singing on patients' mood and no significant effect on glucose control, quality of life and stress. The result could be attributed to the short duration of the intervention (3 days). A longer duration of the intervention might be able to bring about better results.

An Indian study (Singh et al., 2015) reported yoga to have superior effects compared to music therapy or standard care alone in diabetic individuals. This randomized controlled trial recruited diabetic adults into 3 groups: 112 in a yoga group (mean age = 50 years), 110 in a music group (mean age = 50 years) and 115 in a control group (mean age = 49 years). The yoga group practiced pranayama and yoga-asanas for 6 months after a training period of 2 weeks. The music group received receptive music therapy and listened to Indian classical instrumental music for 30 minutes twice a day over a period of 6 months. After 6 months, the outcome measures showed that practicing yoga as well as music therapy had positive effects on glycemic control, lipid profile, BMI, anxiety, depression, self-efficacy and quality of life in

diabetes patients. Significant improvements were observed in the music group; however, the changes were much higher in the yoga group. It is important to note that the music intervention was not facilitated by a board-certified music therapist in this study.

Paucity of evidence makes it difficult to assess the role of music therapy in diabetes care. Replication of research is required with higher sample sizes to arrive at a definite conclusion. Further, there is an absence of a licensed music therapist in most of the studies. These limitations should be confronted in future research.

Cancer

A cancer diagnosis brings with itself immense fear and stress for patients as well as their families. Cancer refers to a group of diseases that involve uncontrollable and abnormal cell growth in one or more parts of the body. Carcinoma, sarcoma, lymphoma, leukemia and melanoma are some types of cancer. The most common cancers in the year 2020 were cancers of the breast, lung, colon and rectum, prostate, skin and stomach (Ferlay et al., 2020). A genetic predisposition in combination with physical carcinogens (UV rays, ionizing radiation) or chemical carcinogens (asbestos, tobacco smoke, arsenic) or biological carcinogens (infections due to bacteria, viruses or parasites) causes malignant tumours to grow and metastasize. The symptoms of this disease vary with the type of cancer and they usually include, but are not limited to, fatigue, lumps in the body, cough or hoarseness, night sweats, sudden weight changes, bladder/bowel changes, etc. All types of cancers are treated through surgery, chemotherapy and/or radiation therapy. During the early stages of the disease, chances of complete cure are high if intervened in a timely and effective manner (National Cancer Institute, 2019; World Health Organization, 2021).

While music does not directly help in the treatment of cancer, it has been found to reduce patients' symptomatic complaints. Music therapy when used in conjunction with

conventional cancer treatments, has been found to positively control or reduce symptoms of pain, discomfort, fatigue and improving overall quality of life in cancer patients as well as survivors (Krishnaswamy & Nair, 2016; Alcântara-Silva et al., 2018; Hilliard, 2003).

The psychosocial impact of cancer involves a range of negative emotions along with changes in personal relationships (Stanczyk, 2011). Anxiety, depression, denial, uncertainty, fear of death, poor quality of life, anger, isolation, body image issues, etc. are common psychological outcomes of dealing with cancer. Although conventional treatment focuses on treating the disease through surgery, chemotherapy and radiotherapy; it does not target such psychosocial factors which also play a role in maintaining the disease state. Further, as a consequence of medical treatment, cancer patients experience secondary effects like pain, nausea, fatigue, loss of appetite, loss of interest, isolation, body image issues, and depressive symptoms (Carelle et al, 2002).

A large body of research points towards the beneficial effects of music therapy in cancer care. Several studies have confirmed the positive effects of music therapy on symptom management of cancer. Music as a therapeutic intervention has been found to alleviate pain, anxiety, depression, nausea, fatigue and other side-effects of radiation and chemotherapy. Patients also experienced improvement in overall quality of life and relaxation (Rossetti et al., 2017; Jasemi et al., 2016; Hilliard, 2003; Potvin et al., 2015).

Music therapy has been targeted to improve the sleep quality of cancer patients. Vinayak et al. (2017) found an enhancement in sleep quality in hospitalized cancer patients. This RCT was carried out on 184 patients who were assigned to a control group and two experimental groups – active music therapy group (AMT) and receptive music therapy group (RMT). The AMT group participated in daily 20–30 minute sessions of playing a musical instrument (guitar) and singing along with it for 10 days; whereas the RMT group participated

in music-listening sessions of their preferred songs for the same duration. The control group ascribed to normal routine medical care. Post-test results showed a significant improvement in sleep quality scores in the experimental groups. Further, active music therapy was found to be more effective than receptive music therapy.

In another study, Lafci and Oztunc (2015) studied sixty hospitalized breast cancer patients (27-69 years) who were divided into an experimental (N=30) and a control (N=30) group. The experimental group was exposed to a music-listening session of Turkish soft classical music every night before bedtime for a period of 7 days while the control group continued with standard medical care. Sleep quality of the experimental group significantly improved whereas sleep quality of the control group worsened during their stay at the hospital.

Music therapy has also been associated with themes of spirituality in cancer patients. McClean et al. (2012) conducted a qualitative study on 23 cancer patients who attended a 5-day residential retreat programme at a cancer care center. The active music therapy sessions were facilitated by a music therapist for duration of 1.5 hours. Post session telephonic interviews with the participants revealed the emergence of themes related to spirituality such as transcendence, connectedness, search for meaning, and faith and hope. Studies have also found an increase in spiritual well-being in patients after music therapy sessions in hospital/hospice settings (Renz et al., 2005). Cook and Silverman (2013) conducted a mixed-methods study on 17 hospitalized cancer patients to examine the effect of music therapy on spirituality. Participants were randomly divided in 2 groups (experimental and control). A certified music therapist conducted three sessions of active music therapy in the experimental group. Posttest results showed significant increases in peace and faith scores in the experimental group. A qualitative analysis revealed that music therapy helped them feel closer to God and also improved their mood.

A review by Gramaglia et al. (2019) showed that music therapy has been used in combination with non-pharmacological interventions in several studies to improve quality of life and reduce depression, anxiety and pain perceptions. A RCT was conducted by Zhou et al. (2015) on 170 breast cancer patients to examine the effect of music therapy coupled with progressive muscle relaxation training (PMR) on health outcomes. A sample of 170 participants were divided into 2 groups (experimental and control). The experimental group (N=85) received music therapy and PMR within 48 hours of radical mastectomy, twice a day for 30 minutes. Results reported a reduction in depression, anxiety and length of hospital stay in the experimental group after receiving music therapy coupled with progressive muscle relaxation training.

The Bonny Method of Guided Imagery and Music (BMGIM) has been used by Burns (2001) to investigate its effect on cancer patients. A sample of eight cancer patients were equally divided into an experimental and a control group. In the experimental group, BMGIM elevated mood, improved quality of life and increased well-being (physical, psychological and spiritual) too. Interestingly, participants' scores on mood and quality of life continued to increase even after the intervention was completed. A doctoral dissertation used qualitative methods to assess the impact of BMGIM for 10 sessions with cancer survivors (N=6). The intervention was conducted by a therapist twice a week for 5 weeks. Participants exposed to this intervention reported improved mood, new perspectives on past/present/future, enhanced hope, improved self-understanding, coming to terms with life and death; and opening towards spirituality (Bonde, 2005).

BMGIM was also utilized by in another doctoral dissertation work by Bhana (2016) on a sample of 24 cancer patients. Quantitative analyses indicated improvements in psychological and spiritual well-being, and decrease in fatigue and pain severity. In addition, qualitative

analysis surfaced four themes: development of coping strategies, experience of physical wellbeing, psychological wellbeing, and spiritual wellbeing.

Bradt et al. (2015), in their study on cancer patients, compared the effect of music therapy and music medicine on psychological outcomes. The study followed a mixed methods approach in a sample of 31 adult cancer patients who were exposed to two sessions of music therapy (involving interactive music making) facilitated by a music therapist and two sessions of listening to pre-recorded music. According to the quantitative data obtained, both the interventions were equally effective in improving symptom management. Themes such as hope for survival and connecting to a pre-illness self emerged. However, participants preferred to choose music therapy over music medicine as they believed it helped them embrace their creative and playful side.

Chronic Obstructive Pulmonary Disease (COPD)

Chronic Obstructive Pulmonary Disease is a group of progressively declining lung diseases that are characterized by emphysema, inflammation of the lungs and obstruction of airflow resulting in breathing difficulty, dyspnea, sputum production, cough and wheezing. Smoking is one of the major reasons of COPD. Long-term exposure to fumes/dust or genetic causes may also result in the development of COPD. Treatment includes taking inhalers and regular medication, pulmonary rehabilitation, surgery/lung transplant and making lifestyle choices such as quitting smoking. In the absence of treatment, symptoms progressively deteriorate (British Lung Foundation, 2019).

Music therapy is studied on both physiological and psychological parameters in COPD patients. A randomized control trial in China (Liu et al., 2019) examined the effects of group singing on depressive symptoms and quality of life in individuals diagnosed with COPD. A sample of sixty participants was recruited for this study. The experimental group (N=30)

engaged in group singing once a week for 24 weeks and received routine health education. The control group received routine health education only for the same period. Results showed a reduction in depressive symptoms and an increase in quality of life scores at 3 months and 6 months after intervention.

Another study compared the effects of a singing intervention and a handicraft intervention, when coupled with physiotherapy on pulmonary function parameters and quality of life in 30 COPD patients (Bonilha et al., 2009). Participants were equally put into two groups. The singing practice intervention was conducted by a singing teacher and a physiotherapist. The intervention consisted of relaxation exercises followed by various singing exercises. On the other hand, the handicraft intervention led by a physiotherapist and a handicraft work teacher consisted of relaxation exercises followed by the execution of handicraft work like paper folding, collage and drawing. A comparison between the health outcomes of the two groups indicated that the singing group showed improvements on maximal expiratory pressure, dyspnea, and inspiratory capacity ($p = 0.01$), and decreases of expiratory reserve volume. Both the groups displayed improved scores of quality of life.

McNaughton et al. (2016) conducted individual interviews and focus group discussions with COPD patients to explore the ways in which community singing group participation affected their health and well-being. Group singing was described as a highly positive experience for the participants. Four key themes that emerged out of the study were: being in the 'right space', connection with others, experience of purpose and growth and participation in a meaningful activity.

Canga et al. (2015) examined the impact of active music therapy as an adjunct to pulmonary rehabilitation in COPD patients through an RCT. A sample of 98 COPD patients diagnosed with GOLD stages II/III/IV (48-88 years) were selected for the study. Certified

music therapists provided music therapy to the experimental group through live music visualizations, wind instrument playing inclusive of clinical improvisation, and singing in addition to pulmonary rehabilitation for a duration of six weeks. The control group received standard pulmonary rehabilitation only. Active music therapy in combination with pulmonary rehabilitation was found to decrease depressive symptoms, perceived dyspnea and enhance a sense of control in COPD patients; in comparison to pulmonary rehabilitation only. This study strongly suggests the implementation of music therapy as an adjunct therapeutic technique.

Further, Singh et al. (2009) employed a sample of 72 Indian COPD patients who underwent a recent episode of exacerbation to assess the impact of music therapy (MT) and progressive muscle relaxation (PMR) on health outcomes through a randomized controlled study. The experimental group received music therapy by listening to music selected by the participants ranging from 60-80 beats per minute for a period of 30 minutes. The control group practiced PMR through a pre-recorded audio set of instructions. After two sessions, significant results were found in both groups. However, compared to the PMR group, COPD patients exposed to the MT group experienced reduced anxiety, dyspnea, systolic blood pressure, pulse rate and heart rate.

Another study compared the difference between the effect of Western classical music and Turkish classical music on physiological and psychological measures of 96 hospitalized COPD patients (Horuz et al., 2017). Participants were divided into 3 groups: one was exposed to Western classical music; another was exposed to Turkish classical music and the third group was a control group. Although both experimental groups showed decreased anxiety, systolic blood pressure and diastolic blood pressure, in comparison to the controlled group; no significant differences between the two groups were observed.

The effect of music therapy has been studied on various outcome measures in COPD patients. A Chinese five-element music therapy intervention based on the midnight-noon ebb-flow theory was used to examine its effect on the sleep quality of COPD patients (Zhang et al., 2017). A sample of sixty patients were allocated to an experimental group (N=30) and a control group (N=30). Music-listening sessions were provided to the experimental group for 30 minutes over a period of 8 weeks. Standard medical care was provided to the control group. Findings indicated an improvement in sleep quality and reduction in daytime fatigue in the experimental group in comparison with the control group.

Another study recorded the beneficial effect of rhythmically enhanced music to increase 6-minute walk distance in COPD patients (Hernandez et al., 2020). Twenty five men with moderate-to-severe COPD were selected to complete three 6-minute walk tests: with music, with rhythmically enhanced music and with no music. Results showed that participants walked 12 meters farther ($p=.015$) during the test in the rhythmically enhanced music condition when compared with the other two conditions.

Evidence related to this section is inconclusive as several gaps in literature exist. Though, a majority of the studies showed positive results of music therapy on COPD patients, elaborate investigations are required to assess the impact of music therapy on COPD. There is insufficient information with regard to the effect of combined interventions on the illness. Further, differences between active and passive music interventions need to be examined.

Music Therapy and Arthritis

Arthritis refers to a group of diseases that affect the joints of the body and the tissues that surround the joints. Degenerative arthritis, inflammatory arthritis, infectious arthritis and metabolic arthritis are the different types of arthritis. Symptoms of this condition include pain, swelling, stiffness of joints and a decreased range of motion. It is more common

in women, than men; and is managed using medication, physical or occupational therapy, assistive aids, patient education and support, and joint replacement surgery. If left untreated, the condition will progressively worsen and lead to disability (Nichols, 2017).

The outcome of music therapy on arthritis is documented by only a handful of studies. Although sparse, studies do show the beneficial effect of music therapy on lessening pain due to arthritis and osteoarthritis (McCutchen, 2007; Santos & Carvalho, 2012; McCaffery & Freeman, 2003).

Ottaviani et al. (2012) evaluated the impact of a music therapy intervention on osteoarthritis patients undergoing knee joint lavage surgery. A sample of 62 participants (mean age = 68.8 years) were randomly allocated to an intervention group ($N=31$) and a control group ($N=31$). The intervention group was exposed to recorded music that was played during the preparation for the procedure as well as during the entire procedure. No intervention was given to the control group and participants underwent standard medical procedure. Participants belonging to the intervention group reported a decrease in pain, heart rate and perioperative anxiety levels. Additionally, tolerability of the surgical procedure was also found to be higher in these patients. However, no difference in SBP or DBP was found compared to the control group.

Four case studies aimed to inspect the effect of music therapy on the management of hand osteoarthritis in older adults (Zelazny, 2001). Four participants received a music therapy intervention for 30 minutes, 4 days a week over a period of 4 weeks. The intervention involved playing melodies on an electronic keyboard. The researcher found that keyboard playing decreased arthritic discomfort and increased finger strength/dexterity, range of motion and finger pinch meter in the participants. In addition, participants also found an improved structure of their leisure time and increased socialization.

Jeong et al. (2010) recruited a sample of 31 women with osteoarthritis who received a Korean music therapy intervention (Jang-Gu) twice a week, for 12 weeks. Findings indicated a decrease in body discomfort but no changes in depression, stress and pain scores. Further, a comparative study by Innes (2018) aimed to assess the impact of mantra meditation versus music listening on health outcomes of older adults with knee osteoarthritis. A sample of 21 participants were randomized into a mantra meditation (MM) group (N=11) and a music listening (ML) group (N=11). Both groups were instructed to practice their respective interventions for 15-20 minutes twice every day, for a period of 8 weeks. Both groups showed significant decreases in pain and discomfort along with greater improvements in sleep, mood and quality of life; however, greater changes were noted in the MM group as compared to the ML group.

As the literature available in this area is still in its infancy, more studies are required to assess the effect of music therapy on arthritis and to replicate results. The limited evidence available is not decisive as most of the studies have an inadequate sample size and an absence of a control group. Further, there is a lack of clarity regarding the presence of a trained music therapist while delivering the intervention. Majority of the studies have used receptive music therapy on the participants, therefore, the effect of active music therapy on arthritis should also be investigated.

Conclusion

In summary, it may be said that this review found a trend of therapeutic properties of music therapy on chronic illnesses. Music therapy is associated with positive outcomes across different chronic illnesses. It does not affect the disease itself but focuses on the physiological and psychological needs that arise from treatment. However, a cause-effect relationship cannot be established between the two as there is a lack of sufficient literature.

The application of music therapy in chronic illness care is in its nascent stages and plenty of studies are required to assess and replicate the role of music therapy in chronic illness. Such studies need to be well-designed, randomized and controlled with a high sample size. Studies comparing different types of music need to be carried out. Further, the combined effect of music therapy and other interventions may be explored. It is imperative to keep in mind that the presence of a music therapist is essential for the facilitation of music therapy. However, most experimental studies do not have certified music therapists to deliver interventions. This aspect should be looked into during the research process.

Music therapy is widely used in developed countries. Majority of music therapists who belong to the United States work in the field of oncology (Stanczyk, 2011). Although music therapy is not a new concept to India, it is not an established profession in the Indian healthcare system due to lack of awareness and scientific research. The healing effects of Indian classical music have been documented in ancient Indian texts like the *Vedas* but there is a dearth of Indian scientific studies assessing the impact of music therapy in health and illness.

Music therapy is a valuable, harmless and cost-effective non-pharmacological intervention. Interactive music therapy can be used to develop rehabilitation programmes for cardiac and pulmonary disease patients. Therefore, further research should be carried out to throw light on its therapeutic effects for holistic patient care.

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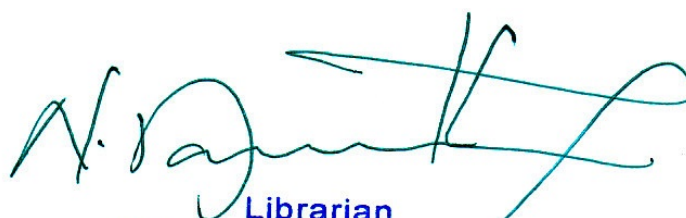
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Measuring Resilience: Standardization of the Mathematical Model

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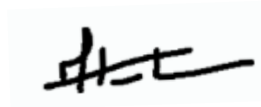
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