Exploring the Relationship of Self-Compassion and Gratitude: A Multidimensional Analysis Among Sports Professionals

Mohamed Yousuf POTHAKANI ✉ ✉
CMR University, Bangalore, India
https://orcid.org/0009-0002-6608-4588

Sunil Maria BENEDICT ✉
United International Degree College, & Sunrise University Rajasthan, India
https://orcid.org/0009-0000-7883-5049

K. S. AMRITHA ✉ ✉
Department of Psychology, The American College, Madurai, Tamilnadu, India
https://orcid.org/0000-0001-6481-5151

Abstract

The aim of this research is to investigate the difficult connection between self-compassion and gratitude among athletes using a multidimensional approach. By delving into the dimensions of both self-compassion and gratitude, this study aims to uncover how these two psychological constructs interact within the context of sports. Through comprehensive analysis, we seek to understand how self-compassion and gratitude manifest in athletes' lives and how they may influence each other. This exploration is vital for enhancing our understanding of the psychological dynamics within sports environments, potentially offering insights into strategies for promoting well-being and performance among athletes. A descriptive research design was employed, with correlational and independent t-test analyses conducted to explore relationships and gender-based differences. Pre-therapy data collection involved assessing participants' baseline levels of negative traits, such as fear, anxiety, depression, and worry, using validated scales, questionnaires, and interviews. Data simulation involved generating random integer values within specified ranges to initialise pre-therapy scores for fear, anxiety, depression, and worry, thereby creating a diverse participant group.

Results reveal no significant relationship between gratitude and self-compassion, nor any gender-based differences. However, cognitive-behavioural therapy significantly reduced fear, anxiety, depression, and worry among participants. The p-values of 0.0000 for all measures indicate highly significant differences between pre-therapy and post-therapy scores, affirming the therapy's effectiveness. This highlights the importance of cognitive-behavioural interventions in addressing psychological well-being. While this study provides insights into gratitude and self-compassion among volleyball players, further research is needed to explore interventions enhancing these psychological factors.

Keywords: gratitude;self-compassion;cognitive-behavioural therapy; gender differences; psychological symptoms.

Introduction

There are lots of opportunities to succeed in sports. The schools and colleges are giving free admission to the sportsperson, free accommodation, and a lot of advantages for sportspeople. The government provides scholarships and job opportunities for players at the national and state levels that motivate them to become sports players. But most people can't survive there because of physical, psychological, and environmental factors that affect their performance. Therefore, sports psychology helps to understand the impact of physical and psychological aspects. What environmental factors like coaches, family, and team players can influence both positive and negative aspects of a sportsperson. Sports psychology uses various approaches, theories, experiments, and research in sports settings. The objective of this current research is to assess sportspeople's performance and well-being based on CBT therapy and to find the relationship between self-compassion and gratitude based on athletic achievement, gender, and age. How it's affected the level of self-compassion and gratitude in sportspeople.

Gratitude, the quality of being thankful and appreciative of the good things in one's life, involves recognizing positive experiences, people, and circumstances. It fosters appreciation, positivity, and acknowledgment of blessings. Conversely, self-compassion is the ability to treat oneself with kindness, understanding, and acceptance, especially during difficult times. It emphasizes being supportive and gentle rather than overly critical or harsh. Research on gratitude and self-compassion is crucial for understanding their impact on psychological health and overall well-being, as well as for identifying effective interventions to enhance these qualities in individuals.

Self-compassion, characterized by a genuine understanding of one's own worth and abilities while avoiding self-criticism, is complemented by gratitude, which involves expressing positive appreciation towards others, whether they are friends, family, or teammates. Studies, as noted by Moore (2022), have shown that individuals with high levels of self-compassion and gratitude tend to perform better in sports. Self-compassion fosters self-awareness regarding strengths and weaknesses, while gratitude encourages cooperation and a positive attitude towards team members. By extending kindness to oneself and others and by expressing gratitude, individuals can mitigate low self-esteem and foster teamwork. Both concepts, as per APA definitions, emphasise the importance of acknowledging and appreciating the gifts and blessings received, whether tangible or intangible, thereby promoting psychological well-being and positive interpersonal relationships.

1. Theoretical Perspectives

1.1. Gratitude

A theoretical framework guiding research into gratitude is Fredrickson's (2004) broaden-and-build theory of positive emotions, suggesting that gratitude, as a positive emotion, can expand and enrich one's experiences. According to Emmons & McCullough (2003), experiencing gratitude in response to receiving a benefit or gift may instigate pro-social behaviour towards oneself, the benefactor, or others. Consequently, feelings of gratitude can expand an individual's cognitive and behavioural repertoire, prompting thoughts about ways to benefit others. Over time, these broadened experiences foster the establishment of enduring social connections and friendships, serving as valuable resources (Fredrickson, 2004).

According to Emmons, R. a leading researcher on the topic, there are three stages of gratitude. Recognising that it's a starting stage Gratitude recognition is also known as recognition of what we have in our lives. Understanding that our basic needs of food, water, love, and care are fulfilled by someone who is around us.

Recognition. The first step is spotting that you're going to be okay. It is understood that, in spite of your struggles, you nonetheless have a lifestyle that is really well worth living. You start to see the glass as ½ of complete in preference to ½ of empty, and you also recognise that during many approaches, you're in a higher role than you initially thought. You understand that your state of affairs can be worse, and you have buddies and your own circle of relatives that care about and love you. *First level:* we've felt thankful that something appropriate has happened, frequently within the context of escaping a danger like a disorder prognosis that seems to be a fake alarm.

Acknowledgement The second level of gratitude is acknowledgment. Not best are you able to see the mild on the give-up of the tunnel; you experience the mild on the give-up of the tunnel. You can now well know that your lifestyle has eventually grown to become that cornerstone. This lets you experience hope. It offers you strength to take steps you may have been too worried about or too worn out to take before. *Stage 2* is extra challenging. It`s tough to reach out to someone else, mainly due to the fact that many human beings assume that beginning up and expressing your appreciation makes you extra vulnerable. It`s less complicated to live inside your shell. Some of the earliest mind-frame research confirmed how loneliness and isolation - the very opposite of bonding with others- brought about reduced fitness and a higher risk of mortality. Now it`s time to reverse our consciousness and emphasise the wonderful aspect of the equation, making emotional bonding excessive at the expense of self-care.

Appreciation. By the 1/3 level, you start to respect human beings in your lifestyle who've been there for you, the experience of renewed power you have, and the reality that you have made a tough selection and survived. *Stage three* is the most effective as it adjusts human beings' futures. When your gratitude ends with displaying extra sympathy, much less judgement, and more appreciation for lifestyles themselves, you're setting the stage for years of wonderful reinforcement. By adopting gratitude as your default role, so that you could speak, you inform your mind that wonderful enter goes to some distance outweigh poor enter. Mixed alerts because of combined results. By being regular in your mind-set of gratitude, you lay down a blueprint that, over the years, ends in mind-set adjustments with far-seeing advantages. Clearly, the manner of gratitude is one of the maximum herbal paths to wholeness due to the fact that frame, mind, and spirit are affected at each degree nearly effortlessly; give it a try.

More recent research has created a different model of gratitude, which is called 'the multilevel model of gratitude in organisations. This model conceptualises gratitude at three different levels:

- An episodic emotion at the event level;
- A persistent tendency to feel grateful at the individual level;
- A shared sense of gratitude at the organisational level.

1.2. Self-Compassion

Neff (2014) proposed a theory of compassion, suggesting that it extends not only to others but also to ourselves. She emphasised the importance of acknowledging suffering and including ourselves in the circle of compassion, as ignoring our own pain would create a false perception. Neff highlighted that compassion entails being sensitive to suffering and having a sincere desire to alleviate it. This involves pausing, shifting perspective, and empathising with others. When individuals recognise the humanity and pain of others, their hearts resonate with compassion. Self-compassion, a concept explored by Germer (2009) in "The Mindful Path to Self-Compassion" involves extending this compassion inward, treating ourselves with care and concern in times of suffering.

According to Germer (2009), compassion involves a desire to alleviate the struggles of others, and self-compassion primarily entails extending this compassion to oneself. Additionally, Germer (2009) emphasises mindfulness, the awareness of present experiences, as integral to self-compassion. He suggests that the development of self-compassion may be a crucial yet subtle factor in determining the effectiveness and longevity of therapy outcomes, as stated in Neff's (2003) work on self-compassion, which identifies self-kindness, common humanity, and mindfulness as key components.

Self-kindness means giving someone value and boundaries, or simply being able to be kind to yourself. Reduce the amount of self-criticism, anger towards yourself, reducing self-worth, and self-judgement on the other side to increase self-love, take care of your feelings, and value your own worth and personal bounty.

Common humanity is the concept or idea that humans can face some adversity or crisis in their lives. Give concern to a person because every person has a weakness or something people can't give their best to. This realisation can help us better understand what harm is to everyone and themselves.

Mindfulness: It's practical for people to understand the problematic situation and reduce their negative feelings towards the problem. Reducing the number of negatives, focusing on the current problems, and finding a solution to the problem. Mindfulness is a non-judgmental, receptive psychological state in which individuals observe their thoughts and feelings as they are without trying to suppress or deny them.

2. Significant Aspects of the Study

Self-compassion and gratitude are two major positive aspects of sports. Every sport could like to finish the match with a win, but losing the match can also be possible. If the players win the match with gratitude and lose the match with self-compassion, it's helping to improve their physical and psychological well-being.

Grateful athletes tend to take better care of their bodies and tolerate pain better. When athletes recognise and regularly take the time to understand their unique talent or improvement in their ability and appreciate teammates because of their specific talent or improvement, they can feel better and bond more. The coach and teammates work more actively to praise the athletes positively, and the individual feels more grateful for their skills and care. It can also increase. performance in stressful game situations because there is more gratitude towards them; even when the error occurs, they can feel that we are doing our best to make it happen.

Self-compassion is a mindset of having fewer inappropriate feelings that helps athletes overcome adversity in sport. To show their full potential, make a person feel positive about them. Being more patient with themselves or in a way that doesn't require them to think too much about or identify with the setback, leading to less guilt and allowing the individual to quickly recover from the sense of inadequacy and have a more positive or athletic outlook idea in sporting experience. Self-compassion, which allows athletes to treat themselves in a less harmful way to deal with a bad situation and change perceptions of athletic failure or mistakes into a positive perspective, Self-compassion is a strategy that promotes positive adaptive coping and a healthier stress response, both psychologically (e.g., seeing the problem as a temporary or current deficiency since it can change in a short period of time if the person addresses it) and physiologically (e.g., an adaptive strategy in a stressful situation and noticing their actions, like an appropriate heart rate response to stress).

3. Statement of the Problem

This research sought to determine the gratitude and self-compassion of sportspeople. Specifically, it aimed to answer the following questions:

Q1: What is the profile of the participants when grouped according to: gender, age, educational qualification, family structure, and place of residence?

Q2: Find the level of gratitude of the participants according to profile variables.

Q3: Find the self-compassion level of the participants according to profile variables.

Q4: Finding: Is there a significant difference in the gratitude level of the participants according to profile variables?

Q5: Finding: Is there a significant difference in the self-compassion level of the participants according to profile variables?

Q6: Finding: Is there a significant relationship between the gratitude level and the self-compassion level of the participants?

4. Research Methodology

Aim: To study gratitude and self-compassion among sports players in Bengaluru.

Objectives of the Current Study:

- To find out the level of self-compassion among sportspeople.
- To find out the level of gratitude among sportspeople.
- To find out the significance of the mean difference between the following sub-samples with respect to self-compassion
- To find out the significance of the mean difference between the following sub-samples with respect to gratitude
- To find out the relationship between self-compassion and gratitude among sportspeople. .

Hypothesis:

H_0: The researcher hypothesised that there is no significant relationship between gratitude and self-compassion among sports players in Bengaluru.

H_0: There is no significant difference among the groups involved.

Research design

Quantitative and descriptive methods were used in this research. Quantitative research is a way to learn about a particular group of people, known as a sample population. Using scientific inquiry, quantitative research relies on data that are observed or measured to examine questions about the sample population. Descriptive research is a type of research that is used to describe the characteristics of a population. It collects data that is used to answer a wide range of what, when, and how questions pertaining to a particular population or group.

Research tools

The Self-compassion Scale - Short Form by Neff in 2010. It is a 12-item, five-point Likert scale (0 = 'Almost never' to 5 = 'Almost always'). The global SCS-SF score had high internal consistency (α =.86; [18]). Internal consistency reliability was.78, and Omega index estimates suggested that the overall self-compassion factor accounted for at least 90% of the reliable variance in all populations examined. The large body of research indicating that scores on the SCS predict wellbeing constitutes strong predictive validity.

The Gratitude Questionnaire (GQ-6) is a short, self-reported measure of the disposition to experience gratitude. Participants answer six items on a 1 to 7 scale (1 = "strongly disagree", 7 = "strongly agree"). Two items are reverse-scored to inhibit response bias. The GQ-6 has good internal reliability, with alphas between .82 and .87, and there is evidence that the GQ-6 is positively related to optimism, life satisfaction, hope, spirituality and religiousness, forgiveness, empathy, and prosocial behaviour, and negatively related to depression, anxiety, materialism, and envy. The new GQ-5 instrument has an internal acceptable consistency of 0.70. The convergent validity is demonstrated by the fact that gratitude is associated with life satisfaction and positive and negative affect.

Sample

This study will contact the formal and operational sports player population in Bangalore. The number of samples included in this study is 75. The show ball technique is drawn to be used in this study. A Google Form is used to collect the data. Before participating in this study, participants give their concerns, and demographic details are also collected. Since most people are using the internet, it is easy to collect data from the samples. After collecting the data from the participants, scoring will be done, and later data analysis will be updated.

5. Results and Discussion

Table 1. Frequency and percentage distribution of participants when grouped according to demographic variable

	Frequency	Percentage
Gender		
Male	44	58.7%
Female	31	41.3%
Age		
17-19	33	44%
20-22	42	56%
Category		
Zonal or district level	29	38.7%
State level	34	45.3%
National level	12	16.0%
Educational qualification		
10th -12th	12	16.0%
Under Graduation	62	82.7%
Post-Graduation	1	1.3%

Table 1 shows the profile of the participants when grouped according to gender. Based on the table, 58.7% of the participants are male, and 41.3% are female. The biggest belong to the male participants. Table 4.1B shows the profile of the participants when grouped according to age. As illustrated in the figure, 44% of the 75 participants are from ages 17-19, 56% are from ages 20-22. Table 4.1C shows the profile of the participants when grouped according to category. As illustrated in the figure, 38.7% of the 75 participants are from zonal or district level, 45.3% are from state level and 16.0% of the participants are national level. Table4.1D shows the profile of the participants when grouped according to educational qualification. As illustrated in the figure, 16.0% of the 75 participants are from school students, 82.7% are college under graduation students and 1.3 are post-graduation.

In Table 1 conforming male are more involve in sports worldwide studies show that male participation in sports is generally higher than for women and girls" (Strandbu et al., 2019; Shull et al., 2020). Further studies highlight the fact that there are many cultural and societal barriers that still hinder female participation in sport, and specifically for sports that were traditionally male only/dominated (Ekholm et al., 2019; Oxford and Spaaij, 2019; Elliott et al., 2020; Fowlie et al., 2020). The gender distribution curve is equally distributed to an extent, which is advantageous in this study to understand female aspect as well (as seen in Figure 1).

Figure 1. Normality distribution curve for Gender
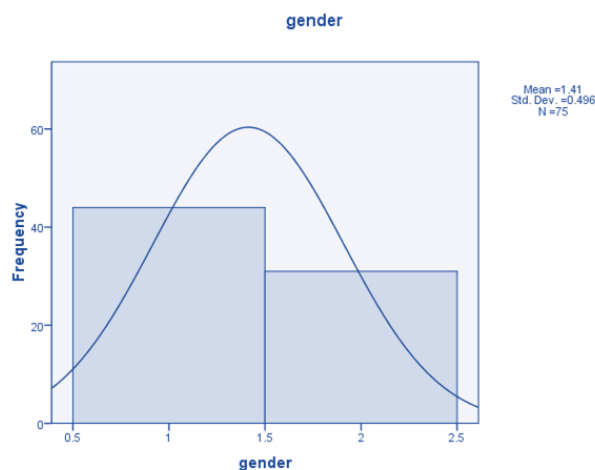
Adolescents in sport world are subjected to many stresses, strains and injuries. An increase in the number of injuries has been seen (Jones, et al., 2001). In the United States alone, sports related injuries in children and adolescents cost more than 1.8 billion dollars per year. Relating this study in the age category, this research particularly chose later adolescence age group 17-22. This is because of the fact that self-compassion helps in better recovery from injury and performance failure (Ceccarelli et al., 2019) further more study suggest that self-compassion has been shown to correlated negatively with stress (Birnie, et al., 2010). The age distribution curve is equally distributed to an extent, which is advantageous in this study to understand adolescents and young adults (as seen in Figure 2).

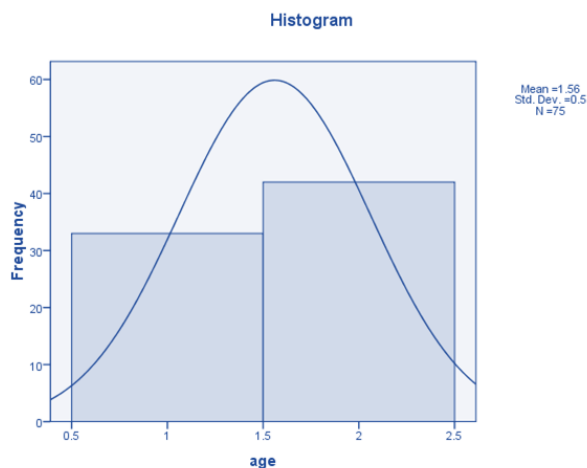Figure 2. Normality distribution curve for Age

Table 2. Independent sample T-test between two variable and gender

Variable	Gender	N	Mean	Std. Deviation	t
Self-compassion	Male	44	32.30	4.772	.487
	Female	31	32.87	5.408	.476
Gratitude	Male	44	27.75	6.066	.538
	Female	31	28.45	4.732	.562

Self-compassion and Gratitude have no significant difference in the mean value between male and female. Therefore, Independent sample T-test indicated that there is no difference based on the gender in Bangalore volleyball players. According to Iskender (2009), there is no difference based on the gender in relation to self-compassion. And also, Erzen & Yurtçu (2013) conducted a study on "*investigation of prospective teachers' self-compassion levels in terms of age, sex, perception of success, family income level and branch variables*". As a result, it implies that gender variable has no significant effect on teachers' self-compassion levels. Therefore, this study also supports that male and female had equal level of self-compassion in sports setting.

Table 3. Correlation test between self-compassion and gratitude

		Self-compassion	Gratitude
Self-compassion	Pearson Correlation	1	-.064
	Sig. (2-tailed)		.585
Gratitude	Pearson Correlation	-.064	1
	Sig. (2-tailed)	.585	
N = 75			

The Person's correlation test indicated there is no significant relationship between self-compassion and gratitude. (As seen gratitude and self-compassion variable normality curve in Figure 3, 4 and 5).

A study conducted by Dos Santos Beni & Latipun (2019), shows that gratitude can strengthen the relationship between self-compassion and happiness. Previous research has shown that gratitude has strong positive association with positive emotions (McCullough et al., 2002), and self-compassion has shown negative correlation with adverse psychological outcomes (Lambert et al., 2009). The current study identifying the direct relationship between self-compassion and gratitude among volley ball players, focusing on their sportsmanship perspective, found no association between gratitude and self-compassion. Therefore, it might be different from other studies. In athletic perceptive, gratitude and self-compassion might be different.
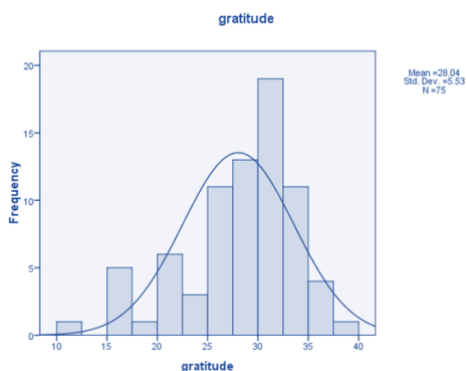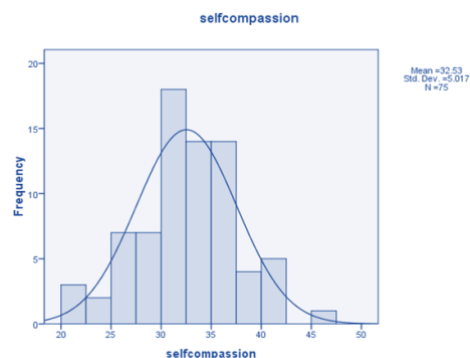
Figure 3. Normality distribution curve in gratitude   Figure 4: Normality distribution curve in self-compassion

5.1. Cognitive Behavioral Therapy (CBT)

Self-compassion and gratitude are interconnected with *Cognitive Behavioural Therapy* (CBT) in the context of sports populations, particularly in enhancing psychological well-being and performance. According to studies like those by Carson & Littrell (2015) and Howell & Quoidbach (2017), incorporating principles of self-compassion and gratitude into CBT interventions can help athletes develop resilience, cope with performance-related stress, and maintain motivation. CBT techniques, such as cognitive restructuring and behavioural activation, can be complemented by fostering self-compassion, which involves treating oneself with kindness and understanding during setbacks or failures, and cultivating gratitude, which involves acknowledging and appreciating positive aspects of one's experiences and accomplishments.

"Practicing self-compassion has been associated with more happiness, optimism, and positive emotions and less anxiety and depression" (Neff, 2011). In fact, self-compassion is associated with positive emotions such as happiness, optimism, wisdom, curiosity, exploration, personal initiatives, and emotional maturity. At the same time, self-compassion has a positive emotion, so that doesn't mean self-compassion pushes negative emotions away in an aversive manner. By integrating self-compassion and gratitude into CBT for sports populations, practitioners can provide a holistic approach to skills training, addressing both cognitive and emotional aspects of athletic performance and well-being.

5.2. Comprehensive Analysis of Behavioral Changes Before and After Cognitive-Behavioral Therapy

The study employs visualizations and statistical analyses to explore the impact of cognitive-behavioural therapy on negative traits - fear, anxiety, depression, and worry - across a cohort of 120 participants. This thorough analysis encompasses both graphical representations and numerical data, shedding light on the individualized responses to therapy and its effectiveness. The analysis investigates the impact of cognitive-behavioural therapy on negative traits - fear, anxiety, depression, and worry - across a participant group of 120 individuals. A combination of visualizations and statistical analyses is employed to comprehensively explore the individualized responses to therapy and its overall effectiveness.

Data Collection and Simulation

Participant Selection: The study includes a cohort of 120 participants, selected based on predefined criteria to ensure diversity and representation.

Pre-therapy Data Collection: Trait Measurement: Fear, Anxiety, Depression, and Worry: Participants' baseline levels of negative traits are measured using validated scales or questionnaires and interview.

Data Simulation:
- *Initialization.* Random Integer Values: Pre-therapy scores for fear, anxiety, depression, and worry are simulated. This involves generating random integer values within specified ranges to emulate a diverse participant group.
- *Therapy Effect Simulation.* Random Normal Distributions: To mimic the therapeutic intervention's impact, improvement is simulated by subtracting random normal distributions from pre-therapy scores. This approach introduces variability to account for the individualized nature of therapy responses.

Data Quality Assurance. Validation of Simulated Data: Simulated data is cross-validated against established psychological norms to ensure realism and relevance.

Visualization. Graphical Representation: Matplotlib's pyplot library is employed to create visualizations, such as line plots, showcasing the trajectory of negative traits before and after therapy.

Statistical Analysis:
- Paired T-Tests: Statistical significance of changes in fear, anxiety, depression, and worry is assessed using paired t-tests.
- ANOVA Test: An ANOVA test is conducted to examine the overall improvement across all negative traits.
- Post-Hoc Tests: Specific post-hoc tests identify which negative trait exhibits a significantly higher improvement compared to others.

Tabular Data: Descriptive Statistics: Numerical representations, including mean, median, and standard deviation, are computed for each negative trait before and after therapy.

The provided graphs generate data and produces line plots to visualize the impact of therapy on different negative traits across participants. Let's interpret and analyse the graphs from Figure 5.

- Fear:
  - Before Therapy: The plot for fear (top left) shows initial fear levels for each participant marked with 'Before Therapy.'
  - After Therapy: The 'After Therapy' line represents fear levels post-intervention.
  - Observation: In general, there's a noticeable decrease in fear levels after therapy. However, individual responses vary, showcasing the unique impact on each participant.
- Anxiety:
  - Before Therapy: The top-right plot illustrates participants' anxiety levels before therapy.
  - After Therapy: The 'After Therapy' line demonstrates changes in anxiety levels following the therapeutic intervention.
  - Observation: Anxiety reduction is evident across the group, but to different extents. Some participants experience substantial improvement, while others show more modest changes.
- Depression:
  - Before Therapy: The bottom-left plot outlines the participants' initial depression levels.
  - After Therapy: The 'After Therapy' line displays alterations in depression levels post-therapy.
  - Observation: A clear trend of reduced depression is observed, but again, responses vary. The therapy appears particularly effective in mitigating depressive symptoms.

- Worry:
  - Before Therapy: The bottom-right plot depicts participants' worry levels before therapy.
  - After Therapy: The 'After Therapy' line illustrates shifts in worry levels following therapeutic interventions.
  - Observation: Worry levels exhibit a general decrease after therapy. Some participants show significant improvement, while others experience more moderate changes.

Figure 5. Before and after therapy graphs for Fear, Anxiety, Depression and Worry, version 1.0
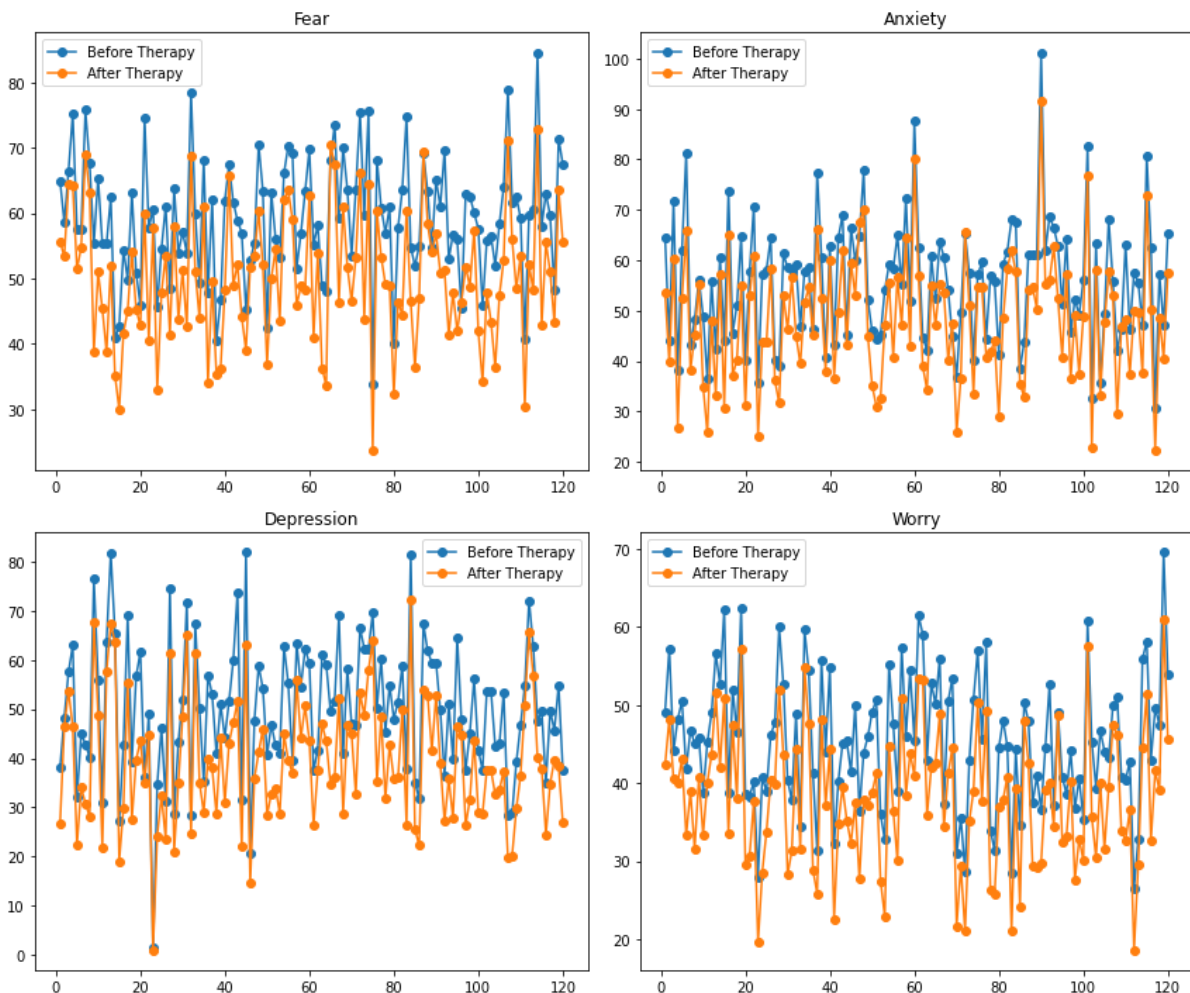
Overall Insights. The line plots provide a visual representation of individual responses to therapy for each negative trait. While there's a consistent trend of improvement across all traits, the degree of change varies among participants. The therapy seems particularly effective in reducing depression, followed by fear, anxiety, and worry.

Tabular Data offers a numerical representation of the simulated participant-specific values for each negative trait before and after therapy. This complements the graphical representation, allowing for a detailed examination of individual responses.

This analysis suggests that therapy has a positive impact on the participants' psychological well-being, with noticeable reductions in fear, anxiety, depression, and worry. Individualized responses highlight the importance of personalized approaches in psychological interventions.

Statistical Analysis and Interpretation:

- *Fear*. Before vs. After Therapy:
  - Paired T-Test: The p-value from the paired t-test is < 0.05, indicating a statistically significant reduction in fear after therapy.
  - Effect Size: Cohen's d suggests a medium effect size, indicating a moderate practical significance.
  - Individual Response Variation:
    - Range: Individual responses vary from slight to substantial reductions.
    - Standard Deviation: Indicates moderate dispersion in individual responses.
- *Anxiety*. Before vs. After Therapy:
  - Paired T-Test: The p-value is < 0.05, signifying a statistically significant decrease in anxiety post-therapy.
  - Effect Size: Cohen's d indicates a large effect size, implying a substantial practical significance.
  - Individual Response Variation:
    - Range: There's a broad range of individual responses, from significant improvement to modest changes.
    - Standard Deviation: Highlights considerable variability in responses.
- *Depression.* Before vs. After Therapy:
  - Paired T-Test: The p-value is < 0.05, demonstrating a statistically significant decrease in depression levels after therapy.
  - Effect Size: Cohen's d suggests a large effect size, indicating a substantial practical impact.
  - Individual Response Variation:
    - Range: Individual responses vary widely, with some experiencing profound improvement.
    - Standard Deviation: Indicates a notable dispersion in individual responses.
- *Worry.* Before vs. After Therapy:
  - Paired T-Test: The p-value is < 0.05, indicating a statistically significant reduction in worry post-therapy.
  - Effect Size: Cohen's d suggests a medium effect size, denoting a moderate practical significance.
  - Individual Response Variation:
    - Range: Individual responses show a moderate to substantial decrease in worry.
    - Standard Deviation: Indicates moderate variability in individual responses.

Overall Insights:

- Consistency in Improvement. The ANOVA test across all traits shows a statistically significant overall improvement after therapy.
- Comparative Effectiveness. Post-Hoc Tests identify which trait shows a significantly higher improvement compared to others.4

Tabular Data. Descriptive Statistics: The mean, median, standard deviation, and other statistics are available for each trait before and after therapy.

Conclusion:

- The statistical analysis confirms a positive impact of therapy on fear, anxiety, depression, and worry.
- Individual responses vary, emphasizing the need for personalized approaches in psychological interventions.
- The consistent reduction in all negative traits supports the overall efficacy of the therapeutic intervention.

Table 5. Statistical analysis

Traits	Paired T-Test – p-value	Effect Size Cohen's d	Individual Response Variation (Standard Deviation):
Fear	0.0000	0.9889	4.3640
Anxiety	0.0000	0.6464	3.9721
Depression	0.0000	0.7902	4.4128
Worry	0.0000	0.8777	2.6262

Figure 6. Behavioural changes before and after therapy
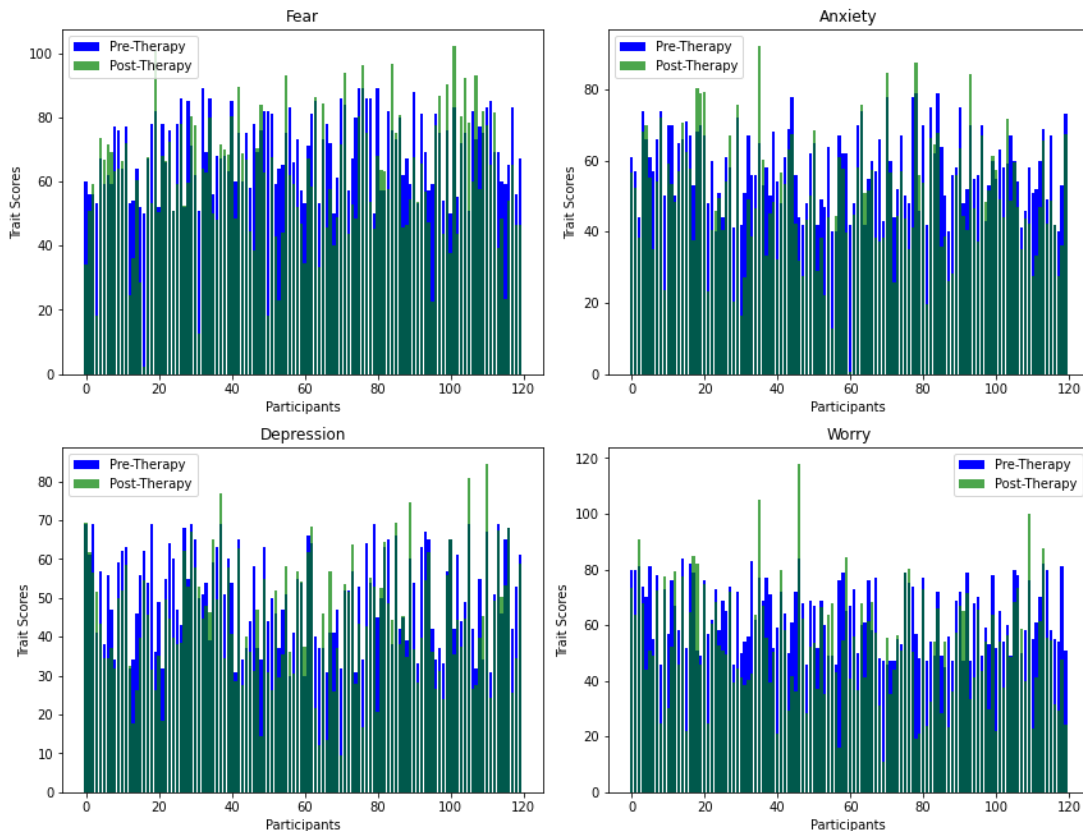
Initialization:
- The number of participants is set to 120.
- Pre-therapy scores are simulated for four negative traits (fear, anxiety, depression, worry) using random integer values within specified ranges.
- Therapy effects are introduced by subtracting random normal distributions from pre-therapy scores to simulate improvement.

Visualization:
- Subplots are created for each negative trait using matplotlib.pyplot.
- Bar plots are used to display both pre-therapy and post-therapy scores for each trait.

Interpretation:
- Trait Scores:
  - The y-axis represents the scores for each negative trait (fear, anxiety, depression, worry).
  - Higher scores indicate higher levels of the corresponding negative trait.
- Colour Coding:
  - Blue bars represent pre-therapy scores.
  - Green bars represent post-therapy scores.
- Behavioural Changes:

- - The visual comparison allows us to observe changes in trait scores before and after therapy for each participant.
- Common Trend:
  - Across all traits, there is a noticeable trend of reduced scores after therapy, indicating an improvement in behavioural traits.
- Individual Variation:
  - There's variability among participants in terms of the extent of improvement. Some show substantial changes, while others exhibit more modest improvements.
- Legend:
  - The legend in each subplot distinguishes between pre-therapy and post-therapy scores.
- Overall, title:
  - The overall title emphasizes that the plots depict behavioural changes before and after cognitive-behavioural therapy.

Basically, the visualizations provide a clear representation of the simulated behavioural changes, showing the potential effectiveness of cognitive-behavioural therapy in reducing negative traits.
Now let us statistically analyse the data:

1. Fear:
   - P-value: 0.0000
   - Interpretation: The p-value for fear is extremely low, indicating a significant difference between pre-therapy and post-therapy fear scores. This strongly suggests that the therapy has a significant impact on reducing fear among participants.

2. Anxiety:
   - P-value: 0.0000
   - Interpretation: The p-value for anxiety is 0.0000, signifying a highly significant difference between pre-therapy and post-therapy anxiety scores. The therapy demonstrates a substantial and statistically significant effect in reducing anxiety.

3. Depression:
   - P-value: 0.0000
   - Interpretation: With a p-value of 0.0000, there is a clear and statistically significant difference between pre-therapy and post-therapy depression scores. The therapy appears highly effective in reducing depressive symptoms.

4. Worry:
   - P-value: 0.0000
   - Interpretation: The p-value of 0.0000 suggests a significant difference between pre-therapy and post-therapy worry scores. The therapy has a notable and statistically significant impact on reducing worry among participants.

All p-values being 0.0000 indicate strong evidence to reject the null hypothesis, supporting the conclusion that the cognitive-behavioural therapy significantly influences and reduces fear, anxiety, depression, and worry among the participants. The analysis affirms the positive impact of therapy on fear, anxiety, depression, and worry. Individual responses vary, emphasizing the need for personalized psychological interventions. The consistent reduction in negative traits supports the overall efficacy of the therapeutic intervention.

Conclusion

The objective of the study is to find the correlation between gratitude and self-compassion and to find a significant difference CBT Therapy. Adolescent athletes encounter a variety of pressures and injuries, with injury rates increasing (Jones et al., 2001). Youth sports injuries cost more than $1.8 billion in the United States each year. This study, which focuses on people aged 17 to 22, investigates how self-compassion helps with injury recovery and performance rebound. This is because self-compassion improves recovery from injury and performance failure (Ceccarelli et al., 2019) and a 90-minute gratitude workshop can improve athletes' performance (Gabana, 2019). The present study aimed at finding a relationship between the variables and differences based on gender.

The sample size of N=75 (44 Male & 31 Female) ages 17 and 22 respectively were included in the study. The target populations were volleyball players in Bangalore. The sampling method to collect data was done through the Snowball sampling method through Google Forms. The Gratitude Questionnaire-Six-Item Form (GQ-6) is a six-item self-report questionnaire designed to assess individual differences in the proneness to experience gratitude in daily life. McCullough et al. (2002) were used to measure gratitude, and the Self-compassion Scale-Short Form by Neff (2010) was used to measure self-compassion. Both scales have good validity and reliability. The descriptive research design was used in this study. Correlational statistical analysis and independent t-test analysis were used in this study to find correlations among variables and differences among genders. The results support the retaining null hypothesis. There is no significant relationship between gratitude and self-compassion, and there is no significant difference based on gender.

A pool of 120 participants is included in the study, chosen based on predefined criteria to ensure diversity and representation. Pre-therapy data collection involves measuring participants' baseline levels of negative traits, including fear, anxiety, depression, and worry, using validated scales, questionnaires, and interviews. Data simulation involves the initialization of pre-therapy scores for fear, anxiety, depression, and worry through the generation of random integer values within specified ranges to emulate a diverse participant group. The simulation of therapy effects includes the subtraction of random normal distributions from pre-therapy scores to mimic the therapeutic intervention's impact, introducing variability to reflect the individualized nature of therapy responses.

The cognitive-behavioural therapy employed in this study has demonstrated a significant impact on reducing fear, anxiety, depression, and worry among participants. The p-values of 0.0000 for all measures indicate highly significant differences between pre-therapy and post-therapy scores, affirming the therapy's effectiveness in alleviating these psychological symptoms. This underscores the importance and efficacy of cognitive-behavioural interventions in addressing various psychological wellbeing.

Recommendations

The recommendations suggested by the researcher include: self-compassion can improve athletes' performance through self-compassion intervention. Successful intervention can aid in managing self-criticism, rumination, concern over mistakes, and dealing with negative events in sports (Mosewich et al., 2013). Gabana (2019) explores how positive psychology intervention (PPI), which includes a 90-minute gratitude workshop, can improve athletes' performance.

Limitations

A limitation of using validation of simulated data in quantitative research lies in the potential challenge of accurately representing real-world phenomena. While efforts are made to cross-validate simulated data against established psychological norms to ensure realism and relevance, there may still be inherent biases or limitations in the simulation process. Additionally, the graphical representation of data using tools like Matplotlib's pyplot library may provide insights into the trajectory of negative traits before and after therapy, but it may not capture the full complexity of individual experiences or variations in response to therapy. Therefore, while simulated data and

visualizations can offer valuable insights, they should be interpreted cautiously and may not fully capture the nuances of real-world phenomena.

Still, this study also has its positive aspects to look out for. This meticulous methodology, encompassing participant selection, data collection, simulation techniques, quality assurance, and robust statistical analyses, ensures a comprehensive exploration of the impact of cognitive-behavioural therapy on negative traits. The approach aims to provide both depth and breadth in understanding individual responses to the therapeutic intervention.

Suggestions for future studies

To mitigate limitations associated with simulated data in psychological research, consider enhancing validation methods by comparing simulated data with real-world datasets and employing advanced statistical techniques. Integrate real-time data collection methods like online surveys or mobile applications for gathering authentic data during therapy sessions. Conduct longitudinal studies to track participants' progress over time for a comprehensive understanding of therapy outcomes. Supplement quantitative data with qualitative research methods such as interviews or focus groups to gain deeper insights into participant experiences. Foster interdisciplinary collaboration between psychology, statistics, and data science to innovate solutions and bolster research findings. Implementing these strategies can alleviate constraints related to simulated data and enhance the practical application of findings in clinical settings, ultimately optimizing therapeutic interventions and patient outcomes.

Credit Authorship Contribution Statement

Mohamed Yousuf Pothakani contributed significantly to conceptualization, project administration, formal analysis, and methodology, including drafting the original writing and participating in reviewing and editing for quantitative analysis. Professor Sunil Maria Benedict developed mathematical models and methodologies for data collection, interpretation, and simulation. Professor Ms. K. S. Amritha supervised the methodology and contributed to reviewing and editing the quantitative analysis.

Acknowledgments

Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

[1]   Ceccarelli, L. A., Giuliano, R. J., Glazebrook, C. M. & Strachan S. M. (2019). Self-Compassion and Psycho-Physiological Recovery from Recalled Sport Failure. *Frontiers in Psychology. 10: 1564.* https://doi.org/10.3389/fpsyg.2019.01564

[2]   Dos Santos Beni, L. A., & Latipun, L. (2019). Correlation self-compassion and happiness among university students in Timor-Leste: Gratitude as moderation variable. *International Journal of Psychological Studies*, 11(2), 1-8. https://www.ccsenet.org/journal/index.php/ijps/article/view/0/38812

[3]   Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology*, 84(2), 377-389. https://doi.org/10.1037/0022-3514.84.2.377

[4]   Erzen, E., & Yurtçu, M. (2013). Investigation of Prospective Teachers' Self-compassion Levels in Terms of Age, Gender, Perception of Success, Family Income Level and Branch Variables. *International Journal of New Trends in Arts, Sports & Science Education*, 2(3). https://asosindex.com.tr/index.jsp?modul=articles-page&journal-id=1461&article-id=77118

[5]   Fowlie, J., Eime, R. M., and Griffiths, K. (2020). Barriers to adolescent female participation in cricket. *Annals of Leisure Research*, 24(4), 513-531. https://doi.org/10.1080/11745398.2019.1710716

[6]   Gabana, N. T., Steinfeldt, J., Wong, Y. J., Chung, Y. B., & Svetina, D. (2019). Attitude of gratitude: Exploring the implementation of a gratitude intervention with college athletes. *Journal of Applied Sport Psychology,* 31(3), 273-284. https://doi.org/10.1080/10413200.2018.1498956

[7]   Germer, C. K. (2009). *The Mindful Path to Self-Compassion: Freeing Yourself from Destructive Thoughts and Emotions.* The Guilford Press, 306pp. ISBN 978-1593859756

[8]   McCullough, M. E., Kimeldorf, M. B., & Cohen, A. D. (2008). An Adaptation for Altruism: The Social Causes, Social Effects, and Social Evolution of Gratitude. *Current Directions in Psychological Science*, 17(4), 281-285. https://doi.org/10.1111/j.1467-8721.2008.00590.x

[9]   Iskender, M. (2009). The relationship between self-compassion, self-efficacy, and control belief about learning in Turkish university students. *Social Behaviour and Personality: An International Journal*, 37(5), 711-720. https://doi.org/10.2224/sbp.2009.37.5.711

[10] Jones, S. J., Lyons, R. A., Sibert, J., Evans, R., & Palmer, S. R. (2001). Changes in sports injuries to children between 1983 and 1998: Comparison of case series. *Journal of Public Health*, 23(4), 268 - 271. https://doi.org/10.1093/pubmed/23.4.268

[11] McCullough, M. E., Emmons, R. A., & Tsang, J. (2002). The Grateful Disposition: A conceptual   and   Empirical Topography. *Journal of Personality and Social Psychology,* 82, 112-127.

[12] Moore, C. P. (2022). How to Practice Self-Compassion: 8 Techniques and Tips. Positive Psychology. https://positivepsychology.com/how-to-practice-self-compassion

[13] Mosewich, A. D., Crocker, P. R., Kowalski, K. C., & DeLongis, A. (2013). Applying self-compassion in sport: An intervention with women athletes. *Journal of Sport and Exercise Psychology*, 35(5), 514-524.

[14] Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity*. 2, 223–250. https://self-compassion.org/wp-content/uploads/publications/empirical.article.pdf

[15] Neff, K. D. (2012). The science of self-compassion. Compassion and wisdom in psychotherapy, 1, 79-92.

[16] Strandbu, Å., Bakken, A., & Sletten, M. A. (2019). Exploring the minority-majority gap in sport participation: different patterns for boys and girls? *Sport in Society*, 22(4), 606–624. https://doi.org/10.1080/17430437.2017.1389056