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Relationship between Mental Health and Critical Thinking Ability among Students at Senior Secondary Level

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Abstract

Contemporary world of digital communication and solo lifestyle make living fast and challenging. This also leads to depression and lack of prospective thought in individuals. Again, engrossment in digital devices and obsession with external performance leads to internal reflection resulting in lack of critical thinking for self-development. The present study concerns these prevalent psychological variables i.e. mental health and critical thinking. A sample size of 100 subjects of Standard XII from the Senior Secondary Schools in the District of North 24 Parganas in West Bengal, India, have been selected by adopting stratified random sampling method. The study was intended to find the effect of genders on Mental health and critical thinking ability of senior secondary students. The mutual effects of each of the variables i.e. Mental health and Critical thinking on each other are also tested in the study along with their correlation and predictability. The study found no significant gender effect on mental health and critical thinking. It was found that Critical thinking ability has a significant effect on mental health and mental health and critical thinking are inversely correlated. Again, regression analysis shows predictability of decrease in mental health with a boost of critical thinking ability of Students at the Senior Secondary level.

Keywords: Adolescent learners, Mental Health, Critical Thinking, PERMA model, education, metacognition

Introduction

Recent educational scenario demands an unquenchable thirst for a change and a strong aptitude for coping with critical situations in all walks and affairs in life. Challenges are the sole secrets of effective growth and attainment of maturity in present contexts. No smooth affair can guarantee a productive prospect in the 21st century multifarious activities involving new generation of learners. The more people are striving for a comfortable life, the more efforts are becoming complex and changing time has much to extract from the new generation. Early age of simple life with a tendency of avoidance of everything complex in no longer appreciable or desirable. Each moment brings before us new problems, new challenges with a new scope of underlying benefits and opening up a new horizon of discovery and finding of truth ahead. Preparation of students for a better problem-finding and problem-solving happens to be the priority of the latest educational endeavor of present educational service providers. Development of Critical-thinking ability of the learners depends on different psychological, social, demographic and academic factors. Learners having different levels of intelligence, social exposure, academic achievement, gender and age possess different levels of Critical Thinking ability. It is also worth considering that level of mental health of the learners may have an effect on development of Critical thinking among learners. Following the concepts and belief of Positive Psychology, mental health is marked by the state of 'well-being' (Kumari, 2023) of an individual and this state is assumed to affect the metacognitive process of applying reason behind thought as a smooth and mobilizing factor that might otherwise obstruct the flow of reasonable thinking and thereby affect quality of thought and arriving at a solution to a critical problem. Generation with a millennial prospect should develop the highest achievable acumen that can work as a survival strategy in their professional, occupational, social and familial spheres of life. Nurturing this kind of mindset needs appropriate attention of recent educationists and researcher to find out the best possible way to develop this versatile ability of thinking critically. Current age of Science, technology, Engineering and Management (STEM) are also making learners capable of TED (Technology, Entertainment and Designing) activities; therefore, due importance is needed to find out correlated factors for efficient development of Critical-Thinking ability and the role of mental ability for development of Critical Thinking among boys and girls studying at senior secondary level at a critical stage of adolescence.

Theoretical Framework

Mental Health:

The word "Mental Health" is used in many different contexts. In addition to discussing mental diseases, which are the primary subject of this paper, we also address the crucial idea of positive mental health. According to Jenkins et al. (2011), "A positive sense of wellbeing, personal resources such as optimism, self-worth, and a sense of mastery and coherence, the capacity to form and maintain fulfilling interpersonal relationships, and the capacity to overcome adversity (resilience) are all considered components of positive mental health." When taken as a whole, these improve a person's ability to support their family, friends, the neighborhoods, and society at large. As a result, mental health encompasses more than merely the lack of symptoms or discomfort. It alludes to a feeling of contentment and a conviction. The ability to see, understand, and interpret our environment, to adjust to it and make appropriate changes, to think and speak rationally, and to interact with others are all components of good mental health. It also has an impact on our capacity to handle transitions, change, and life events like having a kid, being unemployed, losing a loved one, or experiencing physical illness. As a result, physical and mental wellness are interdependent and crucial to an individual's overall wellbeing. They are inseparable components of public health when combined. Good mental health is highly valued by society since it supports several aspects of daily life, such as general productivity. It adds to human, social, and economic capital and is a valuable resource for people, families, communities, and countries.

Indicators of Mental Health:

Mental health of an individual cannot be objectively manifested. It is subjective in nature. It cannot be a tactile phenomenon. Subjective manifestation of mental health can be perceived and observed through positive behavioural traits. Psychologically, feelings of well-being are grounded on the following 'mental observations' (Seifert 2005):

- Self-acceptance,
- Positive relationships with others,
- Autonomy,
- Environmental mastery,
- Feeling of purpose and meaning in life
- Personal growth and development

Self-acceptance: It is the manifestation of a positive attitude towards the Self. It is an acknowledgement and acceptance of multiple aspects of self-activities, behaviour, attitude and concept of one's own self, including acceptable and undesirable qualities along with a feeling of positive view of past life.

Positive relationships with others: The second indicator is an individual's 'warm, satisfying, trusting relationships' with others; it also includes the state of being concerned about the welfare of others, having a high capability of showing cordial empathy, affection along with maintaining a responsible intimacy and understanding the essence of human relationships.

Autonomy: Social and individual autonomy is a prominent indicator of positive mental health. This is marked by self-determination and independence. It also comprises ability to maintain a resistance to social pressures by thinking and acting independently. The basics of regulating behavior by deterring negative outburst and evaluating oneself on the criteria of personal standards.

Environmental mastery: An individual with a good mental health possesses a sense of considerable mastery and competence in managing the surrounding environment; the indicator is also marked by controlling a complex series of activities and using surrounding opportunities effectively. More so and equal dexterity in recreating contexts as suitable for personal needs and values.

Feeling of purpose and meaning in life: Mental health indicator is characterized by setting goals in life with a clear sense of directedness and having an inherent feeling of a definite meaning of life; holding a belief in purposeful life.

Personal growth and development: An individual with a sound mental health strives for personal growth and constant development. It is an event of non-stable and dynamic lifestyle and quest of self-improvement and advancement in all spheres of activities and having a quest for continuous achievements with new experience and self-realization.

Mental Health Model:

Mental health is an important aspect of Positive Psychology. This is concerned about mental well-being and self-restitution. Mental well-being is a remarkable driving force for a meaningful and goal-directed activities. A noteworthy model of

mental health is PERMA model that gives a holistic view of the parameters of mental health. The PERMA model is widely recognized and influential in Positive Psychology. Seligman (2011) proposed PERMA model to explain and define Welfare deeply.

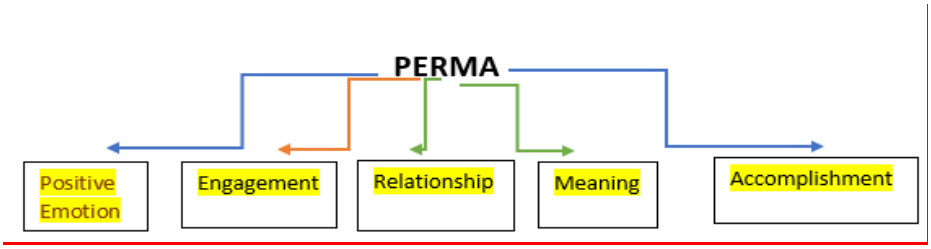

Figure 1: PERMA Model

P – **Positive emotions**: Positive emotions i.e. joy, mirth, ecstasy are overt expressions of inner happiness.

E – **Engagement**: it is important to be engaged in different productive activity not indulge in lazy passage of time. Keeping oneself engaged is a prerequisite for a sound mental health.

R – Relationship: maintaining a healthy relationship with surrounding people, even with domestic pets, ensures a jovial mood boosting mental health.

M – **Meaning**: Each activity and behaviour should be meaningful and purposive. These should not be purposeless, irregular or haphazard. Meaningful interaction is highly motivating and works as a strong drive in an individual.

A – **Achievement**: Success is the ultimate goal that makes all efforts and aims justified. It is achievement that recreates and reboots determination for further endeavour forward. This electrical stimulus leads to self-gratification with a constant flow serotonin to maintain a feel-good mental state that mobilizes thought-process with adequate self-confidence.

This model of positive psychology defines the roles of the predictors of mental health and constructs a holistic structure of productive and supportive framework for understanding well-being and solidifying the foundation for improving mental health.

Importance of Mental Health:

Mental wellness works as an effective booster of self-esteem and it is a facilitating agent of clearer thinking. More than this, sound mental health creates spiritual bond in ourselves making individuals jovial, lively and active and maintains composure even in dire and critical problems and imbroglio. This composed state of mind gives a confident expression that acts as a role model for others.

Benefits of good Mental Health:

Plumptre (2024) elaborates the benefits as detailed below:

Relieving stress: “A Stronger Ability to Cope with Life’s Stressors Reaching optimal mental and emotional states can make overcoming life's problems simpler.”

A Positive Self-Image: Plumptre (2024) states that a strong correlation between mental health and self-perception is observed. This observation is a clear evidence of that “self-worth is influenced by your general mental health. A positive mental state is frequently indicated by confidence.” (Plumptre, 2024)

Healthier Relationship: Good mental health maintains a happy and content family and life becomes easier to lead. Good mental health creates scope for giving companions and family-members “affection, support, and quality time. Being present and supporting the people you care about can be simpler when you're not experiencing emotional turmoil in relationships.” (Plumptre, 2024)

Better Productivity: Positive Mental health is conducive to Managing depressive mental state or other critical mental health conditions and this has an immediate effect on output. This creates an ability to work more productively and bring out quality works bearing evidence of persistent mentally strength.

Higher Quality of Life: Heightened self-confidence, self-respect due to optimum mental health maintains quality of life consistently. Mental health as a boosting factor creates scope for involvement in community development more frequently than ever.

Critical Thinking:

Critical thinking ability is a proficiency to raise questions, make analysis, interpretation, evaluation, and give judgments about what is perceived in form of reading, hearing, saying, or writing. This ability concerns intensive examination, interpretation, evaluation, causation, and reflection. This ability is positively connected to decision-making, and clarification, articulation and taking a persuasive stand.

Nature of Critical Thinking:

Wooll (2022) has thoughtfully analyzed specific critical thinking skills, i.e. identifying bias, making inference, maintaining a researcher outlook, identification of problems, meta-cognition, earnest curiosity, and prioritizing relevance. These skills have an inherent view of the nature of critical thinking and the process of its workings. These skills are elaborated below:

Identifying bias: Critical thinkers are characteristically unbiased decision-makers. Unbiased outlook guides in thinking transparently so that logical undercurrent can be perceived in the way of reasoning.

Making inference: Critical thinkers have persuasive ability. This ability is inherently connected to the process of syllogism through stating a thesis, showing favour for a given topic and an antithesis, showing adverse view on the topic and synthesis that forms a conclusion or making a circumspective decision.

Maintaining a researcher outlook: Critical thinkers have a researcher-mindset. Individuals with high level of critical thinking are concerned about different issues around them. They study all that they encounter and make a cause-effect analysis of them.

Identification of problems: Critical thinking ability is essentially problem-centric. Problem detection and problem solution are important aspects of critical thinking.

Meta-cognition: Critical thinkers are characteristically concerned about individual process of thinking. Constant upgrading and modification of the process of thinking for a goal-directed outcome is the nature of critical thinking.

Earnest curiosity: Curious individuals have inherent questioning mindset. Finding reasons behind actions and cause of different phenomena characterize critical thinking.

Prioritizing relevance: An ideal critical thinker gives priority to issues with contemporary relevance. Abstract and immaterial thinking with little scope for practical context does not characterize critical thinking.

Process of Critical Thinking:

Identify the problem or question: According to Martin (2024), identification of problem is the primary activity that leads to further thinking over the cause and its effects. A multidimensional though-process helps in analysis of a situation that works as a foundation for detecting the underlying problem before a devising a thoughtful and effective solution to it.

Gather relevant information: Gathering information by circumnavigating the given problem is the next important step that ensures encoding the components of the problem and categorize them on the basis of their impactful correlations. The higher is the correlation, the greater is the severity of the components to cause the problem to happen or recur.

Analyze and evaluate data: The next algorithmic step is to analyze information acquired after intersecting the problem and decoding the effects of the components of the problem to find intensity of the impact of the components. This procedure helps in modifying or eliminating the responsible components for solution of the problem.

Consider alternative points of view: Any single point of view for solution to a problem from a specific dimension of a problem might not be universally effective. In this case, considering multiple points of view for solution is needed so that alternative solution can be more effective and impactful to resolve the problem.

Draw logical conclusions: The components of the problem, the perspectives and dimensions need to be specified and a visual representation of this is important along with a projection of positive and negative correlation between components

of the problems and the action needed to resolve the issue to ensure a clarity of analysis of the problem and drawing a logical conclusion to the analysis.

Develop and communication solutions: Identification of the best solution is needed out of several alternative ones by considering different perspectives of a problem. This is a rigorous task of testing the impact of the devised solutions to the given problem to choose the best one and set it ready for application to test its effect actually.

Reflect and learn from the process: The conclusive step is to reflect on effectiveness of the solution applied and its potency over other measures are tested to evaluate and learn from the process of resolving an issue the desirable solution and its long-term efficacy.

Review of related literature

Mental Health

Mental health is unanimously accepted as an important precondition for well-being, self-confidence, and self-directed approaches in all spheres of human activities. Mental health is the prerequisite for a healthy and productive thought process. Good and beneficial decision is regarded as an outcome of sound mental health. In other words, individual having a poor mental health is an originator of detrimental decision that might have an adverse effect on others leading to a negative consequence. According to World Health Organization (2021), 10% to 20% of adolescents suffer from mental disorder due to stress and uncertainty leading to depression, anxiety and behavioural disorders and at the worst, developing a suicidal tendency. WHO also recommends promotion of their mental health status and prevention of undesirable consequences. An illustration in *CDC Mental Health* (2024) clarifies the need for optimum mental health by stating, "Mental health includes our emotional, psychological, and social well-being. It affects how we think, feel, and act." Liu et al. (2021) conducted a study on association between Critical Thinking and impulsive mental disorder. They came out with a conclusion that Critical Thinking session of including problem-detection and problem-solving as a therapy has a positive effect on impulsive mental disorder and they also recommended mental health programmes at all stages of education for constructive intellectual outputs. Regarding Gender status of mental Health, Campbell et al. (2021), observed gender disparity and also found that girls have 'worse average mental health than their male counterparts.

Studies in gender difference on Mental Health

Coveney (2022) made a study on girls in their adolescence having a notably advanced level of depression and disorder of having edibles during their adolescence and at the same time showing suicidal tendency rather than their masculine counterparts. The researcher also observed women counterparts having "inward directed symptoms" characterizing introversion and the male counterparts are more extrovert. It was also pointed out that women are characterized by inward depression and male having more "antisocial" tendencies and female individuals are depressed and having "anxiety disorder due to genetic and biological factors." The study conducted by Majumdar and Srivastava (2023) means to find the difference between the boys and girls belonging to adolescence in respect of mental health in the NCR, Delhi comprising a sample size of 235 senior secondary students with male students 109 and female students 126 in number. The mean difference was found significant implying girls having poorer mental health with less emotional stability than their male counterparts. The paper authored by Anand (2023) Shows social and cultural role in emotional stability and maturity of female individuals empowered with the level of social respect reserved for them in the community mostly dominated by their male counterparts. Yoon et al. (2022) ascertains with evidential proofs that levels of mental health are difference among male and female students; and female ones incubate longer and lasting depression and anxiety during their states of being adolescent and adulthood whereas cognitive impairment of male individuals leads to their antisocial behavioural outcomes. Kvrgic et al. (2013) conducted a research with a sample size of 3627 at Vojvodina in Serbia. Stress level of the subjects was measures by using 'psychological distress scale' with presence of negative conditions. This test outcome shows vulnerability of female individuals in respect of mental health with male counterparts are more stable and resilient.

Studies in gender difference on Critical Thinking

A field activity was done in the region of Murcia (Spain) with 636 learners at the primary level by Albarracín-Vivo et al. (2024) instructing the participants to write a composition with a cue of a picture containing roles of genders. The objective was to test the learners' critical thinking ability and its responses were assessed by using Atlas.Ti software proving a higher level of critical thinking ability of girls in comparison with the boys.

Studies in Correlation between Mental Health and Critical Thinking

Kamarulzaman and Ibrahim (2024) conducted a correlational study between Mental Health and critical thinking and this study revealed a negative correlation between critical thinking skills and mental health issues implying better critical thinking ability with less mental health issues. In another study conducted by Guamanga et al. (2024) with 128 beginners at Spanish Public University with Ryff's 'psychological well-being scale' (PWBS) and the PENCRISAL 'critical thinking test' and calculated means of each test. The correlation was found positive denoting improved critical thinking ability with high mental health status.

Studies in Mental Health of Senior Secondary students

WHO pointed out adolescent individuals with mental health issues face exclusion from society and communities because of behavioural issues and this results in difficulty in educational progress, obstructing challenging mindset, chronic morbidity, and ignorance of human rights. Maheo et al. (2024) assessed mental health and academic achievement of senior secondary students in Churachandpur district of Manipur by using 'mental health battery' as developed by Singh and Gupta in 2005. The test result showed the students with higher academic achievement possess good mental health in comparison with low achievers who had a significantly low mental health status. In another study done by Sheela and Geetha (2024) with 100 students of senior secondary school with a view to assess difference in their critical thinking ability, it is observed that a significant difference exists in the levels of critical thinking ability in respect of genders.

Study in Effect of Critical Thinking on Mental Health

According to Psychology Writing (2024), Critical Thinking has a therapeutic effect on mental health. Critical thinking prevents disorder regarding mental health and helps in making 'smart and well-informed judgment' while facing situations loading with stress and depression. Critical thinking stabilizes depressed and uneasy state of mind restoring a peaceful condition. The notion of interventional critical thinking bout to restore composure and even-oscillation cardiograph emphasizes restorative function of logic to recover from cognitive disorder leading to 'defective thought'.

Research Gap

Studies in interaction between mental health and critical thinking reveal a positive effect of mental health on critical thinking ability, and also show a gender disparity in respect of critical thinking ability; but, a research gap is found in studies regarding the effect of genders on mental health, and effect of critical thinking ability on maintaining mental health of adolescent students. Research gap also exists in studies regarding predictability of the effect of mental health on critical thinking.

Objectives of the study:

i. To find difference in Mental Health (MH) between boys and girls at Senior Secondary level
ii. To find difference in Critical Thinking (CT) between boys and girls at Senior Secondary level
iii. To find the effect of Mental Health on Critical Thinking ability of Senior Secondary students
iv. To find the effect of Critical Thinking of Senior Secondary students on their Mental Health
v. To find correlation between Mental Health and Critical Thinking ability of Senior Secondary students
vi. To predict variability of Critical Thinking ability in respect of Mental Health of the students.

Hypotheses:

i. No significant difference exists on mental health in respect of genders at Senior Secondary level.
ii. There is no significant difference in critical thinking in respect of genders at Senior Secondary level.
iii. There is no significant effect of mental health on critical thinking ability of senior secondary students.
iv. There is no significant effect of critical thinking ability on mental health of senior secondary students.
v. No correlation exists between mental ability and critical thinking ability of senior secondary students.
vi. Critical thinking does not vary significantly with mental health of senior secondary students

Research Design

Descriptive and inferential research design is adopted for this study to explore the nature of relationship between the variables. Sample survey is coordinated with statistical interpretation of data to test the two-way relationship between the

variables making the design quantitative in nature. Basic design for exploration of relationship between two binary variables Mental Health (MH) and Critical Thinking (CT) is shown below:

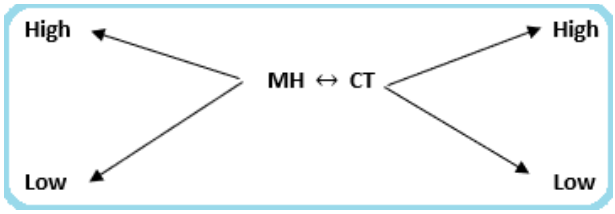

Figure 2: Levels of variables MH & CT

Here, mutual relationship of two interdependent variables with two levels of each was explored in this study.

Population and sample

100 boys and girls from Class XII of Airport English School, Michaelnagar Higher Secondary School and Madhyamgram APC Boys School affiliated to the West Bengal Council of Higher Secondary Education (WBCHSE), have been considered as the sample for this study to represent a population of 10000 senior secondary students in North 24 Parganas within Dumdum and Madhyamgram circle of state education by using stratified sampling method. First, 50 students from Science Stream and 50 from Arts have been selected from each school and thereafter, 25 boys and 25 girls were divided from each stream amounting to 50 boys and 50 girls as the sample for this study as shown in stratified random sampling design below:

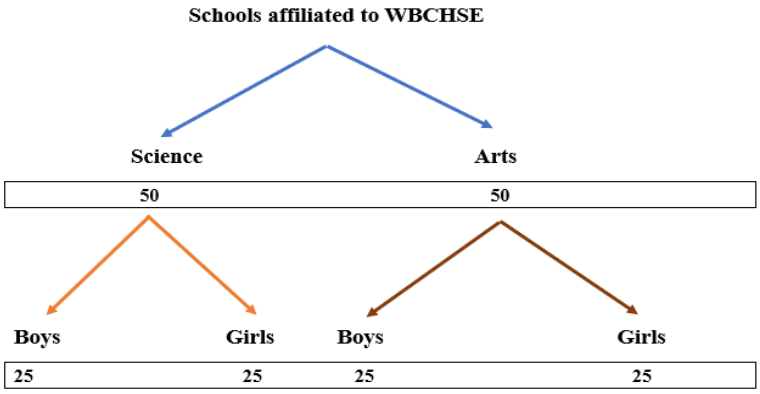

Figure 3: Stratified random sampling design

Methodology

Visualization of data and descriptive statistic are adopted to show the nature of the data and to represent its distribution. Inferential statistic, such as, t-tests, correlations and regression analysis are conducted to test the formulated hypotheses for this study.

Variables

The prominent variables for this study are mental health and critical thinking while both were considered to work as dependent and independent variables to test the respective hypotheses. Both of the variables are dichotomous having two levels of each, i.e. High and Low.

Tools for the study

Tools for the current study comprise Critical Thinking Scale (CTS) by Hemant Lata Sharma and Priyamvada and Online Mental Health Test (MHT) powered by Aditya Birla Mpowered Mind Matters. The reliability of CTS was calculated at 0.70 and MHT 0.80.

Data analysis:

Data obtained from the score secured by the sample population in the tests of Mental Health and Critical Thinking have been presented through the following visualization implying normally distributed.

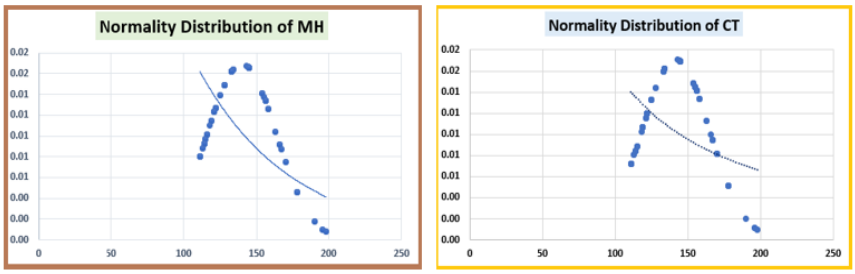

Figure 4: Normality Curves MH & CT

Despite normal distribution of the scores on respective tests, the trend appears to be negative. In the figure 3 of normal distribution of the scores ranges from scores 0.02 to 0.00 implying diminishing mental health score values with non-linear curve. Again, negative trend is also evidenced in the normal distribution graph of the scores on test of Critical Thinking. The range appears to be uniform falling under Normality Distribution score 0.01 implying minimal Standard Deviations of the concerned scores.

Table 1: Descriptive Statistic

MH		CT	
Mean	139.83	Mean	141.69
Standard Error	2.35	Standard Error	2.33
Median	133	Median	144
Mode	133	Mode	145
Standard Deviation	23.57	Standard Deviation	23.35
Sample Variance	555.67	Sample Variance	545.38
Kurtosis	-0.25	Kurtosis	-0.53
Skewness	0.75	Skewness	0.51

Descriptive statistic of the data shows the Mean scores of tests of Mental Health and test of Critical Thinking 139.83 and 141.69 respectively. Difference between Standard errors do not appear to be significant. Negative kurtosis is characteristically less than zero; therefore, distribution of probability is expanded with a flatter top to form a platykurtic curve for both the test scores. On the other hand, positive skewness indicates the normality curve is skewed to the right.

Another important aspect of the descriptive statistic of the data obtained from the test scores is the correlation between the two variables i.e. Mental health and Critical thinking. Correlation between MH and CT appears to be at the extreme negative (-0.01); therefore, the correlation is inversely proportionate, that denotes increase in the value of one variable results in proportionate decrease of the other variable, as shown in the matrix below:

Table 2: Correlation Matrix

	MH	*CT*
MH	1	
CT	-0.01473	1

This correlation can be visually figured out below as it represents a higher level of CT and negatively skewed line ranging down from 97% to 0%. This denotes a rise in the level of MH leads to a downward proportion of CT.

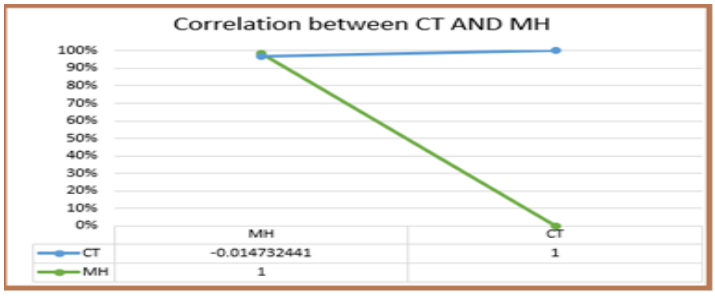

Figure 5: Correlation Graph

This denotes a rise in the level of MH leading to a downward proportion of CT. The matrix at the lower end of the figure shows r = -0.01 pointing out this graphically visualized phenomenon. Percentile conversion of the scores makes the linear representation of the test statistic of the correlation of the respective variables.

Tests of hypotheses

Mental health is regarded as a psychological ground for critical thinking ability and this is often researched for testing the validity of this grounded notion. For gender, the level varies in respect of intelligence, resilience and emotional stability. The first hypothesis is based on the effect of gender on mental health. Based on the collected scores of mental health in respect of gender, analysis is shown below with t-test:

Table 3: Inferential Statistic of Gender effect on Mental Health

Mental Health	N	Mean	t-value	Level of Sig. (α)	df	p	t-critical value
Male	50	140.68	0.35	0.05	98	0.72	1.98
Female	50	138.98					

The t-test output above shows the mean values for mental health of male and female students at Senior Secondary level reflecting 140.68 and 138.98 respectively. The t-value, 0.35, is not statistically significant. Therefore, no significant difference in mental health between male and female students has been concluded.

The second hypothesis is based on the effect of gender on critical thinking. Based on the collected scores of critical thinking in respect of gender, statistic is shown below with t-test:

Table 4: Inferential Statistic of Gender effect on Critical Thinking

Critical Thinking	N	Mean	t-value	Level of Sig. (α)	df	p	t-critical value
Male	50	137.54	1.79	0.05	98	0.07	1.98
Female	50	145.84					

The t-test output above shows the mean values for critical thinking of male and female students at Senior Secondary level showing 137.54 and 145.84 respectively. The t-value,1.79, is not statistically significant. Therefore, no significant difference in critical thinking between male and female students has been concluded.

The third hypothesis is formulated to see the effect of mental health on critical thinking. The test-statistic shows that the mean value of critical thinking of students having high mental health is 139.97; on the other hand, the mean value of critical thinking of students with low mental health is 143.03.

Table 5: Inferential Statistic of MH on CT

Dependent Variable	Independent Variable Levels	N	Mean	t-value	Level of Sig. (α)	df	p	t-critical value
CT	HMH	44	139.97	0.62	0.05	78	0.53	1.99
CT	LMH	56	143.03					

Apparently, the students having low mental health have higher critical thinking but the difference in Critical Thinking between HMH and LMH does not prove significant because the t-value 0.62 is less than t-critical value. The t-test output above shows the t-value in the inferential statistic is not statistically significant.

The study involves finding the effect of mental health on critical thinking ability of Senior Secondary students on which the null hypothesis is formulated. Following figure shows the t-test output:

Table 6: Inferential Statistic of CT on MH

Dependent Variable	Independent Variable Levels	N	Mean	t-value	Level of Sig. (α)	df	p	t-critical value
MH	HCT	52	134.52	2.39	0.05	96	0.02	1.98
MH	LCT	48	145.58					

The inferential statistic above shows that the mean value of mental health of students having high critical thinking ability is 134.52; on the other hand, the mean of mental health among students with low critical thinking ability is 145.58. The t-value 2.39 proves statistically significant; therefore, it is inferred that Critical thinking has a significant effect on Mental health of the adolescent students at senior secondary level.

Correlation between MH and CT

Mental health and critical thinking are two important psychological traits. The correlation between these two traits have been shown in the matrix (Table 2) and it is found to be negatively correlated. The F statistic (Table 7) shows the value 2.05 in regression analysis of critical thinking with mental health, and this value is more than the level of significance (0.05). Therefore, the correlation between mental health and critical thinking is not found significant and the null hypothesis is accepted.

Variability of critical thinking ability in relation to mental health of senior secondary students forms the hypothesis of non-variability of critical thinking with mental health. The regression output follows:

Table 7: Regression output

Hypothesis	Regression Weights	R Squared	β	t -Value	p-value	F	Sig.	Lev. of Sig.
H_0	MH → CT	.021	-.142	1.43	1.55	2.05	0.15	0.05

The null-hypothesis test is conducted by means of regression analysis showing R-squared value .021 that implies 02.1% change in CT with each unit of MH and beta value -.142 suggests 14.2% decrease in CT with increase in each SD of MH. But, t-value and F-value 1.43 and 2.05 respectively proves that this variation is not statistically significant; therefore, the null-hypothesis is retained. The following Line-plot represents the minimal variation of critical thinking with mental health.

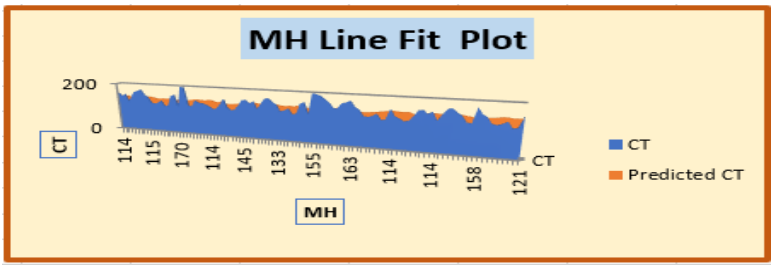

Figure 6: Predicted level of CT with MH

This plot shows actual level and predicted level of CT with increased MH level but the variation is too low to be significant.

Result

Mental health and critical thinking are universally acclaimed as the correlated factors for logical thinking process and mental wellness. This current study with a determined sample and statistical inference shows different mutual effects of mental health on critical thinking and critical thinking on mental health as well as the effect of genders on both psychological variables. The first null hypothesis on the effect of gender on mental health is accepted establishing no significant difference in mental health between male and female senior secondary students. The next null hypothesis on the difference in critical thinking between male and female students is also accepted establishing no significant difference in critical thinking between two genders. The third null hypothesis on the effect of mental health on critical thinking is also accepted showing no difference in mental health does not make a significant difference in developing critical thinking ability of senior secondary students. The following null hypothesis on the effect of critical thinking on mental health proves to be rejected establishing a significant effect of critical thinking ability on mental health of senior secondary students. The correlation coefficient -0.01 proves significant negative correlation between mental health and critical thinking of senior secondary students. The regression analysis shows decrease in critical thinking with increase in mental health status of senior secondary students and regression coefficient is not significant that is visually represented in the line fit plot (Figure 5)

Discussion

The concerned variables i.e. mental health and critical thinking of the adolescent students have been studied statistically to show the correlation and effect of on the other. Usually, academic performance is assumed to depend on logical critical thinking ability of the students. It has also been taken into consideration that mental health of the concerned individuals plays an important role to develop their critical thinking ability. Studies also put emphasis on difference between male and female individuals in respect of mental health and critical thinking and significant correlation and regression between these variables. But, this study shows no gender difference exists in mental health and critical thinking ability of senior secondary students. The study also establishes that mental health does not have significant effect on critical thinking but nurture of critical thinking ability in students maintains mental health of the concerned students. This finding has an implication that inherent mental health does not impact so much on developing critical thinking ability as development of critical thinking ability helps in maintaining mental health as a wellness therapy for the senior secondary students.

Conclusion:

Mental health and critical thinking are important psychological variables on which different studies have been conducted from their different dimensions and their relationship with pertinent wellness and cognition boosting variables. Present study on the respective variables shows significant effect of critical thinking ability on maintaining mental health of senior secondary students that proves to be a unique finding to fill in the research gap in contemporary studies. Moreover, this study shows mental health and critical thinking ability do not vary with genders. It is also found that better mental health does not lead to higher critical thinking ability and the relationship is rather inversely proportionate. This study opens an important vista to take special care with different gender-neutral strategies to develop critical thinking ability of prospective students. Development of the ability to think critically and logically should be included along with prevalent wellness strategies, such as, meditation, co-curricular and extra-curricular activities and life-skill training to maintain mental health of prospective adolescent senior secondary students.

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