Understanding the role of Empathy and Anxiety on Cognitive Control: A Dual Perspective

A thesis submitted in the partial fulfilment of the requirement for the degree of

MASTERS OF ARTS IN PSYCHOLOGY

Submitted By

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UNDER THE SUPERVISION OF

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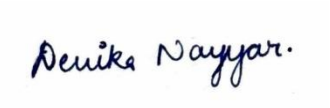
Certificate

This is to certify that the thesis entitled, "Understanding the role of Empathy and Anxiety on Cognitive Control: A Dual Perspective" is being submitted in partial fulfilment of requirements for the award of the degree of Master of Arts in Psychology, presented in the Thapar School of Liberal Arts & Sciences, Thapar Institute of Engineering and Technology, Patiala. This work is carried out under the supervision of Dr. Richa Nigam, at Thapar School of Liberal Arts & Sciences, Thapar Institute of Engineering and Technology, Patiala, and no part of this thesis has been submitted for the award of any other degree.



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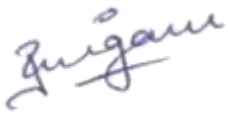

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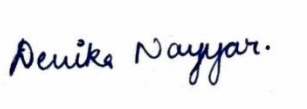
Candidate's declaration

I, Devika Nayyar (862302017), student of M.A. in Clinical Psychology (2023-2025), declare that the work being presented in the thesis entitled, *"*Understanding the role of Empathy and Anxiety on Cognitive Control: A Dual Perspective*"* in the partial fulfilment of the degree of Masters of Arts in Psychology, Thapar School of Liberal Arts and Sciences, Thapar Institute of Engineering & Technology, Patiala, is an original record of my own research work carried out under the guidance and supervision of Dr. Richa Nigam, Assistant Professor, Thapar School of Liberal Arts and Sciences, Thapar Institute of Engineering &Technology, Patiala. The content in the dissertation has not been submitted to any other university or institute for the award of any other degree.



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Acknowledgement

A statement of thanks is of evident to show my deep sense of gratitude and obligations to all those who helped in completing my thesis. It has been a great honour and privilege to undergo my project in the Department of Psychology at Thapar School of Liberal Arts and Sciences, Thapar Institute of Engineering and Technology, Patiala.

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Finally, I would also like to thank the participants of this study, for taking their time and effort to perform the experiments.

Abstract

This study explored the combined effects of empathy and anxiety on cognitive control using a face-word Stroop task. Seventy-three participants (aged 18–25) were assigned to either an empathy-induced or non-empathy group. Empathy was induced through a narrative-based message (Shen, 2010), while anxiety was assessed using the State-Trait Anxiety Inventory and Beck Anxiety Inventory. Results showed that empathy itself acted as an affective variable and significantly interfered with cognitive control. This suggested increase in cognitive load, wherein higher anxiety individuals revealed impaired cognitive control in the presence of empathy irrespective of emotion. No interaction was found between empathy and anxiety, suggesting their effects are independent and additive.

These findings highlight the cognitive cost of emotional engagement and have implications for tasks requiring both empathy and executive control, such as those in clinical and educational settings.

Keywords: Cognitive control, Empathy, State anxiety, Cognitive Control, Emotional interference.

Table of Content

Chapter 1: Introduction

There has been a lot of interest in cognitive psychology because of the complex relationship between emotional states and cognitive function. People's perceptions, processing, and reaction to information are greatly influenced by their emotions, whether they are momentary or permanent. Of these, anxiety and empathy are very strong and affective factors that influence cognitive control. For examining these impacts, reaction time- a key measure of cognitive processing speed and efficiency is a reliable and measurable dependent variable. Anxiety which is linked to hypervigilance and poor cognitive control can either help or disturb the performance. It has also been demonstrated that empathy, or the ability to comprehend and identify with the emotional states of others, can change how people manage their attention especially when they are exposed to emotionally challenged stimuli or situations. According to Decety and Lamm (2006), Empathy can be helpful in social situations, but it can cause hindrance when processing highly emotional or upsetting stimuli. Additionally, congruency the degree to which the stimuli's emotional tone matches the participant's current emotional state can change cognitive processes, by affecting reaction times. As a result, reaction time is a useful behavioural indicator that shoes how well underlying cognitive processes respond to different emotional and empathetic demands (Luce, 1986).

1.1 Empathy

Empathy is a multifaceted psychological construct that enables individuals to recognize, understand, and respond to the emotional states of others. It plays a critical role in fostering social connection, prosocial behavior, and effective communication. According to **Hoffman, 2000***: "Empathy is a conscious emotional and cognitive response that involves higher order emotional and cognitive processes (example: Empathetic concern or abstract reasoning)*". The ability to experience or induce empathy can be modulated through various psychological and environmental factors, such as exposure to emotionally salient narratives or stimuli that mirror others live experiences. This process, referred to as **induced empathy**, allows individuals to temporarily internalize others' emotions, enhancing emotional resonance and social cognition. A complex socioemotional concept, empathy is essential to how people see and react to the feelings of others. It is conceptualized to have two distinct but related concepts i.e. Affective empathy and cognitive empathy. The ability to recognize and understand another person's perspective or more simply, the capacity to recognize and

cognitively represent another person's emotional experiences is known as **Cognitive Empathy**. **Affective Empathy**, on the other side is the automatic, emotional connection with another person's feelings that frequently leads to shared affective experiences. Empathy's practical applications, especially in relation to social and emotional management. Affective empathy can improve interpersonal relationships and compassionate behaviour, but if it is not controlled, it can also result in emotional excess or psychological suffering.

Although, social functioning benefits from both types, their effects on emotional control and cognitive function are essentially different. **According to Thompson et al. (2002),** People who have high levels of cognitive empathy typically have superior emotional regulation skills because this type of empathy is linked to higher cognitive functioning, which includes goal maintenance, mental flexibility and inhibitory control. High affective empathy, on the other hand is frequently associated with elevated emotional reactivity, which can interfere with attentional regulation and hinder cognitive function when performing emotionally heightened tasks. Cognitive empathy may have a moderating impact on cognitive control since it is linked to less interference from distracting emotional stimuli. Conversely, emotional interference is linked to affective empathy, which may be the result of a greater emotional connection to the stimuli. The difference indicates how empathy influences cognitive-affective interactions in two ways: affective empathy can increase exposure to emotional distraction, whereas cognitive empathy may facilitate adaptive processing in emotionally demanding circumstances.

1.2 Anxiety

A complicated emotional and physiological condition, anxiety is defined by increased alertness, fear, and tension in reaction to potential dangers or uncertain consequences. A certain amount of anxiety can be adaptive, focusing attention and conditioning the body for action, but excessive or persistent anxiety can interfere with everyday living, hamper emotional control, and impair cognitive function. Usually characterized by extreme worry or apprehension, anxiety is future focused and frequently occurs in the absence of an obvious or immediate threat. Both physiological (such as elevated heart rate, restlessness, and tense muscles) and cognitive (such as recurring thoughts of danger, trouble focusing) symptoms are possible. When anxiety becomes overpowering or prolonged, it might affect cognitive functioning, even though it is adaptive in moderation.

According to the American Psychological Association, Anxiety is a common reaction to stress and, in some cases, can even be beneficial, such as boosting focus and attention during a test or work assignment. Anxiety disorders, on the other hand, are characterized by more intense emotions of fear or anxiety as opposed to momentary ones.

According to the Diagnostic and Statistical Manual (DSM-5), "*anxiety is defined as excessive worry and anxious anticipation about a variety of events or activities, such as work or school performance, that occur more often than not for at least six months".*

The concepts of state and trait anxiety were first introduced by Cattell **(Cattell 1966 &Scheier, 1961, 1963)** and have been elaborated by **Spielberger (1966, 1972, 1976,1979)**. The term "**state anxiety**" describes a brief emotional state marked by elevated autonomic activity and feelings of tension, apprehension, and worry. The way someone feels "right now" is reflected in their sensitivity to environmental demands or situational pressures. Depending on the perceived threat or challenge, the degree of this transient type of anxiety can change. **Trait anxiety** is a more consistent and long-lasting feature of personality that reflects an individual's inclination to react anxiously in a variety of circumstances. Even neutral or somewhat stressful situations are more likely to be seen as dangerous by those with high trait anxiety, and they also tend to feel state anxiety more frequently and with greater intensity. Anxiety traits are associated with enduring emotional response patterns that are frequently influenced by acquired dispositions and prior experiences.

Eysenck et al. (2007) introduced the well-known **Attentional Control Theory (ACT),** which describes how anxiety impairs cognitive function by interfering with cognitive control systems. The goal-directed attentional system, which typically allows people to concentrate on task-relevant stimuli, is hampered by anxiety, according to ACT, while the stimulus-driven attentional system, which gives priority to emotionally charged or potentially dangerous information, is strengthened. This imbalance results in less flexibility when switching between tasks and a decreased capacity to suppress unimportant emotional distractions. Anxious people put in more cognitive effort, which lowers processing efficiency, even if task accuracy may stay largely unchanged—a crucial difference highlighted in ACT. These effects are especially noticeable when people are required to suppress emotionally incongruent information in activities that involve emotional conflict, as the emotional Stroop test. Because they are more sensitive to cues related to threat, anxious participants tend to exhibit shorter reaction times and more interference in these tasks.

1.3 Emotion Regulation

Efforts to control our own or other people's emotions are referred to as **emotion regulation (ER).** Emotion regulation is a basic psychological process that includes how people control the emotions they feel, when they feel them, and how they express and deal with them. In order to adapt to social and environmental demands, emotions should be modulated in terms of intensity, duration, and expression rather than suppressed or eliminated.

In response to situational demands, this includes both up-regulation (raising or enhancing emotional show) and down-regulation (suppressing or lowering emotional expressions). The authors stress that emotion regulation is more than simply understanding which techniques work; it also entails being able to apply those tactics in real-world scenarios, as determined by objective measurements made in lab conditions.

Chapter 2: Review Of Literature

2.1 Cognitive control and Stroop Paradigm

A collection of mental processes known as cognitive control enables people to align their thoughts and behaviours with their internal objectives, especially in the face of conflicting information. J. Ridley Stroop's 1935 work "Studies of interference in serial verbal reactions" established the Stroop task as the fundamental paradigm for researching these processes. Participants in the traditional Stroop paradigm are required to choose a word's ink colour without considering its semantic significance. In contrast to congruent settings (e.g., "RED" printed in red ink) or neutral conditions, participants generally exhibit slower response times when the ink colour and word meaning are incongruent (e.g., the word "RED" printed in blue ink). The cognitive cost of suppressing the automatic reading response in favour of the task-relevant colour-naming response is represented by this slowdown, which is referred to as the Stroop interference effect.

Since its creation, the Stroop paradigm has undergone substantial change, with researchers creating a wide range of variations to investigate various facets of cognitive control. The emotional Stroop task is a significant variation that looks at how emotional content affects attentional processes by using emotionally charged words instead of color words. The emotional Stroop includes affective interference by giving words with emotional value that participants must ignore while concentrating on non-emotional aspects like font color, in contrast to the standard Stroop task that involves semantic conflict. According to research, emotional material can have significant interference effects, especially when it comes to clinical populations or people who are sensitive to certain emotional content.

Another significant variation is the affective face-word Stroop (AFWS), which directly replicates the perceptual, semantic, and response conflicts found in cognitive Stroop tasks but in the affective domain by overlapping words over emotionally expressive faces. Participants in these paradigms are required to recognize the word while disregarding the facial expression, or the other way around. This approach enables researchers to investigate the processing and resolution of contradictory emotional information from several channels (verbal-semantic versus visual-facial). Stroop-type interference effects are robust across cognitive and affective domains, as evidenced by studies that consistently reveal delayed responses on incongruent trials as compared to congruent trials.

2.2 Impact of Empathy on Cognitive Control

The ability to understand and experience another person's emotions is known as empathy, and it is becoming more widely acknowledged that empathy affects cognitive control processes, especially in emotional situations. Affective empathy, or experiencing another person's emotions through a virtual experience, and cognitive empathy, or comprehending another person's emotional states, are usually distinguished by researchers because they have distinct connections to cognitive control processes. An especially useful tool for studying cognitive control in emotional circumstances is the emotional Stroop test. Depending on a person's unique level of empathy, this task can reveal attentional biases toward emotionally salient material. Response time latencies are directly impacted by the emotional load of the words, with emotionally charged phrases causing larger interference effects than neutral ones, according to studies employing the emotional Stroop. According to this pattern, emotional information automatically absorbs attentional resources, necessitating more cognitive control to keep the focus on the job at hand.

Studies using neuroimaging to study the effects of emotional interference on cognitive control have consistently shown patterns of brain activity that could be influenced by empathy. Research employing functional magnetic resonance imaging (fMRI) during emotional Stroop tasks has revealed heightened activity in areas linked to emotional processing (insula, amygdala) and cognitive control. According to these results, several brain networks must work together to resolve emotional conflict, and those with high levels of cognitive empathy may recruit control regions more effectively when confronted with emotional distractions. One useful framework for comprehending how empathy affects the way contradictory emotional information is processed across modalities is the affective face-word Stroop (AFWS) paradigm. It is sometimes necessary to evaluate and choose between channels of contradictory affective information in order to navigate the intricacies of social communication, which often entails ambiguity and opposing emotional signals. According to studies employing the AFWS, people who possess greater empathy might be more adept at recognizing and resolving these kinds of disputes. According to research using electroencephalograms (EEGs), control-related activation takes place in the right rostral anterior cingulate cortex quickly (96–118 ms post-stimulus), followed by a reduction of activity in face-processing areas during incongruent trials. According to these results, the

ability to empathize may influence the early identification of conflicts as well as the subsequent application of controls.

Individual variations in affective and cognitive empathy may result in unique performance patterns on emotional control tasks. Affective empathy may make people more vulnerable to emotional interference because of increased emotional resonance, whereas cognitive empathy may make people better able to sustain goal-directed behaviour in the face of emotional distractions. However, this link is complicated and context-specific, with significant moderating effects from elements including the character of the empathic response and the relevance of emotional information to present objectives.

2.3 Impact of Anxiety on Cognitive Control

Cognitive control processes are significantly impacted by anxiety, and there is strong evidence that the consequences vary depending on the particular control mechanism in play. The Dual Mechanisms of Control theory offers valuable insights into the cognitive vulnerabilities linked to anxious moods and features by suggesting that anxiety appears to have dissociable impacts on proactive vs reactive control methods. State anxiety has been shown to simultaneously improve reactive control while decreasing proactive control. Researchers used the threat of shock manipulation to create state anxiety in a study that directly compared these effects. Performance was evaluated on the standard Stroop task, which measures reactive control, as well as the AX-CPT, which measures proactive control. As predicted by theory, anxiety enhanced reactive control while decreasing proactive control. These results are consistent with theoretical explanations that anxiety enhances reactive control by directing attention to threat and activating conflict monitoring systems, while simultaneously impairing goal representation maintenance by using up limited working memory resources. Clarifying how anxiety influences attentional biases toward emotional information has been made easier with the use of the emotional Stroop test. Studies have repeatedly demonstrated that people with higher levels of anxiety have more interference effects while processing emotionally distressing or dangerous inputs, which reflects their inability to divert their focus from possible dangers. Both heightened initial orienting toward threat and impaired ability to subsequently disengage appear to be associated with this attentional bias; both processes may be mediated by reduced prefrontal control and amygdala activation.

Important new information on the brain processes behind anxiety's effects on emotional interference and cognitive control has been made possible by neuroimaging research. FMRI research using emotional Stroop tasks, meta-analyses have identified consistent patterns of brain activation associated with emotionally relevant objects during cognitive conflict trials. These patterns span the dorsal anterior cingulate cortex, medial prefrontal cortex, and lateral prefrontal cortex (dorsolateral prefrontal cortex and inferior frontal gyrus). Crucially, these activation patterns seem to be moderated by the degree of emotional conflict. Mild emotional interference trials exhibit more limited activation, mainly in sensorimotor areas, whereas powerful emotional interference trials involve extensive frontoparietal regulatory networks. With implications for comprehending how anxiety may significantly alter processing under diverse levels of emotional stress, these findings imply that distinct brain networks are engaged based on the intensity of emotional conflict. Anxiety seems to have a particularly negative impact on cognitive control when working on tasks that call for prolonged attention and working memory. Anxiety lowers the number of cognitive resources available for upholding goal representations and exercising control by filling them with worry and rumination. This could help to explain why nervous people occasionally exhibit intact or even improved performance on simpler tasks that primarily rely on reactive, stimulus-driven control, yet frequently do worse on demanding, complicated tasks that call for proactive control tactics.

Chapter 3: Methodology

3.1 Participants and Experiment Design

Participants were chosen based on the criterion that they met. 18 to 25 was chosen as the age range. To test the experiment and data output, pilot research was carried out on a sample of 15 people using 384 trials that were then split into two blocks. Only 100 of the 125 people in the sample were chosen for the main study due to the experiment's requirements. Before the experiment, questionnaires were completed and informed consent was obtained. A mixed factor design is used in the research.

3.2 Stimuli and Apparatus

3.3.1 Face word Stroop task

A cognitive psychology paradigm, the face-word Stroop task examines how contradictory information from several sensory modalities—specifically, written words and facial expressions—interferes with cognitive processing. It is similar to the traditional colour-word Stroop task. Because we evaluate and select from conflicting emotional cues to manage the social world, our emotions and social interactions are linked. An experimental technique called the Effective face-word Stroop task (AFWS) can be used to identify the basic brain mechanisms underlying important social and emotional skills. A study found that conflict management mechanisms take place within the components of visually perceived potentials, with respect to the time, location and order of control processes involved in responding to emotional conflicts during Affective word Stroop task (Jamieson et al.). The human brain can identify visual information from a short latent sample (Vukusic et al., 2017) and facial micro expressions that last 500 ms or less (Yan et al., 2013).

This exercise can be used to study the brain mechanisms behind selective attention, cognitive control, and the resolution of emotional and cognitive conflicts.

Participants are shown pictures of faces with obvious emotional expressions (like happiness or anger) superimposed on them, along with emotion words (like "happy" or "angry") printed across the face. This is a common face-word Stroop task. The crucial modification is the alignment of the word and the facial expression:

Congruent trials: The facial expression and the emotion term match (for example, "happy" with a happy face).

Incongruent trials: When a joyful face is used with the word "angry," the emotion term and the visual expression are at odds.

Typically, participants are told to concentrate on one element of the stimulus—either the word or the facial expression—and to answer as fast and precisely as they can, ignoring the other element. They might be asked, for instance, to determine the emotion conveyed by the face while ignoring the word, or vice versa.

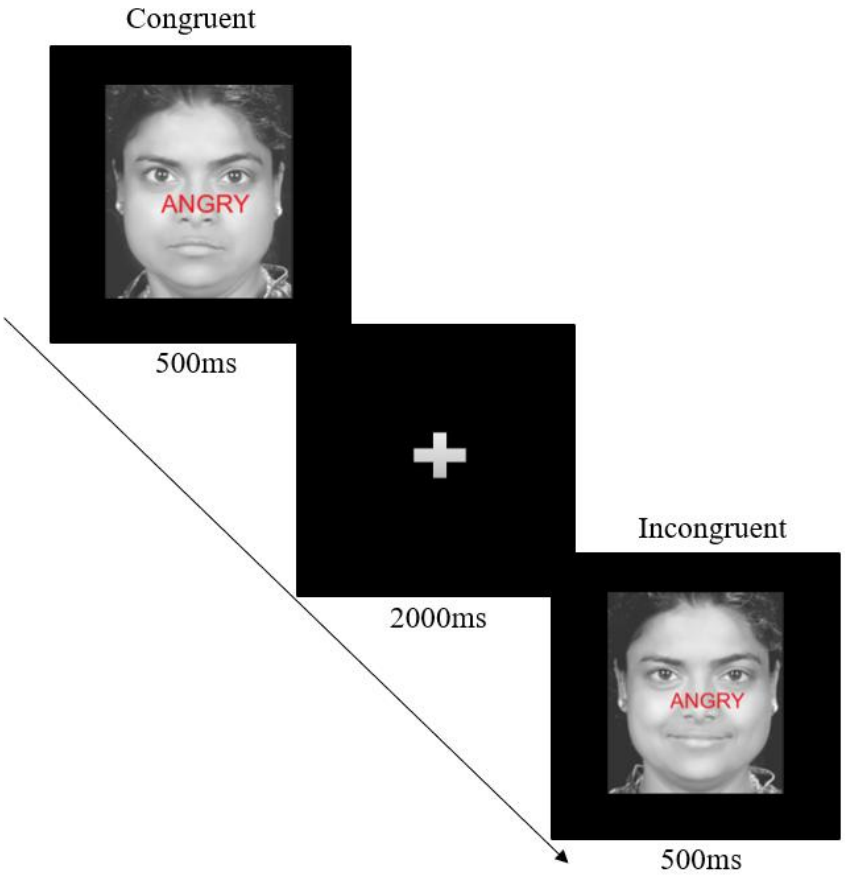


Figure 3: Trial Structure

3.3.2 State-Trait Anxiety Inventory (STAI)

The State-Trait Anxiety Inventory (STAI), created by Spielberger and others, is a widely used psychological assessment instrument that distinguishes between state and trait anxiety, the two fundamental components of anxiety. **State anxiety** is a temporary emotional state

marked by increased tension, worry, and physiological arousal in reaction to particular events or stimuli. By contrast, **trait anxiety** is a persistent, long-lasting a tendency to see a broad spectrum of events as threatening, therefore producing a constant tendency to feel higher anxiety across time and environments. Respondents score their agreement on a four-point Likert scale for two distinct 20-item subscales of the STAI, each assessing either state or trait anxiety. Demonstrated across various populations and therapeutic environments, its remarkable psychometric qualities—including high internal consistency and validity—have been While state anxiety scores vary with situation, research using the STAI has revealed that high trait anxiety is linked to inappropriate emotion control techniques and more susceptibility to psychological problems. Its capacity to consistently distinguish between transitory and dispositional anxiety makes the STAI a great tool for psychological study as well as clinical diagnosis, therefore offering important insights on the role of anxiety in cognitive, affective, and behavioral processes.

3.3.3 BAI Questionnaire

Beck Anxiety Inventory (BAI), a commonly validated self-report tool especially for assessing the degree of anxiety in both clinical and research environments. Comprising 21 items, A wide range of anxiety symptoms that have occurred over the past three weeks are covered by the BAI, including both physical (such as numbness, heart palpitations, and light-headedness) and cognitive (such as anxiety-related fear of losing control and difficulties relaxing) aspects of anxiety. A 4-point Likert scale is used to rate each item, with total scores ranging from 0 to 63. Higher values indicate greater anxiety severity. ("not at all") to 3 ("severely; it bothered me a lot"). Among other established anxiety and depression measures, the BAI has shown outstanding psychometric qualities including high internal consistency, great test-retest reliability, and strong convergent and discriminant validity. Its sensitivity to changes in anxiety over time makes it appropriate for both cross-sectional and longitudinal studies. Validated across several languages and people, the BAI supports its dependability and relevance in many cultural settings.

3.3.4 Interpersonal Reactivity Index (IRI)

To assess individual differences in empathy across cognitive and affective domains, Mark H. Davis developed the widely used multidimensional self-report Interpersonal Reactivity Index (IRI). A total of 28 items split into four separate seven-item subscales—Perspective Taking (PT), Fantasy (FS), Empathic Concern (EC), and Personal Distress (PD)—the IRI From

"does not describe me well" to "describes me very well," each item is scored on a 5-point Likert scale allowing respondents to show how well each statement describes them.

The Empathic Worry (EC) scale is particularly fascinating in empathy research because it measures "other-oriented" feelings of compassion, sympathy, and concern for those who are unfortunate or uncomfortable. "I often have tender, concerned feelings for people less fortunate than me" and "When I see someone being taken advantage of, I feel kind of protective towards them" are among the items in the EC subscale. Unlike the Personal Distress scale, which measures self-oriented distress in reaction to others' suffering, the EC scale accesses the emotional component of empathy that drives prosocial and altruistic action. Studies show time and again that higher EC subscale scores correlate with more prosocial inclinations, more readiness to assist others, and more emotional reactivity to the needs of others. The EC scale has strong internal consistency and construct validity across many different groups and languages, and it correlates well with external measures of prosocialness and emotional sensitivity. Research also indicates that the EC scale, which is included in the IRI, is rather independent of cognitive empathy (as assessed by the PT subscale), hence reinforcing the multidimensional character of empathy as stated by Davis.

3.3.5 Empathy Induction

The study defined state empathy as a complex process comprising affective, cognitive, and associative (identification) elements, especially in reaction to persuasive communications (the PSAs). The measurement concentrated on message-induced state empathy, or empathy felt in reaction to seeing the Public Service Announcement messages. The study did not use a standard, previously validated empathy questionnaire (like the Interpersonal Reactivity Index or Toronto Empathy Questionnaire).
Instead, the author developed a custom state empathy scale for the purposes of this research, tailored to the context of message-induced empathy in response to PSAs.

A state empathy score for each PSA was produced by averaging the participant's answers to the 11 items. The study finds that the scale demonstrated great internal consistency suggesting the items consistently assessed one construct.

3.3 Sample

The study was done on 100 participants and between the ages of 18 and 25. Participants were recruited according to the following criteria: they should be physically and mentally healthy and should be able to understand and be fluent in English. Participants were chosen at random from among those available.

3.4 Design

Using a spatial Stroop task, the current study used a Mixed Factorial Design to examine how emotional and cognitive factors affect cognitive processing. Emotion (having two levels: happy and angry) and Congruency (having two levels: congruent and incongruent) were among the within-subject factors. To investigate their effects on performance, both separately and in combination, these conditions were systematically changed. The investigation of how individual differences influence task performance was made possible by the inclusion of anxiety and empathy as between-subjects variables in addition to the within-subject factors. Reaction Time (RT), the study's dependent variable, was a measure of cognitive control and attentional processing in a range of emotional and congruency situations. This design made it possible to examine situational and dispositional effects on cognitive performance at the same time.

3.5 Tools Used:

Stimuli

Rated Images (Angry and Happy) – Total of 8 rated images were selected for this task, 4 of males and 4 of females. The images were standardised by having them rated on the basis of what emotion they evoke and how intense they seem.

Face word Stroop Task – For this task stroop images were used which consisted of happy or angry word written with font colour-red and font-arial on the face. In which the participant had to focus on the word and press the key accordingly. The keys they had to press were as follows:

‘**1**’ for Happy word.

‘**2**’ for Angry word.

The congruent condition was when the emotion expression and word was same for example: happy emotion face had happy word written on it and incongruent trials were when the emotion of the face and emotion of the word did not match.

3.6 Software

The experiment was built on Psychopy software and MS Office Excel 2016 and IBM SPSS Software was used for data analysis.

3.7 Procedure

The experiment was conducted on two groups. **Group-1** was Induced Group on which empathy was induced by using the empathy inducing message and the **Group-2** was Non-Induced Group. Both the groups filled State-Trait Anxiety Inventory and Beck Anxiety Inventory. Group-1 Filled the custom state empathy scale before the experiment and through out the experiment; to check the empathy of the participants, they had to rate the Empathetic concern's questions from Interpersonal Reactivity index scale in the experiment only.

The experiment had 3 phases one feedback and two testing phases. The feedback phase contained 20 trails and the other two testing phases contained 192 trails each. Participants had break after each phase. A total of 384 trials were used in this experiment.

The experiment took almost 20 minutes to complete. After filling out the consent form, STAI and BAI. The experiment began with instructions being displaying on the laptop screen. After explaining the instructions to the participant, the experiment was started. In the feedback phase participants were given feedback if they had responded correctly or incorrectly. Participants were given breaks after each part. The experimental design was as such in the – a fixation cross appeared on the screen for 500ms, after which a stroop image either congruent or incongruent appeared for 500ms after which participant had to focus on the word and respond accordingly and press key '1' for happy word and '2' for angry word. This process was repeated.

Chapter 4: Results

The results were analysed using IBM SPSS and JASP 0.18.1.0. Descriptive statistics, paired t-test, and repeated measures ANOVA was done to determine the results. In data analysis, the reaction time was noted for each block for each participant as recorded in the log files.

Table 1 Between subject Effects

Source	Sum of Squares	df	Mean Square	F	p	η²	Observed Power
Intercept	117,207,591.626	1	117,207,591.626	3788.89	<.001	.987	1.000
Empathy	170,933.874	1	170,933.874	5.53	**.023**	.103	.634
Error	1,484,859.948	48	30,934.582				

Table 1 A between-subjects ANOVA indicated a significant main effect of empathy on response time, $F(1, 48) = 5.53$, $p = .023$, partial $\eta^2 = .103$. This signifies that empathy contributed to roughly 10.3% of the variance in response time, indicating a moderate effect.

Table: 2 Tests of Within-Subjects Contrasts

Source	SS	df	MS	F	*p*	Partial η²	Observed Power
Anxiety (Linear)	62.41	1	62.41	0.11	**.742**	**.002**	.062
Anxiety × Empathy (Linear)	778.86	1	778.86	1.37	.248	**.028**	.208
Error (Anxiety) (Linear)	27393.60	48	570.70				
Emotion (Linear)	2966.04	1	2966.04	7.09	.010	**.129**	.742
Emotion × Empathy (Linear)	1705.75	1	1705.75	4.08	.049	.078	.508
Error (Emotion) (Linear)	20070.60	48	418.14				
Anxiety × Emotion (Linear)	88.61	1	88.61	0.16	.696	.003	.067
Anxiety × Emotion × Empathy	0.						

Table 2 The linear effects of emotion and anxiety, as well as how they interact with empathy, on response time were investigated using a repeated-measures ANOVA. With F (1, 48) = 0.11, p =.742, the main effect of anxiety was not significant, suggesting that response times did not reliably change across anxiety levels. Likewise, the interaction between anxiety and empathy was not significant (F (1, 48) = 1.37, p =.248). Emotion, on the other hand, had a significant main impact (F (1, 48) = 7.09, p =.010), indicating that response time varied significantly across emotional contexts. Furthermore, a noteworthy emotion × empathy interaction was discovered, F (1, 48) = 4.08, p =.049, suggesting that empathy mitigated the impact of emotion on reaction time. F (1, 48) = 0.16, p =.696 indicated that the anxiety × emotion interaction was not significant, and there were no interpretable data for the three-way interaction. While anxiety had no impact on response time, these results demonstrate the important role that emotion and empathy play.

Table:3

Independent Samples Test Empathy non empathy

Pair Comparison	t	df	p	Mean Difference	SD	SE	95% CI
HHappy_SE – HAngry_SE	-2.46	24	.021	-14.83	30.08	6.02	[-27.25, -2.41]
HHappy_SE – LHappy_SE	0.20	24	.841	1.54	38.00	7.60	[-14.14, 17.23]
HAngry_SE – LAngry_SE	0.60	24	.551	4.11	34.03	6.81	[-9.93, 18.16]
LHappy_SE – LAngry_SE	-1.71	24	.100	-12.26	35.86	7.17	[-27.06, 2.54]

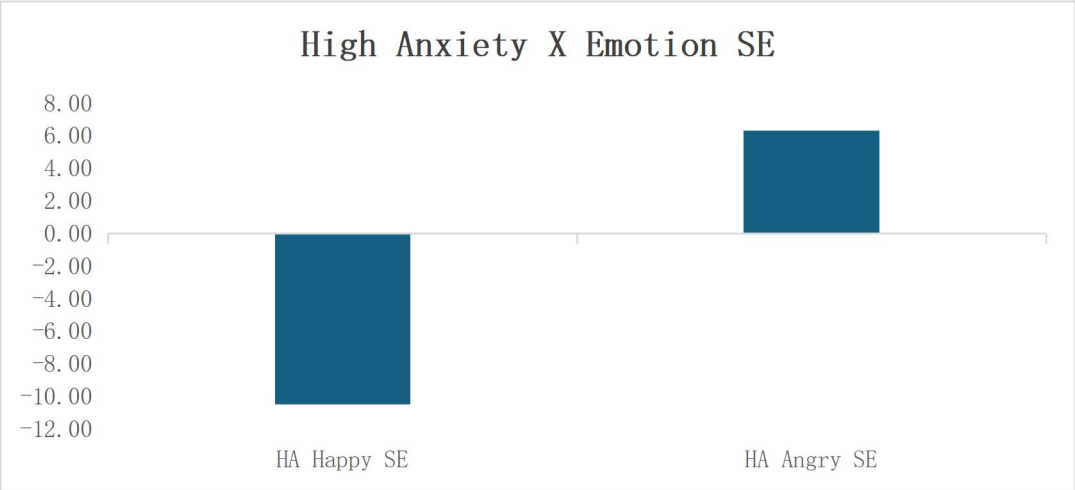


Table 3 Stroop Effect scores using paired-samples t-tests showed that the High Angry condition had substantially more interference than the High Happy condition (t(24) = -2.46, p =.021, 95% CI). [-27.25, -2.41]. High Happy and Low Happy (t(24) = 0.20, p =.841), High Angry and Low Angry (t(24) = 0.60, p =.551), and Low Happy and Low Angry t(24) = -1.71, p =.100) did not differ significantly from one another. These findings imply that while emotion intensity by itself does not significantly alter the effect, emotional valence—especially high-intensity anger—increases Stroop interference.

Table 4 Paired Samples Test EMPATHY GROUP

Condition	t	df	p	Mean Difference	SE	95% CI
HHappy_SE	-1.25	48	.216	-7.70	6.15	[-20.06, 4.66]
HAngry_SE	0.65	48	.520	3.89	6.00	[-8.19, 15.96]
LHappy_SE	-2.16	48	.036	-15.69	7.28	[-30.33, -1.05]
LAngry_SE	-0.67	48	.505	-_		

Table 4 One-sample t-tests examined whether the Stroop Effect (SE) in each emotion-intensity condition differed from a reference value. A significant effect was found only in the *Low Happy* condition, $t(48) = -2.16$, $p = .036$, 95% CI [-30.33, -1.05], indicating reduced interference. SEs in the *High Happy*, *High Angry*, and *Low Angry* conditions were not significantly different from the reference, all $ps > .21$.

Table 5 Within subject contrasts

Source	df	F	*p*	Partial η^2	Observed Power
Anxiety	1, 48	8.95	.004	.157	.834
Emotion	1, 48	0.00	.995	.000	.050
Congruence	1, 48	0.41	.526	.008	.096
Anxiety × Empathy	1, 48	1.40	.242	.028	.213

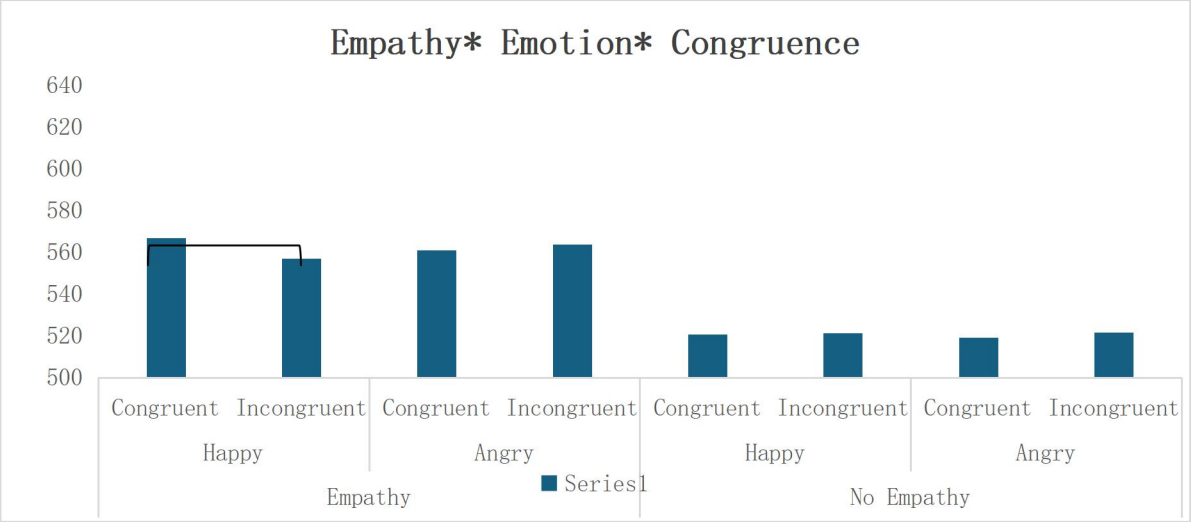
Emotion × Empathy	1, 48	0.06	.801	.001	.057
Congruence × Empathy	1, 48	2.57	.116	.051	.349
Anxiety × Emotion	1, 48	0.15	.703	.003	.066
Anxiety × Congruence	1, 48	0.50	.483	.010	.107
Emotion × Congruence	1, 48	6.06	.018	.112	.674
Anxiety × Emotion × Empathy	1, 48	2.48	.122	.049	.338
Anxiety × Congruence × Empathy	1, 48	1.10	.300	.022	.177
Emotion × Congruence × Empathy	1, 48	3.50	.067	.068	.450
Anxiety × Emotion × Congruence	1, 48	0.32	.576	.007	.086

In **Table 5** Anxiety, Emotion, Congruence, and Empathy were tested for their linear impacts on response time using a repeated-measures analysis of within-subject contrasts. Anxiety had a significant main effect ($F(1, 48) = 8.95$, $p = .004$, $\eta^2 = .157$), meaning that increases in response time were linked to increased anxiety levels. There was a significant interaction between emotion and congruence ($F(1, 48) = 6.06$, $p = .018$, $\eta^2 = .112$), indicating that the effect of emotion on response time differed according to the congruency of the stimuli. The Emotion × Congruence × Empathy interaction also got close to significance ($F(1, 48) = 3.50$, $p = .067$, $\eta^2 = .068$), suggesting ng that empathy might have a moderating effect on how individuals processed emotionally incongruent stimuli. While none of the other main effects or interactions were statistically significant (ps >.05), a number of tiny effect sizes ($\eta^2 \approx .05$) indicate that these factors would be worth examining in bigger samples.

Table 6 ***Descriptives***

Anxiety Level	Emotion	Congruence	Empathy Group	N	Mean (ms)	SD	SE	CV
High	Happy	Congruent	Empathy	25	595.36	109.16	21.83	0.183
			No Empathy	25	536.36	87.04	17.41	0.162
		Incongruent	Empathy	25	584.89	107.57	21.51	0.184
			No Empathy	25	533.59	81.53	16.31	0.153

Low	Angry	Congruent	Empathy	25	591.90	104.00	20.80	0.176
			No Empathy	25	532.14	82.99	16.60	0.156
		Incongruent	Empathy	25	596.26	103.46	20.69	0.174
			No Empathy	25	532.61	83.86	16.77	0.157



In **Table 6** participants in the high anxiety group tended to react more slowly than those in the low anxiety group. When compared to the no-empathy group, the empathy condition participants consistently displayed longer and more varied reaction times across both anxiety levels. For example, the empathy group (M = 595.36, SD = 109.16) answered more slowly than the no-empathy group (M = 536.36, SD = 87.04) in the high anxiety, happy–congruent condition. Conversely, the group with no empathy and low anxiety showed the lowest and most consistent performance (e.g., happy–congruent: M = 504.70, SD = 41.42, CV = 0.082). These trends imply that whereas reduced anxiety without empathy is linked to quicker and more reliable performance, empathy under high anxiety may reduce cognitive efficiency.

Table 7 ***Post Hoc Comparisons - Emotion ✻ Congruence***

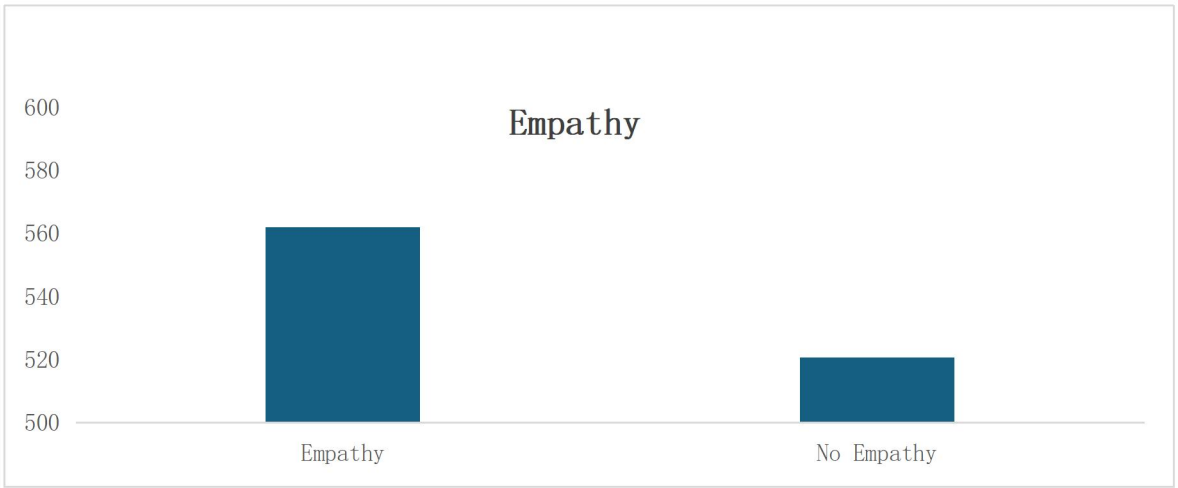
		Mean Difference	SE	df	t	p_{tukey}	p_{bonf}
Happy, Congruent	**Angry, Congruent**	3.830	1.759	48	2.177	0.207	
	Happy, Incongruent	5.279	2.174	48	2.429	0.114	

	Angry, Incongruent	1.481	2.398	48	0.618	1.000
Angry, Congruent	**Happy, Incongruent**	1.450	2.205	48	0.657	1.000
	Angry, Incongruent	-2.349	2.022	48	-1.162	1.000
Happy, Incongruent	**Angry, Incongruent**	-3.798	2.664	48	-1.426	0.962

In **Table 7** Despite observing significant interaction effects in the ANOVA, post hoc pairwise comparisons did not yield statistically significant differences. The mean differences between conditions were small (≤ 6 ms) and within-group variability was high, reducing statistical power. Although the total sample size was 100, the factorial design resulted in small subgroup sizes, limiting the ability to detect significant effects.

Table 8 ***Post Hoc Comparisons - EMPATHY (1= empathy, 2= no empathy)***

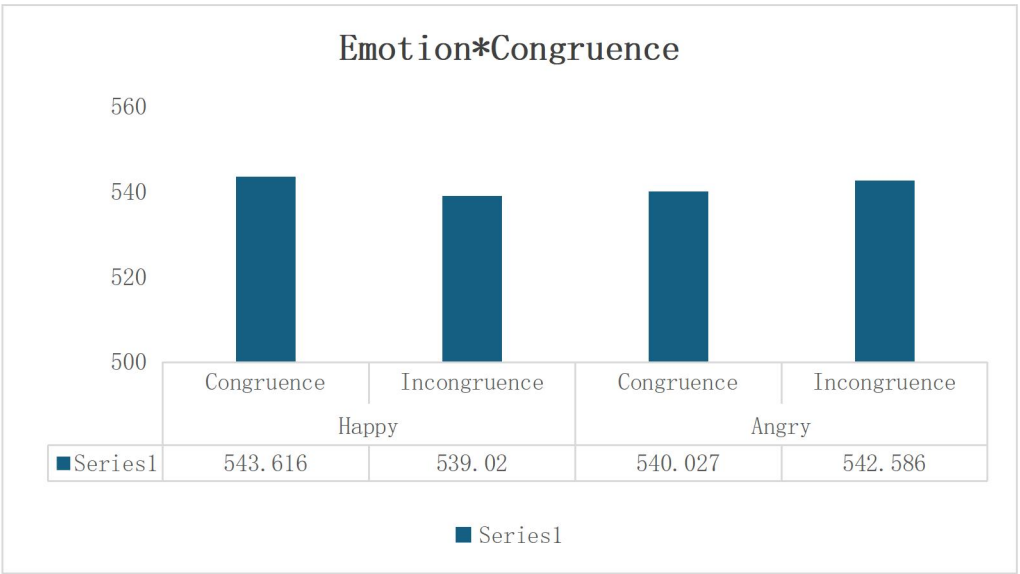
Group Comparison	Mean Difference (ms)	SE	df	t	pTukey	pBonferroni
Empathy (1) vs. No Empathy (2)	43.22	14.37	48	3.01	.004	.004



In **Table 8** Participants in the empathy condition and those in the no-empathy condition had statistically significant differences in reaction times t (48) = 3.01, p =.004), according to a pairwise comparison. Participants in the empathy condition had considerably faster reaction times than those in the no-empathy condition, as evidenced by the mean difference of 43.22 milliseconds (SE = 14.37). The idea that empathy induction affects cognitive processes, possibly raising attentional load and delaying reaction time, is supported by this finding.

In Table 9 ***Post Hoc Comparisons - Emotion ✻ Congruence***

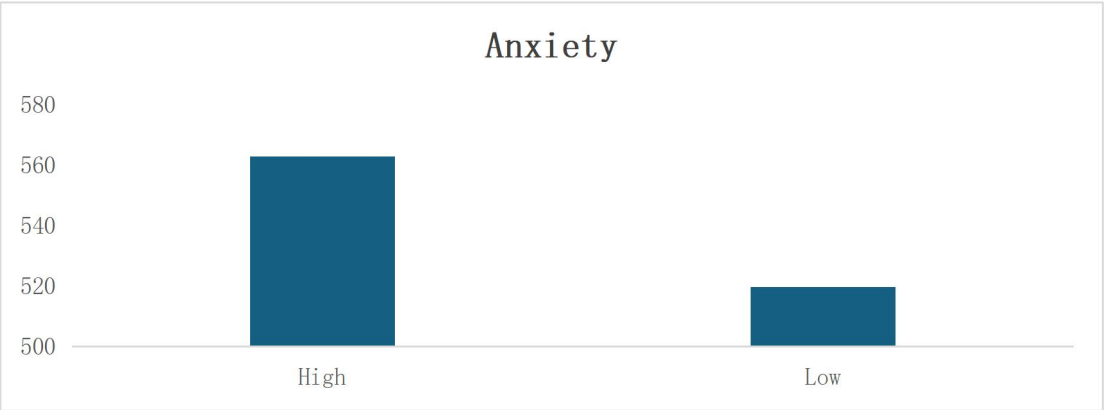
Pair Comparison	Mean Difference (ms)	SE	df	t	pTukey	pBonferroni
Happy, Congruent – Angry, Congruent	3.83	1.76	48	2.18	—	.207
Happy, Congruent – Happy, Incongruent	5.28	2.17	48	2.43	—	.114
Happy, Congruent – Angry, Incongruent	1.48	2.40	48	0.62	—	1.000
Angry, Congruent – Happy, Incongruent	1.45	2.21	48	0.66	—	1.000
Angry, Congruent – Angry, Incongruent	-2.35	2.02	48	-1.16	—	1.000
Happy, Incongruent – Angry, Incongruent	-3.80	2.66	48	-1.43	—	.962



In **Table 9** Post hoc comparisons for the Emotion × Congruence interaction revealed no statistically significant differences between condition pairs after Bonferroni correction. *In the happy emotion the participants took more time to respond to the image.*

Table 10 ***Post Hoc Comparisons – Anxiety***

Comparison	Mean Difference (ms)	SE	df	t	pBonferroni
High Anxiety vs. Low Anxiety	41.28	17.47	48	2.36	.004



In **Table 10** The difference in reaction times between individuals with high and low anxiety was examined using a post hoc comparison. Participants in the high anxiety group exhibited significantly longer reaction times than those in the low anxiety group, based on the analysis, which showed a statistically significant difference t (48) = 2.36, $p_{Bonferroni}$ =.022). Higher anxiety levels were linked to slower cognitive processing, as evidenced by the mean difference of 41.28 milliseconds (SE = 17.47). This result contributes evidence to the theory that worry impairs cognitive control, especially when performing tasks requiring a lot of attention.

Chapter 5: Discussion

The current results show that evoking empathy clearly slowed down the reaction times of participants on cognitive measures, which implies that empathic processing is a cognitively demanding task that disrupts executive control. This finding fits with the idea that empathy incurs intrinsic cognitive costs. As described in recent literature, sharing someone's emotional state involves considerable mental work. In fact, empathy is strongly associated with central executive processes (e.g., working memory, inhibitory control, and flexibility), suggesting that the recruitment of empathic processes is highly dependent on the same resources that are required for goal-oriented activity. In our experiment, response latencies for participants in the empathy-induced condition were slower, as if "experience sharing" and compassion require subjective effort. This cognitive load corresponds to neural evidence that the processing of empathy is based on more bottom-up, stimulus-based neural routes, which are able to compete with top-down task requirements. In total, these findings complement earlier research by showing that even short-lived, state-dependent empathy hinders cognitive performance, capturing empathy's fleeting demands on attentional control. In the same way, high-anxiety participants had slower reaction times than low-anxiety participants, suggesting that anxiety compromises cognitive control efficiency. This result is completely in line with Attentional Control Theory, which states that fear prevents goal-directed attention by enhancing stimulus-driven processes. In high-anxious participants, attentional resources are preoccupied with worry or threat monitoring, thus depleting available resources for task performance (resulting in slower reaction times). In fact, Coombes et al. (2009) reported that high-anxiety participants showed significantly slower reaction times on an attentional task than low-anxiety participants. Similarly, there is a recent meta-analysis that has stated that anxiety disorders are linked with strong deficits in processing efficiency (in the form of slower response times) on tasks of executive function. Our data confirm these findings with the high-anxiety group's slow responses: anxiety seems to compromise efficiency even if general accuracy may be sustained, as the theory would predict. Collectively, these similarities with previous research imply that slowing observed is a valid marker of anxiety's negative impact on attentional control according to Eysenck et al.'s model that anxiety leads to bias in the direction of bottom-up inputs rather than top-down regulation. Notably, the fact that the interaction between anxiety and empathy induction does not reach significance shows that these variables have independent influences on cognitive control. That is, feeling empathy and feeling anxious each slowed down

responses in an additive fashion, with neither one reducing the effect of the other. This profile indicates different underlying processes. In line with this hypothesis, neurocognitive evidence reveals that empathy and anxiety activate dissimilar of attention: empathic processing is likely to increase stimulus-driven, bottom-up processing of socioemotional information, while anxiety specifically reduces top-down attentional control.Our results are consistent with this dissociation: empathic induction increased reaction times independent of anxiety level, and anxiety increased performance independent of empathic state, consistent with parallel processing to cognitive interference. The current findings therefore suggest that both empathy and anxiety exhaust shared cognitive resources (e.g., working memory, inhibition) without synergizing, resulting in independently additive impacts on task performance.

There are some limitations of the current study that merit consideration. Future research could include other behavioral or neurophysiological indices (e.g., error rates, brain imaging, or electrophysiology) to better describe how empathy and anxiety influence executive processing. Second, the induced empathy occurred in a laboratory environment (e.g., via instructed perspective-taking or emotional stimulus exposure), potentially not representative of empathic interaction in naturalistic contexts. Induced empathy intensity and type may affect cognitive effect; therefore, manipulating the method of inducing empathy or using ecological tasks would be a stronger generalizability approach. Third, our design and sample might constrain inferences. Longitudinal or clinical research (e.g., with individuals with anxiety disorders or extremely empathic professionals) could investigate whether higher or chronic empathy/anxiety provides different patterns. Fourth, we handled anxiety categorically (high vs. low); investigating anxiety as a continuous measure and looking at physiological anxiety indicators (e.g., cortisol, heart rate variability) might give a more subtle insight. The addition of subjective or objective empathy measures in the moment (e.g., self-report ratings or neural markers of empathy) would ensure that the induction was successful in terms of its psychological impact and would make clear how cognitive slowing is related to moment-to-moment empathy. While limiting the generalizability of results, even these methodological constraints are significant and have important theoretical and practical consequences. The findings support Attentional Control Theory's key assertion that anxiety disrupts the efficacy of executive processes. Showing that empathy impairs cognitive control implies that emotion-regulation theories should include empathic

engagement as one of those factors that can stress prefrontal regulatory resources. For instance, successful emotion regulation (e.g., cognitive reappraisal) is contingent upon intact cognitive control; our findings suggest that high empathic engagement may temporarily impair such regulatory ability. In practice, there are implications for professions combining empathy and cognitive control. In clinical and caregiving occupations (such as psychology, medicine, social work), professionals frequently call on empathy when making high-stakes decisions about individuals; our findings imply there may be a trade-off in which empathic attention impairs cognitive processing. Training programs could hence stress ways to buffer the cognitive load of empathy (like specific perspective-taking breaks or awareness prompts) to counteract impairments. Analogously, treatments decreasing anxiety (such as cognitive-behavioral therapy or attentional training) can assist in the preservation of cognitive functioning in situations of stress. In educational settings, an awareness that anxious or overly empathetic students might require additional time for complex activities could shape instructional design and accommodations. Overall, this research presents converging evidence that both empathy and anxiety separately hinder cognitive control as seen in delayed reaction times. These effects reproduce previous results on the cognitive cost of emotion-related processes and emphasize the importance of considering emotional states in executive function assessment. Future research needs to examine further how these variables interact with various task types and in different populations, and whether specific interventions can buffer the impairments reported here. More generally, the current results increase our knowledge of how social and emotional processes meet cognitive control, with far-reaching implications for emotion regulation theories and for areas where empathy and anxiety are relevant.

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Appendix-A Consent Form

You are invited to participate in a research study. I, Devika Nayyar, a student of M.A. Psychology from Thapar School of Liberal Arts & Sciences (TSLAS), Thapar Institute of Engineering and Technology, Patiala, is conducting this research as a part of my dissertation under the guidance of Dr. Richa Nigam (Professor, TSLAS, Patiala). This study aims to check the impact of empathy on cognitive control and impact of high and low levels of anxiety on cognitive control. By participating, you will be asked to provide some basic demographic information (e.g., name, age, contact details) and complete a short questionnaire assessing anxiety. Followed by that, you will participate in the experiment.

CRITERIA FOR PARTICIPATION

College students aged 18-25 years who are physically and mentally healthy (no known illness), can speak and understand the English language and are residents of India. If you fulfil the above criteria, please feel free to participate in the study. There are no known risks and costs to you if you decide to participate in this study. The information you provide will solely be used to collect data for the study. The whole experiment will take about 20-30 minutes to complete. The information collected may not benefit you directly, but the information learned in this study should provide more general benefits. Your participation in this study is voluntary. By completing the experiment, you voluntarily agree to participate. You are free to withdraw at any point in time from the study. No individual information will be disclosed should the data be published.

Kindly participate by accepting the following:

I have read the instructions and am willing to participate in the study

□ YES

□ NO

If you have any questions about the study, please contact;
Devika Nayyar (Masters Student, TSLAS) - Dnayyar_ma23@thapar.edu
Dr. Richa Nigam (Faculty, TSLAS) – richa.nigam@thapar.edu

Name: _____ Age: _____ Gender: _____

Email Id: _____

Contact Number: _____

Signature: _____ Date: _____

Appendix B: State Trait Anxiety Inventory

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on anyone statement but give the answer which seems to describe your present feelings best.

1- Almost never **2**- Sometimes **3**- Often **4**- Almost Always

1. I feel calm……. 1 2 3 4
2. I feel secure……...……. 1 2 3 4
3. I am tense …….……. 1 2 3 4
4. I feel strained……..……. 1 2 3 4
5. I feel at ease……. 1 2 3 4
6. I feel upset……..……. 1 2 3 4
7. I am presently worrying over possible misfortunes…….. 1 2 3 4
8. I feel satisfied…….…...……. 1 2 3 4
9. I feel frightened……...…. 1 2 3 4
10. I feel comfortable……...……. 1 2 3 4
11. I feel self-confident……. 1 2 3 4
12. I feel nervous…….…. 1 2 3 4
13. I am jittery……. 1 2 3 4
14. I feel indecisive…….…. 1 2 3 4
15. I am relaxed……...…. 1 2 3 4
16. I feel content……...…. 1 2 3 4
17. I am worried……...……. 1 2 3 4
18. I feel confused……...……. 1 2 3 4
19. I feel steady……...…. 1 2 3 4
20. I feel pleasant……...…. 1 2 3 4

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the appropriate number to the right ofthe statement to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on anyone statement but give the answer which seems to describe how you generally feel.

1- Almost never **2**- Sometimes **3**- Often **4**- Almost Always

21. I feel pleasant……..…. 1 2 3 4

22. I feel nervous and restless…….……...…. 1 2 3 4

23. I feel satisfied with myself……..……...…. 1 2 3 4

24. I wish I could be as happy as others seem to be……...…. 1 2 3 4

25. I feel like a failure……..…...…. 1 2 3 4

26. I feel rested……...…. 1 2 3 4

27. I am "calm, cool, and collected"……...…. 1 2 3 4

28. I feel that difficulties are piling up so that I cannot overcome them…….....…. 1 2 3 4

29. I worry too much over something that really doesn't matter……...……...…. 1 2 3 4

30. I am happy……..……...…. 1 2 3 4

31. I have disturbing thoughts……...……...…. 1 2 3 4

32. I lack self-confidence……...…. 1 2 3 4

33. I feel secure……...……...…. 1 2 3 4

34. I make decisions easily……...…. 1 2 3 4

35. I feel inadequate……...…. 1 2 3 4

36. I am content……...……...…. 1 2 3 4

37. Some unimportant thought runs through my mind and bothers me…...…...…. 1 2 3 4

38. I take disappointments so keenly that I can't put them out of my mind…...…. 1 2 3 4

39. I am a steady person……...…. 1 2 3 4

40. I get in a state oftension orturmoil as I think over my recent concerns and interests……...……..... 1 2 3 4

Appendix-C Beck Anxiety Inventory

Below is a list of common symptoms of anxiety. Please carefully read each item in the list. Indicate how much you have been bothered by that symptom during the past month, including today, by circling the number in the corresponding space in the column next to each symptom.

	Not at all	Mildly, but it didn't bother me much	Moderately – it wasn't pleasant at times	Severely – it bothered me a lot
Numbness or tingling	0	1	2	3
Feeling hot	0	1	2	3
Wobbliness in legs	0	1	2	3
Unable to relax	0	1	2	3
Fear of worst happening	0	1	2	3
Dizzy or lightheaded	0	1	2	3
Heart pounding / racing	0	1	2	3
Unsteady	0	1	2	3
Terrified or afraid	0	1	2	3
Nervous 0	0	1	2	3
Feeling of choking	0	1	2	3
Hands trembling	0	1	2	3
Shaky / unsteady	0	1	2	3
Fear of losing control	0	1	2	3
Difficulty in breathing	0	1	2	3

Fear of dying	0	1	2	3
Scared	0	1	2	3
Indigestion	0	1	2	3
Faint / lightheaded	0	1	2	3
Face flushed	0	1	2	3
Hot / cold sweats	0	1	2	3

Appendix-D Empathy Induction Questionnaire

Greetings, I am Devika Nayyar, second year MA Psychology student at Thapar School of Liberal Arts and Sciences. This survey is a part of my experiment. I just want to know honest thoughts and opinion. The survey takes merely 2 minutes

Instructions:

There are no right or wrong answers. In this regard you will be required to fill out the following questions. Please be informed of the following points: -

-Data you provide will be kept anonymous and confidential and will solely be used for research purposes.

-You are free to withdraw your participation at any time during or after the completion.

-Avoid choosing "neutral" unless it's very likely of you.

Please note the following Eligibility Criteria:

1. You must be between the age of 18-25

For any queries, please feel free to reach out to at: dnayyar_ma23@thapar.edu

I appreciate your consideration and look forward to your valuable participation. * Indicates required question

1. Name
2. I have read the information provided above and agree to take part in the study.
    - Yes
    - No
3. Age_____
4. What do you identify as?
    - Male
    - Female
    - Others
5. Occupation.

- Employed
- Student
- Other

6. Cigarettes killed Krystell's mom Krystell talks about how she doesn't want to grow up like her mother, Pam Laffin. It scares her to imagine what life would be like if she were dying from emphysema (lung disease), "All my friends say, 'Oh, I want to be like my mom when I grow up and I can't say that because if I said that, then they would think I mean I want to start smoking when I am 10. If I was her than I think I would die, Because I tried not breathing for

a while to see what my mom feels like, but I can't do it. And that makes me sad." Imagine images of Krystell's mom, Pam Laffin in hospital, as Krystell talks.

1) 1. What disease was Krystell's mom, Pam Laffin suffering from?

- Parkinson's Disease
- Emphysema
- Cholera

1) The character's emotions are genuine.
   Not Completely 1 2 3 4 5 Completely
2) I experienced the same emotions as the character when watching his message.
   Not Completely 1 2 3 4 5 Completely
3) I was in a similar emotional state as the character while reading this message.
   Not Completely 1 2 3 4 5 Completely
4) I can see the character's point of view.
   Not Completely 1 2 3 4 5 Completely
5) I can recognize the character's situation.
   Not Completely 1 2 3 4 5 Completely
6) I can understand what the character was going through in this message.
   Not Completely 1 2 3 4 5 Completely
7) While reading this message, I was fully absorbed.
   Not Completely 1 2 3 4 5 Completely
8) The character's reactions to the situation are understandable.
   Not Completely 1 2 3 4 5 Completely
9) I can relate to what the character was going through in this message.
   Not Completely 1 2 3 4 5 Completely
10) I can identify with the situation described in the message.
    Not Completely 1 2 3 4 5 Completely
11) I can identify with the characters in the message
    Not Completely 1 2 3 4 5 Completely

Appendix- E Interpersonal Reactivity Index

For each item, indicate how well it describes you by choosing the appropriate number on the scale at the top of the page: 0, 1, 2, 3, or 4. When you have decided on your answer, fill in the letter next to the item number. READ EACH ITEM CAREFULLY BEFORE RESPONDING. Answer as honestly as you can. Thank you.

ANSWER SCALE:

0	1	2	3	4
DOES NOT DESCRIBE ME				DESCRIBES VERY WELL

1. I often have tender, concerned feelings for people less fortunate than me.
2. Sometimes I don't feel very sorry for other people when they are having problems.
3. When I see someone being taken advantage of, I feel kind of protective towards them.
4. Other people's misfortunes do not usually disturb me a great deal.
5. I am often quite touched by things that I see happen.
6. I would describe myself as a pretty soft-hearted person.
7. When I see someone being treated unfairly, I sometimes don't feel very much pity for them.