

**IMPACT OF HOPE, RESILIENCE, AND COGNITIVE FLEXIBILITY ON STRESS
AND IMMUNITY**

A Thesis submitted

In the partial fulfilment of the requirement for the degree of

MASTER OF ARTS

IN PSYCHOLOGY

(Clinical)

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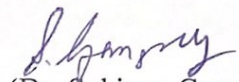
CERTIFICATE

This is to certify that the thesis entitled "**Impact of Hope, Resilience and Cognitive Flexibility on Stress and Immunity**" being submitted in partial fulfillment of requirements for the award of degree of Masters of Arts in Psychology, submitted in the Thapar School of Liberal Art & Sciences, Thapar Institute of Engineering & Technology, Patiala is a bonafide work carried out under the supervision of Dr. Sohinee Ganguly, Professor, School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology, Patiala and that no part of this project has been submitted for the award of any other degree



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This is to certify that the above statement by the student concerned is correct and true accurate and the best of my knowledge.



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CANDIDATE'S DECLARATION

I hereby declare that the work presented in this thesis entitled, **"Impact of Hope, Resilience and Cognitive Flexibility on Stress and Immunity"** in fulfilment of the requirement for the award of Degree of **Master of Arts in Psychology**, submitted to the **School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology**, Patiala, is an authentic record of my own work carried out under the supervision and guidance of Dr. Sohinee Ganguly, Professor, School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology, Patiala and refers other researcher's work which is duly listed in the reference section.

The matter embodied in this thesis has not formed the basis for the award of any other degree at this or any other university.

Date- 15 June 2022

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ABSTRACT

This study focused on the relationship between Hope, Resilience, Cognitive Flexibility, Stress and Immunity by using a sample of individuals aged between 18 to 30 years. The sample consists of 200 individuals. The adult hope scale was used which was developed by Snyder in 1997. To measure resilience, Brief Resilience Scale developed by Smith et al in 2008 was used. Also, Cognitive flexibility scale developed by Martin and Rubin (1995) which estimates individual's attention to correspondence choices, readiness to adjust to the circumstance, and self-viability in being adaptable was used. To measure stress, Cohen's (1988) perceived stress scale was used. Also, the immune status questionnaire developed by Wilod Versprille et al. in 2019 was used. The results indicated that there exists a negative relationship between hope and stress; resilience and stress; and cognitive flexibility and stress. Also, a positive relationship was found with resilience and immunity and cognitive flexibility and immunity.

Keywords: Immunity, Resilience, Cognitive flexibility, Hope, Mental flexibility, Stress, Perceived Stress

CHAPTER 1

INTRODUCTION

1.1 Hope

Hope for the future empowers compelling adaptation to formative difficulties. It explains choices for people and assists them with analyzing wellsprings of individual strength by identifying with the future and not just depending on the past (Sharabi et al., 2012). A few analysts have attempted to characterize hope and have underlined various parts of this construct. Snyder (2002) offered a definition where hope joins individual insights, to produce elective ways of accomplishing desirable objectives. Others have proposed that hope is an individual asset that can be created and cultivated and which is fundamental for adapting achievement, and direction.

While Snyder (1994, 2000) focused on the conceptual part of hope, Jacoby and Goldzweig (2014) clarified Snyder's concept of hope and recognized three sub-thoughts that highlight the profound pieces of hope. In their view, the term intrapersonal hope alludes to hope in which an individual investigates him/herself while evaluating his/her resources. Interpersonal hope alludes to the connections one has with various critical and significant people whom one can trust. Transpersonal hope alludes to hope that depends on extraordinary powers and which provides a person with a feeling of significance and reason (Jacoby and Goldzweig, 2014). The portrayal of hope in this manner is associated with the idea of self-amazing quality, which additionally addresses awareness that is identified with different sources from one's interior self to one's current circumstance and widening to incorporate the universe (Wong, 2016).

Moreover, Hope is characterized as the apparent ability to determine pathways to wanted objectives, and propel oneself through organizational thinking to utilize those pathways.

There are two aspects of hope- Agency (goal-directed energy) and Pathway (planning to accomplish goals).

1.2 Resilience

Resilience alludes to positive transformation, or then again, the capacity to keep up with or recover emotional well-being, despite encountering difficulty (Wald et al, 2006). Personality characteristics (transparency, extraversion, and appropriateness), inward locus of control, dominance, self-efficacy, confidence, intellectual evaluation (positive translation of occasions and strong reconciliation of affliction into self-account), and good faith all obvi to resilience.

The past literature on resilience demonstrates that cognitive functioning, intellectual adaptability, social connection, positive self-ideas, emotion regulation, positive feelings, otherworldliness, dynamic adapting, solidness, confidence, trust, creativity, and versatility are related to resilience (Joseph & Linley, 2006). Previous findings of research on biological and genetic factors in resilience (Luthar & Brown, 2007) suggest that harsh early environments can affect developing brain structure, function, and neurobiological systems (Cicchetti & Cohen, 2006). Changes may occur in brain size, neural organizations, the affectability of receptors, and the synthesis and reuptake of neurotransmitters (Curtis & Nelson, 2003). These actual changes in the brain can generously worsen or lessen weakness to future psychopathology (Cicchetti & Cohen, 2006). Brain changes and other biological processes can influence the ability to moderate negative emotions, and thereby affect resilience to adversities. An EEG study (Curtis & Cicchetti, 2007) in abused and non-maltreated youngsters matured 6 to 12 years saw critical cooperation in examples of EEG action between resilience, abuse status, and sexual orientation.

On a microenvironmental level, social help, including associations with family and companions, is related to resilience. Secure connection to a mother, family solidness, secure connection with a non-harmful parent, great nurturing abilities, and nonappearance of

maternal wretchedness or substance misuse are related to fewer conduct issues and better mental prosperity in abused youngsters. Social help can emerge out of sure friends, strong instructors, and different grown-ups just as close family (Herrman et al, 2011). On a macro systemic level, local area factors, for example, great schools, local area administrations, sports and imaginative openings, social variables, spirituality and religion and, also, absence of openness to viciousness, add to resilience (Luthar & Cicchetti, 2000).

1.3 Cognitive Flexibility

Cognitive flexibility is the human capacity to adjust the cognitive handling techniques to confront new and unexpected conditions in the climate (Canas et al. 2003). This definition includes three significant idea characteristics. First and foremost, Cognitive Flexibility is a capacity that could infer a course of realizing, that is, it could be acquired with experience. Besides, Cognitive Flexibility involves the transformation of cognitive handling strategies. A procedure, with regards to this definition, is a sequence of tasks that search through an issue space (Payne et al. 1993). Cognitive flexibility, subsequently, refers to changes in complex practices, and not in discrete responses. At long last, the adaptation will happen to new and unexpected ecological changes after an individual has been playing out an errand for quite a while.

Moreover, to be adaptable, an individual needs to zero into considerate these conditions consistently. What's more, all together to adapt their conduct to the new conditions, the person needs to rebuild their insight to effectively interpret the new circumstance and the new assignment requirements. Cognitive flexibility, in this manner, relies upon attentional processes and information portrayal. Spiro and Jehng (1990) have proposed the Cognitive Flexibility Theory as indicated by which individuals who represent a portrayal of the task according to numerous points of view can undoubtedly decipher situational changes in the environment and, hence, can be all the more cognitively adaptable. These individuals,

therefore, can rapidly rebuild their insight, henceforth adjusting their reactions to fundamentally changing situational requirements.

1.4 Immunity

A satisfactorily functioning immune system is fundamental for the body to perceive and safeguard itself against openness to outer specialists, including microorganisms, infections, and substances (e.g., liquor and medications). Different natural variables, ways of life, and ways of behaving can influence immune functioning, both decidedly and adversely (Velde, 2016). Openness to mental elements (e.g., stress) can likewise affect immune functioning. The immune system assumes a significant part, either positive or negative, indifferent infections and problems and is a significant well-being determinant (Moldofsky and Dickstein, 2016). For example, adjusted immune working could pronouncedly influence conventional physiological cycles and yet is related to the pathology of various relentless ailments as well as specific mental problems like misery and chemical imbalance (Smith, 1991 & Warren, 1986). A blend of neuroinflammatory, neuroendocrine, and metabolic effects can achieve lessened immune working and, in this manner, unfavourably influence the flourishing and individual fulfillment (Dickstein, 1999). To recognize individuals in danger of infection (Chaussabel et al., 2010), surveying how well the immune system capacities, i.e., immune wellness, means quite a bit to empower early intervention for instance.

There are multiple ways of assessing immune functioning. The most often involved include objective subjective and quantitative appraisals in blood, e.g., counts of the sort and number of immune cells, immune go-between like cytokines, chemokines, and antibodies (Chaussabel et al., 2010). Such measures are generally costly, dreary, and meddling. Indeed, even painless evaluations in salivation or pee require expert assets and can be viewed as a burden on those being surveyed. Furthermore, there is typically a period of delay before

results are accessible.

1.5 Stress

Selye (1956) utilized the expression "stress" to address the impacts of whatever truly compromises homeostasis. The genuine or perceived danger to an organic entity is alluded to as the "stressor" and the reaction to the stressor is known as the "stress reaction".

Perceived stress is the emotions or considerations that an individual has about how much stress they are under at a given moment or throughout a given time frame. Perceived stress consolidates emotions about the unmanageable and incalculable of one's life, how frequently one needs to manage disturbing issues, how much change is happening in one's life, and trust in one's capacity to manage issues or challenges (Lazarus and Folkman, 1984). It isn't estimating the sorts or frequencies of stressful occasions which have happened to an individual, yet rather how a person feels about the overall stressfulness of their life and their capacity to deal with such stress. Individuals could encounter relative negative life events yet survey the impact or earnestness of these to different degrees due to factors like adjusting to new situations, and backing. Along these lines, perceived stress mirrors the collaboration between an individual and their current circumstance which they assess as compromising or overpowering the resources that will influence their health (Lazarus and Folkman, 1984).

Albeit different circumstances will quite often inspire various examples of stress reactions, there are additionally individual contrasts in stress reactions to a similar circumstance. This inclination to display a specific example of stress reactions across an assortment of stressors is alluded to as "reaction stereotypy" (Lacey and Lacey 1958). Across a collection of conditions, a couple of individuals will for the most part show stress responses connected with dynamic adjusting, however others will by and large show stress responses more associated with aversive caution (Kasprowicz et al. 1990, Llabre et al.1998)

CHAPTER 2.

REVIEW OF LITERATURE

2.1 Hope and Stress

The human way of behaving is coordinated towards a reason and decides the heading of mental action. The methodologies for achieving the intention are the perspective on having the choice to convey appropriate procedures for achieving the motivation behind life (Snyder, Rand, and Sigmon, 2002). Individuals who contemplate themselves display perspectives that will work on their reasoning (Pierce and Gardner, 2004). In a study on KPSS (Personnel selection examination) students revealed that KPSS applicants might encounter elevated degrees of stress because of these negative circumstances. Future disquiet and trepidation about separation from the family, and difficult demeanor could occur (Wohl, DeShea, and Wahkinney, 2008). On account of these situational factors, the issue is that the students who are living, the hope diminishes, and the more they perceive stress.

Sucan (2019) also found a negative and significant association between levels of hope and perceived stress. In various research studies, the positive inspiration, interest, effort and positive feelings of the individuals in their academic career are good; a negative relationship was found between stress and hope (Vilaythong et al., 2003; Snyder et al., 2000; Snyder et al., 2002; Pekrun et al., 2002). Factors such as negative thinking, worry about the future and peer pressure would increase the perceived stress of the candidates. The negative idea made by an undeniable level of stress, along with the backing of the family, will add to the hopefulness of the individual. In actuality, it is said that social help decidedly influences the mental prosperity of young people, and anticipates hopeful thinking by further developing their adapting abilities (Won, 2011). Also, Özdemir and Özdemir, 2015 conducted a study on students and found out that education stress was increased when students have low levels of

hope. Similarly, Lee and Hwang, 2016 opined that a negative relationship exists between self-esteem, hope, social support, and stress.

2.2 Resilience and stress

Resilience is the capacity to "return quickly" or recuperate from stress (Bonanno, 2004; Ong et al., 2006; Smith et al., 2008). The process of resilience incorporates an arrangement of betterment-based considerations, behavior, and activities that can be created by anybody instead of a stable quality an individual has (Bonanno and Mancini, 2008; Loh, Schutte, and Thorsteinsson, 2013). Elements of resilience incorporate emphatically reappraising stressful situations, upgraded capacities to direct feelings, and prevalent executive working control (Chmitorz et al., 2018; Graber, Pichon, and Carabine, 2015). Specifically, the Broaden and Fabricate model of positive feelings (Fredrickson, 2001) might be particularly helpful in explaining how people increment resilience even with stress. Of note, positive feelings help renew physiological and mental resources (Folkman, 2008) to diminish the impacts of stress on significant results (Bryant and Veroff, 2007).

Rutter in 2006 suggested that more elevated levels of resilience direct the degree to which people experience pessimistic stress-related results. Moreover, a study by Steinhardt et al., 2008 suggested that those young adults who had poor resilience were less capable of dealing and coping with stress and it was opined that those who had better resilience were able to easily cope up with stressful situations and also poor coping skills were observed in people having low resilience.

Another study by Tung et al., 2014 found that higher stress levels have been observed in those having lower resilience and therefore they might suffer from associated symptoms that can cause lower quality of life and general health. Similar results to the present study were found by Khalsa et al., in 2012.

2.3 Cognitive Flexibility and Stress

In young humans, learning and memory under intense stress are characterized by increased use of inflexible constant response strategies at the expense of flexible cognitive methodologies (Schwabe & Wolf, 2009). Cognitively inflexible people will quite often answer to stressful circumstances unbendingly and responsively or, at the end of the day, go through cognitive combination, making it hard to find the purpose (Tyndall et al., 2018). a study by Alexander et al., 2007; Plessow et al., 2011 on humans, and a study by Laredo et al., 2015 on rodents found that cognitive flexibility is affected in stressful situations. The study on rodents even suggested that less cognitive flexibility is more likely to be seen in men than women in stressful situations. Whenever changes are expected to dynamic coping methods, inflexible people depend on a similar technique, no matter what its purpose and results; this adds to inflexible people's load (Karekla& Panayiotou, 2011; Rueda and Valls, 2020). Ex-forthcoming more resources on the aversion process makes the evasion methodology inflexible (Kashdan et al., 2006), and endeavors to suppress and avoid feelings that are in many cases inordinate and even increment the recurrence of contemplations and feelings that cause stress (Gross, 2002). Then, high stress makes people see what is happening as a danger and to become inflexible in deciding on coping techniques (Gomes et al., 2013).

Moreover, many studies done on cognitive flexibility and stress found there exists a negative relationship between the two variables. This includes a study by Han et al., 2011 on starters and non-starter athletes found that athletes who had high cognitive flexibility had lower stress levels at the start and end of the game. Also, a study by Kvetnanský et al., 1998 suggested that adjustment of cognitive flexibility and those tasks requiring cognitive flexibility affect the performance of the athletes, and Masaoka et al., 2007 opined that cognitive flexibility in starter athletes would control uneasiness as time elapsed which permitted the competitors to keep their play stable while defying stressful and restless circumstances.

2.4 Hope and Immunity

Hope may be perceived to be a positive inspirational form that empowers individuals to continue on towards objectives and pathways (Synder et al., 1991). Because of Snyder's work on hope and others, diagnostic instruments have been created to gauge hope and hopelessness, which have been utilized to assess the relationship with mental and social health (Boyle et al., 2014). It was found that hope has a positive relationship with the psychosocial process and results in cognitive flexibility, positive affect, life fulfillment the feeling of direction, personal satisfaction, and social help (Ciarrochi et al., 2015). Alternately, low degrees of hope - or hopelessness - have been emphatically connected with a raised risk of psychological well-being issues like nervousness, depression, and posttraumatic stress disorder.

According to Seligman, 1975; Taylor, 1991, hope has been related to well-being and fruitful adapting while discouragement, depression, and sadness have been connected to capitulation, disease, and even death. Many studies have shown a connection between health and states of hope (Gottschalk, 1974; Snyder, Harris, Anderson, Holleran, Irving, Sigmon, Yoshinobu, Langelle, & Harney, 1991). A study by Long et al in 2020 suggested that those study participants who had high levels of hope were found to have fewer chronic diseases, but less strong or no association was found with some chronic diseases such as stroke, diabetes, and hypertension. Also, it was also found that there exists a positive relationship between hope and psychosocial well-being. Moreover, this study also highlights the association between increased levels of hope with reduced experience of chronic pain and sleep problems.

Furthermore, many studies have explored the relationship between hope and cancer. It was found that moderate hopelessness was associated with incident cancer. Also, it was observed

in a study that the probability of cancer was reduced to 12% for those who had high levels of hope.

2.5 Resilience and Immunity

Resilience is personally connected with emotional well-being and is viewed as a significant part of psychosocial change (Truffino, 2010). There is a relationship between a few mental sicknesses such as depression and anxiety and physical diseases with rates going from 0 to 70% (Trask et al., 2000). Depression is 5 to 10 times more noteworthy in people who are actually sick. Resilience can be described as the ability to keep a consistent amicability (Bonanno, 2004). More established grown-ups who are versatile to untimely insusceptible dysregulation age more effectively than their partners.

Furthermore, a study by Wagnild in 2009 proposed that high resilience scores are positively associated with physical health and lesser symptoms, and it is contrarily associated with depression and other psychiatric disorders, therefore determining the quality of life. Also, another study by Girtler in 2010 suggested that certain facets of resilience that involve optimism, vitality, positive emotions, and extroversion are associated with increased efficacy, coping and physical activities, and acceptance of social support leading to better immune functioning. Moreover, a study by Norte et al., 2011 suggested that interventions that help to develop resilience in patients with post-traumatic stress disorder helped in the reduction of symptoms such as reduction in heart rate, respiratory rate, skin conductance, cortisol levels, and sympathetic balance. Also, similar interventions in the non-clinical sample were performed and it was observed that there was the prevention of mental and physical diseases along with improvement in well-being (Millar et al., 2008). It has been proposed that people who are considered versatile have superior mental and actual well-being through emotional, mental, and conduct adapting pathways (Segerstrom et al., 2003). It has been shown that joy,

which is decidedly associated with resilience, has an impact on the view of health (Lu et al., 2014). Moreover, Sabatini observed that satisfaction was the best indicator of abstract wellbeing status (Sabatini, 2014). Identifying indicators of resilience, tough qualities, and cycles that upgrade resilience is vital to foster mediations to further develop well-being results.

2.6 Cognitive Flexibility and Immunity

Cognitive flexibility alludes to a person's(a) mindfulness that in some random circumstance there are choices and options accessible to the person in question, (b) ability to be adaptable and adjust to the circumstance, and (c) self-viability in being adaptable (Martin and Rubin, 1995). Cognitive flexibility, thus, might actually empower a person to adapt to outer and inner stressors, and consequently, flexibility might actually impact a young adult's health. A study by Segrin and Flora (2000) revealed that people with more significant levels of relational abilities either directly or indirectly experience more significant levels of psychological, social, and physical well-being.

Although limited literature was found stating the relationship between cognitive flexibility and immunity. Most of the studies found a positive relationship between cognitive flexibility and immunity. An interesting study by Dawson & Golijani-Moghaddam in 2020 found that the ability to recognize and adapt to different situations for longer-term outcomes is positively associated with well-being and negatively associated with distress. Furthermore, similar to our findings, a study by Luo et al., 2018 found that patients with ulcerative colitis showed lower cognitive flexibility and therefore their quality of life was impacted.

Also, a study by Rudnik et al., 2019 revealed a significant and positive correlation between cognitive flexibility and coping with stress and therefore, improvement in health-related

quality of life and sense of satisfaction with life. Moreover, studies by Gan et al., 2006; Cheng et al., 2014 seasoned that flexible adaption improves well-being and health.

Theoretical Framework

A stress theory developed by Palmer in 1997 involves Lazarus' seven modalities consisting of behaviour, sensory, images, affect response, cognitions, interpersonal relationships and drugs. According to this model, stress and coping involves five stages. In initial stage, individual perceives the stressor, either from external sources or internal. Moving to next stage, the individual analyses his resources such as resilience, psychological flexibility, hopefulness, optimism etc to understand his or her ability to deal with the stressor. If the individual fails to deal with the stressor, he or she moves to next stage. The third stage involves behavioural, affective, sensory, images, cognitive, interpersonal and biological changes in context with stress responses. In next stage, individual assesses the viability of coping strategies that he or she is using. If they find themselves to be able to successfully cope, they get into the stage of equilibrium and if not, they move to next stage. In last stage, individual faces long term consequences like negative impact on health, if he or she is unable to use coping strategies efficiently.

CHAPTER 3

RESEARCH GAP, OBJECTIVES. RATIONALE AND HYPOTHESIS

3.1 Research Gap

Most of the studies done on Immunity focus on the biological aspects but the present study aims to investigate cognitive aspects. This study also aims to assess the tangible outcomes of intangible aspects i.e., effects of hope on immunity. Therefore, the present study focuses on studying the impact of hope, resilience, and cognitive flexibility on stress and immunity. The present study also assesses the gender differentiation in the immune functioning of both males and females.

3.2 Objective

- I. To study the relationship between Hope and Stress
- II. To study the relationship between Resilience and Stress.
- III. To study the relationship between Cognitive flexibility and Stress.
- IV. To study the relationship between Hope and Immunity.
- V. To study the relationship between Resilience and Immunity.
- VI. To study the relationship between Cognitive flexibility and Immunity.

3.3 Rationale and Hypotheses

The existing literature shows that resilience, hope, and cognitive flexibility impact stress and immunity of an individual. The present study aims to assess the impact of hope, resilience, and cognitive flexibility on stress and immunity, and therefore, the following hypotheses were formed.

H₁ – Hope will be negatively related to stress.

H₂- Resilience will be negatively related to stress.

H₃- Cognitive Flexibility will be negatively related to stress.

H₄ - Hope will be positively related to immunity.

H₅- Resilience will be positively related to immunity.

H₆- Cognitive Flexibility will be positively related to immunity.

H₇- There will be no gender differentiation in immune functioning.

CHAPTER 4

METHODOLOGY

4.1 Sample

A total of 200 students in the age groups ranging from 18 years to 30 years participated in the study, in which 120 were females and 80 were males.

4.2 Design

Independent variable: Hope, Resilience, and Cognitive Flexibility

Dependent variable: Stress and Immunity

Correlational Design was used.

4.3 Statistical analyses

Descriptive statistics (mean and standard deviation), correlation, and stepwise regression were computed using the statistical package for social sciences (SPSS version 20)

4.4 Instruments

Trait Hope scale- It is a 12-item scale with an 8-point Likert type format, developed by Snyder in 1991. It is also called the Adult Hope scale. In this scale, four items measure pathways thinking, four items measure agency thinking, and four items are fillers. The reliability for this scale was .853.

Brief Resilience Scale- The Brief Resilience Scale was created to assess the perceived ability to bounce back or recover from stress. The scale was developed by Smith et al. (2008) to assess a unitary construct of resilience, including both positively and negatively worded items. The possible score range on the BRS is from 1 (low resilience) to 5 (high resilience). It shows an internal consistency of .71.

Cognitive Flexibility Scale- It is a 12-item scale with a 6-point Likert-type format which was developed by Martin and Rubin (1995) which estimates individual's attention to

correspondence choices, readiness to adjust to the circumstance, and self-viability in being adaptable was used. The internal consistency for the scale was found to be .92.

Perceived Stress- The 10-item scale by Cohen et al. (1988) to access an individual's perception of stress. The items in this scale enquire about the feelings and thoughts of an individual during last month. The internal consistency of this scale was found to be .82.

Immunity- The 7-item scale developed by Wilod Versprille et al. in 2019 to access respondents' past year's immune status by inquiring about specific immune-related complaints. The test re-test reliability came out to be 0.796.

4.5 Procedure

Participants were informed about the study protocols in detail and their consent was obtained.

The questionnaires were distributed in an engineering college and subjects were informed about the procedure and then some verbal and written instructions were given:

“You will be provided with five questionnaires. For all the five questionnaires, kindly tick-mark the response you think describes your answer the best. Please answer all the questions honestly and carefully. Information collected from you will be kept strictly confidential.”

Participants were seated comfortably and external disturbances were avoided.

CHAPTER 5

RESULTS

Table No. 1 Descriptive statistics of Hope, Resilience, Cognitive flexibility, Stress, and Immunity.

Descriptive Statistics			
	Mean	Std. Deviation	N
Hope	48.35	8.782	200
Resilience	3.01	.780	200
Cognitive Flexibility	50.36	6.536	200
Stress	19.85	6.490	200
Immunity	6.66	2.687	200

It is seen in Table 1, that for hope, a mean score of 48.35 a and standard deviation of 8.782 is obtained. The mean and SD for Resilience is 3.01 and .780. For Cognitive Flexibility, the mean score obtained is 50.36 and SD is 6.536. The mean for Stress and Immunity was 19.85 and 6.66 respectively and the Standard deviation for the same was 6.490 and 2.687 respectively.

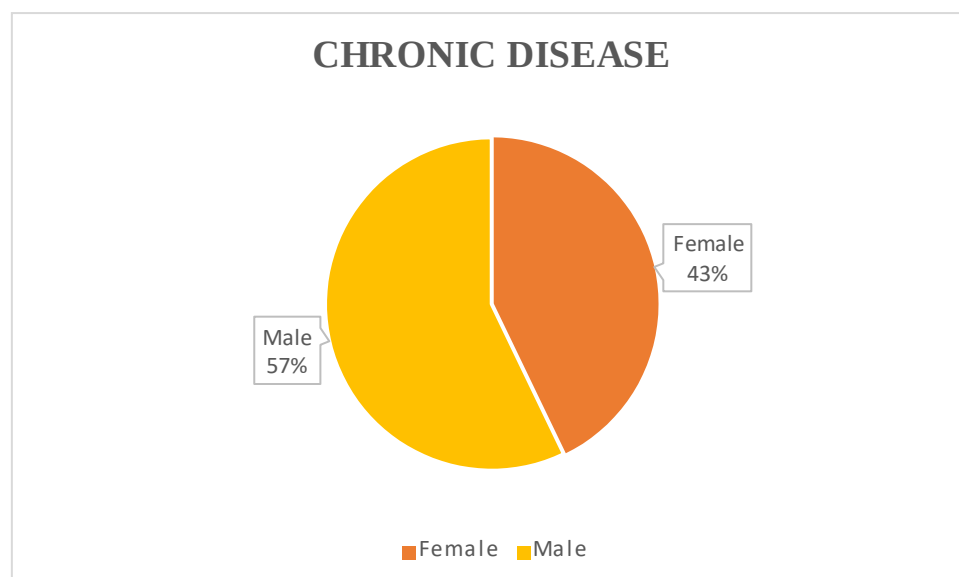
Table 2. Independent t-test Two Sample assuming unequal variances of Immunity

	Female	Male
Mean	6.2	7.35
SD	8.178151	5.065823
N	120	80
t	3.1716	

$p < 0.01^{**}$, $p < 0.05^{*}$

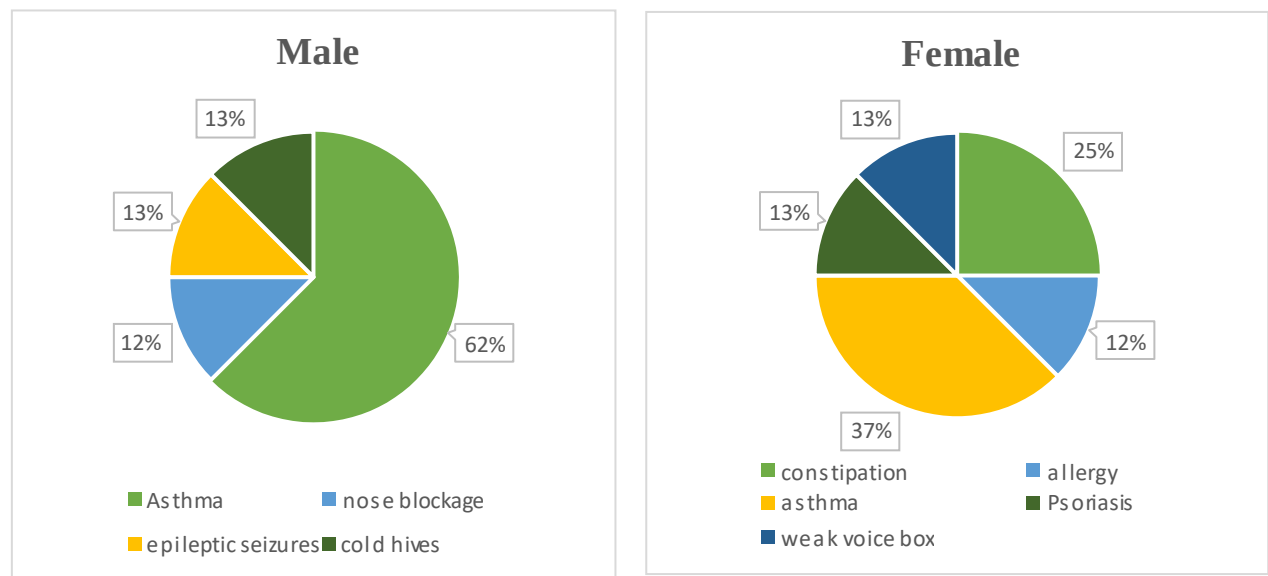
Table 2 shows the mean and standard deviation scores of immunities of both genders. The mean value of 120 females was 6.2 and SD was obtained at 8.178151. For 80 males, the mean value obtained is 7.35, which is a bit higher than females, and SD was found to be 5.065823. The independent-sample t-test came out to be 3.1716, which is significant at a 0.01 level. Thus, it can be concluded that females have better immunity than males.

Graph 1. Shows prevalence of chronic disease between both genders.



Graph 1 shows the prevalence of chronic disease between both genders. It was found that 57% of males had chronic disease while 43% women reported to suffer from chronic disease which affect their immune functioning.

Graph 2. shows the percentage of chronic diseases of males and females.



Graph 2 shows the types of diseases prevalent in both males and females. It was found that in males, 13% suffer from cold hives, 12% suffer from nose blockage, 13% suffer from epileptic seizures while, 62% suffer from asthma. In women, 37% suffer from asthma, 25% suffer from constipation, 13% from Psoriasis, 13% from weak voice box while, 12% from seasonal allergy.

Table No. 3 Correlation between Hope, Resilience, Cognitive Flexibility, Stress, and Immunity

Variables	Hope	Resilience	Cognitive Flexibility	Stress	Immunity
Hope	1				
Resilience	.227**	1			
Cognitive Flexibility	.489**	.240**	1		
Stress	-.363**	-.308**	-.339**	1	
Immunity	.098	.233**	.217**	-.360**	1

p<0.01**, p<0.05*

Pearsons Correlation was computed to understand the relationship between Hope, Resilience, Cognitive Flexibility, Stress and Immunity.

The relationship between Hope and Cognitive Flexibility was found to be positive and significant at a 0.01 level ($r= 0.489$, $p<0.01$). Hope was found to have a positive and significant relationship with Resilience ($r=0.489$, $p<0.01$), and with stress, it was found negative and significant ($r= -0.363$, $p<0.01$).

The relationship between Resilience and Cognitive Flexibility was found to be positive and significant at 0.01 level i.e., ($r= 0.240$, $p<0.01$). Resilience was found to have a negative and significant relationship with stress ($r= -0.308$, $p<0.01$), and a positive and significant relationship with Immunity ($r= 0.233$, $p<0.01$).

The relationship between Cognitive Flexibility and Stress was found to be negative and significant at 0.01 level i.e., ($r = -0.339, p < 0.01$). Cognitive Flexibility was found to have a positive and significant relationship with Immunity ($r = 0.217, p < 0.01$).

Moreover, the relationship between Stress and Immunity was found to be negative and significant at 0.01 level i.e., ($r = -0.360, p < 0.01$).

Table No. 4 Linear Regression Analyses of Hope, Cognitive Flexibility, Resilience, and Stress.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Adjusted R ²	F
		B	Std. Error	Beta				
1	(Constant)	32.815	2.405		13.647	.000		
	Hope	-.268	.049	-.363	-5.482	.000	.127	30.049
2	(Constant)	36.826	2.588		14.229	.000		
	Hope	-.228	.049	-.309	-4.680	.000		
	Resilience	-1.976	.550	-.237	-3.596	.000	.177	22.393
3	(Constant)	42.141	3.393		12.422	.000		
	Hope	-.169	.054	-.229	-3.111	.002		
	Resilience	-1.777	.550	-.214	-3.233	.001	.196	17.180
	Cognitive Flexibility	-.175	.073	-.176	-2.385	.018		

a. Dependent Variable: Perceived Stress

The stepwise regression analysis was done where Resilience, Hope and Cognitive Flexibility where independent variables and Stress was dependent variable. It was found that Hope predicted Stress (B=-2.68, SE= 2.405, β = -3.63, t= -5.482, F(1,198)= 30.049) Adjusted R²= .127. Resilience was predicted Stress (B=-1.976, SE= .550, β = -.237, t= -3.596, F(1,197)= 22.393) Adjusted R²= .177 Cognitive Flexibility was predicted stress (B= -.175, SE= .073, β = -.176, t=-2.385, F(1,196)= 17.180) Adjusted R²= .196

Table No. 5 Linear Regression Analyses of Cognitive Flexibility, Resilience, and Immunity.

Model		Unstandardized		Standardized		Sig.	Adjusted	F	
		Coefficients		Coefficients					R ²
		B	Std. Error	Beta					
a. Dependent Variable: Immunity									
1	(Constant)	4.242	.739		5.739	.000			
	Resilience	.804	.238	.233	3.378	.001	.050	11.413	
2	(Constant)	1.139	1.474		.773	.441			
	Resilience	.663	.242	.193	2.737	.007			
	CF	.070	.029	.170	2.423	.016	.073	5.869	

The stepwise regression analysis was done where Resilience and Cognitive Flexibility were independent variables and Immunity was dependent variable. Resilience predicted Immunity (B=.804, SE= .238, β = -.237, t= .233, F(1,198)= 11.413) Adjusted R²= 0.50

Cognitive Flexibility predicted Immunity (B= .070, SE= .029, β = -.176, t=-2.385, F(1,196)= 5.687) Adjusted R²= .196

CHAPTER 6

DISCUSSION

In this study, we tried to find out the relationship between hope, resilience, cognitive flexibility, stress, and immunity. Most of the studies focus on either the aspects of positive psychology or biological aspects but this study attempts to investigate both aspects.

6.1 Hope and Stress

Hypothesis 1 stated that Hope will be negatively related to stress.

Our results suggested that those who scored high on hope experience less stress, thus hypothesis 1 was accepted.

Similar results were found in the study by Sucan (2019) which was conducted to study the relationship between hope and perceived stress in teacher candidates who participated in a special KPSS preparation course in Kayseri. It was concluded that there exists a high, negative, and significant relationship between perceived stress scores with the level of hope scores of teacher candidates. Also, Özdemir and Özdemir, 2015 conducted a study on students and found out that education stress was increased when students have low levels of hope. Similarly, Lee and Hwang, 2016 opined that a negative relationship exists between self-esteem, hope, social support, and stress. Moreover, a study by Fitness 2001; by Runcan and Iovu, 2013 argued that higher quality of life and less stress were experienced by those, who have high levels of hope. Also, the findings of the present study were aligned with the theory given by Palmer in 1997.

6.2 Resilience and Stress

Hypothesis 2 stated that Resilience will be negatively related to stress.

Our results suggested that those who scored high on resilience experience less stress, thus hypothesis 2 was accepted.

According to past literature, similar results were found in a study by Steinhardt et al., 2008 which suggested that those young adults who had poor resilience were less capable of dealing and coping with stress and it was opined that those who had better resilience were able to easily cope up with stressful situations. Also, a study conducted by Steinhardt et al in 2008 suggested that poor coping skills were observed in people having low resilience, and Chou et al., 2011; Ng & Hurry, 2011 argued that high-stress levels are linked with poor coping skills. Therefore, affects an individual's general health and quality of life (Cohen & Williamson, 1988). Supporting the findings of the present study, research by Tung et al., 2014 found that higher stress levels have been observed in those having lower resilience and therefore they might suffer from associated symptoms that can cause lower quality of life and general health. Similar results to the present study were found by Khalsa et al., in 2012 and theory by Palmer in 1997.

6.3 Cognitive Flexibility and Stress

Hypothesis 3 stated that Cognitive Flexibility will be negatively related to stress.

Our results suggested that those who scored high on cognitive flexibility experience less stress, thus hypothesis 3 was accepted.

Past literature suggests that a study by Alexander et al., 2007; Plessow et al., 2011 on humans, and a study by Laredo et al., 2015 on rodents found that cognitive flexibility is affected in stressful situations. The study on rodents even suggested that less cognitive flexibility is more likely to be seen in men than women in stressful situations. Also, a study by Han et al., 2011 on starters and non-starter athletes found that athletes who had high cognitive flexibility had lower stress levels at the start and end of the game. Moreover,

Kvetnanský et al., 1998 suggested that adjustment of cognitive flexibility and those tasks requiring cognitive flexibility affect the performance of the athletes, and Masaoka et al., 2007 opined that cognitive flexibility in starter athletes would control uneasiness as time elapsed which permitted the competitors to keep their play stable while defying stressful and restless circumstances.

6.4 Resilience and Immunity

Hypothesis 5 stated that Resilience will be positively related to immunity.

Our results suggested that those who scored high on resilience have better immune functioning. Therefore, hypothesis 4 was accepted.

Similar results were found in a study by Wagnild in 2009 which proposed that high resilience scores are positively associated with physical health and lesser symptoms, and it is contrarily associated with depression and other psychiatric disorders, therefore determining the quality of life. Also, another study by Girtler in 2010 suggested that certain facets of resilience which involve optimism, vitality, positive emotions, and extroversion are associated with increased efficacy, coping and physical activities, and acceptance of social support leading to better immune functioning.

Moreover, a study by Norte et al., 2011 suggested that interventions that help to develop resilience in patients with post-traumatic stress disorder helped in the reduction of symptoms such as reduction in heart rate, respiratory rate, skin conductance, and cortisol levels, and sympathetic balance. Also, similar interventions in the non-clinical sample were performed and it was observed that there was the prevention of mental and physical diseases along with improvement in well-being (Millea et al., 2008).

6.5 Cognitive Flexibility and Immunity

Hypothesis 6 stated that Cognitive Flexibility will be positively related to immunity.

Our results suggested that those who scored high on cognitive flexibility have better immune functioning. Therefore, hypothesis 6 was accepted.

According to past literature, a study by Dawson & Golijani-Moghaddam in 2020 found that the ability to recognize and adapt to different situations for longer-term outcomes is positively associated with well-being and negatively associated with distress. Furthermore, similar to our findings, a study by Luo et al., 2018 found that patients with ulcerative colitis showed lower cognitive flexibility and therefore their quality of life was impacted.

Also, a study by Rudnik et al., 2019 revealed a significant and positive correlation between cognitive flexibility and coping with stress and therefore, improvement in health-related quality of life and sense of satisfaction with life. Moreover, studies by Gan et al., 2006; Cheng et al., 2014 seasoned that flexible adaption improves well-being and health.

6.6 Hope and Immunity

Hypothesis 4 stated that Hope will be positively related to immunity.

Our results suggested that those who scored high on hope will have better immune functioning, but the results were not significant. Therefore, hypothesis 4 was rejected.

There is limited literature predicting the relationship between hope and immunity. According to Seligman, 1975; Taylor, 1991, hope has been related to well-being and fruitful adapting while discouragement, depression, and sadness have been connected to capitulation, disease, and even death. Many studies have shown a connection between health and states of hope (Gottschalk, 1974; Snyder, Harris, Anderson, Holleran, Irving, Sigmon, Yoshinobu, Langelle, & Harney, 1991).

6.7 Gender Differentiation

Hypothesis 7 stated that there will no gender difference in the immunity functioning. Our results suggested that there exists a gender difference and women have better immune functioning than men.

According to past literature, a study by Klein & Flanagan in 2016 revealed that for the most part, grown-up females mount more grounded natural and versatile immune reactions than males. This outcome in quicker freedom of microbes and more prominent immunization viability in females than men. Also, another study by Fargallo et al., 2007; Pap et al., 2010 showed that in birds, females show higher antibodies and cell-intervened immune reactions to immune difficulties, and these impacts are frequently generally articulated during the mating season when male testosterone focuses are most elevated. Moreover, females quite often show more prominent neutralizer reactions than men, higher basal immunoglobulin levels and higher B cell numbers (Abdullah et al., 2012).

CHAPTER 7

CONCLUSION, IMPLICATIONS, LIMITATIONS AND SCOPE FOR FUTURE RESEARCH

7.1 Conclusion

The findings of the study indicate that hope, resilience, and cognitive flexibility have an impact on stress and immunity. People high on hope, resilience, and cognitive flexibility will have lower stress levels and vice versa. Similarly, people high on resilience and cognitive flexibility will have better immune functioning. Another interesting finding suggests that women have better immune functioning than men.

7.2 Implication

Since we are exposed to stressors in our daily lives, from major life transitional events to minor stresses can affect an individual negatively. The finding of the study suggests that hopeful individual experience less stress and increased cognitive flexibility help them to adapt to new and unusual situations with little trouble. This also helps them in being resilient and increases their immune functioning. Also, the important implication is in hospitals where people with stress and lower immune functions may be taught to indulge in activities that improve their hope, resilience, and cognitive flexibility.

7.3 Limitation

There were some limitations of the study. The sample size is 200 in the present study, is one of the limitations of this study. Another limitation is the age group. The age group considered for the present study was 18-30 years and a decline in immune functioning is usually seen after the age of 30 years. Also, the number of males and females taken in this study was not equal, which could be one of the limitations.

7.4 Scope for future research

Future work could look into a greater sample and administrate the study on young adults and older adults to study the impact of hope, resilience, and cognitive flexibility on stress and immunity. Also, spirituality could be assessed to understand if spirituality instil hope among individuals. Gender differences and age-group differences in levels of spirituality and their impact on immune functioning may also be worth exploring.

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Appendix A
CONSENT FORM

Dear friends,

I, a post-graduate student of School of Humanities and Social Sciences, Thapar Institute of Engineering and Technology Patiala, am conducting a study related to some behavioural patterns of students. In this connection, I request you to kindly fill in the questionnaire attached here within. The information collected from you would be kept strictly confidential. If you wish to know about the results of your performance you can contact me on the following email address. Kindly fill up the questionnaire sincerely.

agupta_ma20@thapar.edu

I _____, student of class _____ of
_____(school), hereby give my consent to participate in this
study.

(Age) (Signature)

Appendix B

The Trait Hope Scale

Directions: Read each item carefully. Using the scale shown below, please select the number that

best describes YOU and put that number in the blank provided.

1. = Definitely False

2. = Mostly False

3. = Somewhat False

4. = Slightly False

5. = Slightly True

6. = Somewhat True

7. = Mostly True

8. = Definitely True

____1. I can think of many ways to get out of a jam.

____2. I energetically pursue my goals.

____3. I feel tired most of the time.

____4. There are lots of ways around any problem.

____5. I am easily downed in an argument.

____6. I can think of many ways to get the things in life that are important to me.

____7. I worry about my health.

___8. Even when others get discouraged, I know I can find a way to solve the problem.

___9. My past experiences have prepared me well for my future.

___10. I've been pretty successful in life.

___11. I usually find myself worrying about something.

___12. I meet the goals that I set for myself.

Appendix C

Brief Resilience Scale (BRS)

Respond to each statement below by circling one answer per row.

Strongly Disagree/ Disagree /Neutral/ Agree/Strongly Agree

BRS1. I tend to bounce back quickly after hard times. 1 2 3 4 5

BRS 2. I have a hard time making it through stressful events. 5 4 3 2 1

BRS 3. It does not take me long to recover from a stressful event. 1 2 3 4 5

BRS 4. It is hard for me to snap back when something bad happens. 5 4 3 2 1

BRS 5. I usually come through difficult times with little trouble. 1 2 3 4 5

BRS 6. I tend to take a long time to get over setbacks in my life. 5 4 3 2 1

Appendix D

Cognitive Flexibility Scale

The following statements deal with your beliefs and feelings about your own behaviour. Read each statement and respond by circling the number that best represent your agreement with each statement.

Strongly Agree/ Agree/ Slightly Agree/ Slightly Disagree/ Disagree/Strongly Disagree

(6)

(5)

(4)

(3)

(2)

(1)

1. I can communicate an idea in many different ways.
2. I avoid new and unusual situations. ®
3. I feel like I never get to make decisions. ®
4. In any given situation, I am able to act appropriately.
5. I can find workable solutions to seemingly unsolvable problems. ®
6. I seldom have choices to choose from when deciding how to behave.
7. I am willing to work at creative solutions to problems.
8. My behaviour is a result of conscious decisions I make.
9. I have many possible ways of behaving in any given situation.
10. I have difficulty using my knowledge on a given topic in real life situation. ®
11. I am willing to listen and consider alternatives for handling a problem.
12. I have the self-confidence necessary to try different ways of behavior.

Appendix E

Perceived Stress Scale

For each question choose from the following alternatives:

0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often

_____1. In the last month, how often have you been upset because of something that happened unexpectedly?

_____2. In the last month, how often have you felt that you were unable to control the important things in your life?

_____3. In the last month, how often have you felt nervous and stressed?

_____4. In the last month, how often have you felt confident about your ability to handle your personal problems?

_____5. In the last month, how often have you felt that things were going your way?

_____6. In the last month, how often have you found that you could not cope with all the things that you had to do?

_____7. In the last month, how often have you been able to control irritations in your life?

_____8. In the last month, how often have you felt that you were on top of things?

_____9. In the last month, how often have you been angered because of things that happened that were outside of your control?

_____10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Appendix F

Immune Status Questionnaire (ISQ)

Instruction

Please indicate how often you have had the following complaints in the last month
(during COVID-19 Pandemic curfew) .

Each item of the ISQ can be scored as follows:

0= Never

1= Sometimes

2= Regularly

3= Often

4= Always (Almost)

Questions:

1. Sudden high fever

2. Diarrhoea

3. Headache

4. Skin Problem (e.g. acne, eczema)

5. Muscle and joint pain

6. Common cold

7. Coughing