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Standardization and Convergent Validation of the State-Trait Anxiety Inventory with measures of Personality, Affective Control and, Risk Propensity

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Abstract

We standardized the State-Trait Anxiety Inventory (STAI) on 407 young adults. Norms (high, medium, and low anxiety scores) were derived based on T scores and percentile ranks. Convergent validation was performed using correlation and multiple regression analysis followed by moderation analysis to study the relationship between STAI and NEO-FFI 3, Affective Control Scale, and Risk Propensity Scale. Results suggest that higher openness to experience acts as a protective factor against both state and trait anxiety. State anxiety emerged as a significant predictor for both affective control and risk propensity. While trait anxiety moderated the relationship between personality and affective control as well as personality and risk propensity. Higher levels of trait anxiety seem to increase the disabling effect of neuroticism on affective control; risk propensity is least for low trait anxiety and high conscientiousness. These results highlight the differential effects of types of anxiety and also to investigate the structure of STAI with Trait and State Anxiety not simply as two sides of the same coin but themselves as different constructs.

The current study adds to the evidence that STAI is a valuable measure for investigating the effect of anxiety in healthy adults across populations/cultures and that anxiety is correlated with cognitive-affective-predisposition factors.

Keywords: State-Trait Anxiety inventory, personality, affective control, risk propensity, standardization, convergent validation.

Introduction

Anxiety is an aversive emotional and motivational state in threatening circumstances. According to Spielberger (1966), anxiety is characterized by subjective feelings of tension, apprehension, nervousness, and worry, and by the activation or arousal of the autonomic nervous system. Anxiety has often been used as a personality variable or as a measure of individual differences in a healthy population and seems to be a crucial factor in the manifestation of certain disorders such as drug abuse, alcoholism (Belcher et al., 2014; Mezquita et al., 2011; Moylan et al., 2013) post-traumatic stress disorder, (Forbes et al., 2011), and Parkinson's disease (Bower et al., 2010). Anxiety as a measure of individual differences in a healthy population has been studied to examine the effect of anxiety on cognition, health, emotion regulation, and decision-making (Eysenck et al., 2007; Kinderman et al., 2015; Paulus & Yu, 2012; Sarigiannidis et al., 2019; Wu et al., 2013). Anxiety is also correlated with certain personality traits, risk-seeking tendencies, and emotion regulation strategies of an individual. State-Trait Anxiety Inventory (STAI) (Spielberger, 1983) has been a widely accepted measure of anxiety for a healthy population and it provides information about levels (high, medium, low) and types (State vs Trait) of anxiety. We aimed to standardize STAI in Indian context and to understand the relationship between anxiety and other measures of individual differences (personality, affective control, and risk propensity) through the convergent validation of STAI.

State-Trait Anxiety Inventory (STAI)

Easy to use, well-defined norms for a wide range of populations (Spielberger & Reheiser, 2009) make STAI an efficient tool for the assessment of anxiety in comparison to others. STAI has been translated into many languages and adapted for healthy volunteers (Andrade et al.,

2001; Iwata et al., 2000; Spielberger & Gonzalez-Reigosa, n.d. 1971; Vitasari et al., 2011). Since one of the major objectives of the current study is to investigate the differential role played by state and trait anxiety and their interaction with other measures of individual differences, STAI was found to be the most suitable tool in addition to the fact that STAI is the most widely used measure for anxiety in healthy population across countries and cultures. Individual differences related to personality, affective control, and risk propensity was considered for convergent validation of STAI, given their strong association with anxiety.

Anxiety and other measures of individual differences

Anxiety, personality, and affective control

Personality traits include different dimensions of individual differences and may influence a range of behaviors. The five-factor model (FFM) as the hierarchical model organizes personality traits into five broad factors of neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience. Neuroticism is a predisposing factor for stress and anxiety. Anxiety is correlated with high introversion and high neuroticism (Loo, 1979). Besides, traits such as neuroticism, extraversion, agreeableness, and conscientiousness have also been found to predict anxiety (Feizi et al., 2014).

The association between anxiety, personality, and affective control has mostly been examined in the context of affective disorders. In the multi predictor trait model for the spectrum of anxiety disorders, the personality trait of neuroticism has shown a positive association with chronic worry, obsessions, compulsions, social anxiety, and panic (Kotov et al., 2007; Kotov et al., 2010). However, in most cases, negative affect or neuroticism is found to be a general factor for all affective disorders (Uliaszek et al., 2009). In addition to neuroticism, personality variables

such as extraversion, openness to experience, and conscientiousness are also linked with the occurrence of anxiety disorders, although the association is small (Karsten et al., 2012; Rossellini et.al 2007). Personality variables such as conscientiousness and openness to experience influence an individual's ability to cope with stress. Individuals high on conscientiousness perceive stress as a challenge, which can be explained by their higher self-efficacy beliefs. Conscientiousness also serves as a stress-protective factor through its influence on the use of problem-focused coping strategies (Bartley & Roesch, 2011; Ebstrup et al., 2011). While openness to experience appears to possess the flexibility to respond to the recurrent stressful experience, higher openness appears to facilitate a distinctly adaptive response profile during stress exposure (Lü et al., 2016; Ó Súilleabháin et al., 2018). These personality factors are also associated with affective experience (Davis et al., 2003).

Affect regulation strategies such as reappraisal and affective suppression play a major role in determining one's well-being and personality variables play a role in determining which strategy would be used by an individual. Neuroticism is correlated with increased sensitivity for punishment and negative affect, which leads to the activation of defensive motivational systems. Heightened negative affect appears to be associated with the increased use of negative styles of emotion regulation including affective suppression (Mennin et al., 2007; Tortella-Feliu et al., 2010). The negative styles of emotion regulation such as rumination and suppression increase the vulnerability for internalizing disorders like anxiety spectrum disorders and depression (Aldao et al., 2010; Roelofs et al., 2008). Better affective control is also significantly correlated with reduced rumination or worry leading to anxiety (Schweizer, Gotlib & Blakemore, 2020).

Anxiety personality and risk propensity

Risk perception is highly influenced by anxiety. A higher level of anxiety is associated with negative appraisals of risk, which results in less willingness to engage in risky decision-making. Risk appraisals mediate the relationship between trait anxiety and risk avoidance (Maner & Schmidt, 2006). The greater the severity of the situation, the more are the chances of risk avoidance in high trait anxious individuals. The tendency for risk avoidance can be explained based on the intolerance to uncertainty in high trait anxious individuals (Maner et al., 2007). Personality also plays a role in the risk-seeking tendencies of an individual. Risk propensity is directly related to the higher levels of extraversion and openness (Nicholson et al., 2005). Since, risk-seeking tendency is inversely related to neuroticism and conscientiousness, people with high levels of conscientiousness pursue benefits through disciplined striving rather than risk-taking (McGhee et al., 2012).

Neuroticism, in interaction with emotion regulation, also plays an important role in determining risky behaviors in adulthood. Even if levels of neuroticism are high, the level of emotion regulation (high vs low) makes a difference leading to higher risk-taking in adults with anxiety disorders (Auerbach et.al, 2007). In young adults poor styles of emotion regulation predicted greater participation in risky behavior as well as alcohol-induced problems (Magar et al., 2008). The relationship between risk-seeking tendency and emotion regulation is usually dependent upon the association of positive affect/reappraisal with risk perception (Constantinou et al., 2011; Rhodes & Pivik, 2011). Appraisal of negative affect increased risk-taking. By effectively down-regulating the experience of negative emotions, reappraisal strategy contributes to an increased sense of emotional control that mitigates aversion to risky decisions (Heilman et

al., 2010). Emotion regulation may operate mainly via decreasing the attention given to the negative aspects of risky choices (Cassotti et al., 2012; Panno et al., 2013).

Further, early adulthood marks a series of changes in social and professional domains. In the professional domain, it requires fixing career goals, maintaining them, and avoiding/taking risks to achieve them. Also, in the social domain, they have to make up to peer pressure, their aspirations, expectations, and demands of significant others. Factors such as one's prominent personality type, emotion regulation styles, propensity for risk-taking, daily stressors, and predisposition to trait anxiety may play an important role in the achievement of these goals and transition through adulthood. These factors are highly interactive in the sense that a third variable might influence the relationship between any two of these variables. For instance, the relationship between personality traits and emotion regulation might be moderated by the current stressors surrounding an individual and/or anxiety. This is what makes the motivation for the present study, which examined the relationship between state and trait anxiety and other measures of individual differences including personality, risk perception, and a higher-order cognitive-emotional factor, affective control in the process of standardization and validation of the State-Trait Anxiety Inventory (Spielberger, 1983). Convergent validation method was used in the current study, which has been performed by Spielberger in the past through the correlation of STAI with different measures of personality (Minnesota Multiphasic Personality Inventory, Personality research form), academic aptitude, and anxiety under stress. However, the validation studies with personality measures (Spielberger, 1983) did not comprise of all the dimensions included in NEO-FFI3. It was expected that the convergent validation of STAI would allow us to examine the multidimensional influence of individual differences related to state and trait

anxiety, personality, risk perception, and affective control on cognitive performance in future studies.

The current study

Given that STAI has been standardized in many different cultural contexts and languages, the current study intended to achieve the same in the Indian context with a focus on convergent validation of the tool. Personality (NEO-Five Factor Inventory–3, Costa & McCrae, 1992) affective control (Williams, et al., 1997), and risk propensity (Meertens & Lion, 2008) were chosen as theoretically-driven measures of interest. Moderation analysis was best suited to study their interactive and independent effects. Based on the literature, state/trait anxiety was taken as the moderating variable; personality as an independent variable while affective control and risk propensity as dependent variables. The effect of a moderating variable is characterized statistically as an interaction variable that affects the direction and/or strength of the relationship between the independent and dependent variables. Moderation analysis provided an overall context to understand the interaction dynamics of the given variables. As these variables are often used as covariates in behavioral experiments in Psychology/Cognitive Science it would help in understanding the mechanisms of their interaction patterns. Overall, it was hypothesized that state anxiety would moderate the relationship between the more dynamic measures such as personality dimension of openness to experience, agreeableness, and conscientiousness with state anxiety and trait anxiety would moderate the relationship between more stable measures of individual differences such as risk propensity and neuroticism dimension of personality.

Standardization of State-Trait Anxiety Inventory in the young adult population.

Methods

Participants

The original form of State-Trait Anxiety Inventory (STAI) (Spielberger, 1983) was used for the assessment and standardization of STAI in the Indian population in this study. The State-Trait Anxiety Inventory was administered on 407 (224 males, 183 females) participants. The participants included student volunteers from the University of Allahabad, aged between 18-30 years (Males = 21.10 ± 2.22 years; Females = 20.81 ± 2.17 years). All the participants had adequate reading and writing skills in English as their second language. They did not report any difficulty in understanding the instructions or in following the statements in the inventory. The study was approved by the Institutional Ethics Review Committee, University of Allahabad. Written informed consent of the participants was obtained.

Description and Administration of the State-Trait Anxiety Inventory

The State-Trait Anxiety Inventory (STAI) was developed by Spielberger, Gorsuch, Lushene, Vagg, & Jacobs (1983) Form Y has two parts. Y1: State Anxiety and Y2: Trait Anxiety. Form Y1 and Y2 consists of twenty statements each that evaluate how the respondent feels "at this moment" and "generally". The participants had to rate each of the items on a 4-point Likert scale.

The questionnaire was scored as per the instructions given in the manual. The participants were told not to leave any of the items unanswered. Participants were debriefed and were told about the purpose of the study after the administration of the STAI.

Results

Development of norms for STAI for Indian population

Normality assumptions were tested using the Kolmogorov-Smirnov test ($N > 30$). The test was conducted separately for the State and Trait anxiety score for both male and female groups. For state anxiety, data for both the groups were not normally distributed [$D_{Male}(224) = 0.063, p = 0.030$; $D_{Female}(183) = 0.077, p = .011$]. However, for trait anxiety, data for both groups were found to be normally distributed [$D_{Male}(224) = 0.046, p = 0.200$; $D_{Female}(183) = 0.065, p = 0.061$]. Means, standard deviations were calculated separately for male and female participants (see Table 1). Raw scores were converted into a transformed score for ease of comparison. The formula used for transformation is as follows:

$$T = 50 + 10 * (\text{raw score} - \text{mean}) / \text{stdev},$$

Where T is the transformation score, the *raw score* is the raw score either on Y1 or Y2, *mean* is the average score of n participants, *stdev* is the standard deviation of n participants. Further percentiles were calculated. Based on the percentiles, participants were divided into low (T scores $\leq$ 15th percentile), medium (T score between 45th to 55th percentile), and high anxious (T scores $\geq$ 85th percentile). Based on the T scores we can compare the anxiety scores of participants on STAI with other measures of anxiety. Percentile ranks were used for developing norms for STAI. As the data was slightly skewed, percentile-based norms best served the purpose because they are not as strongly affected by the extreme values of the distribution as the mean. Based on the criteria in Table 1, about 14.25% low, 15.97% medium, and 16.70% high

state anxious participants and 13.75% low, 14% medium, and 14.98% high trait anxious participants were identified.

<<Insert Table 1 here>>

Since normality assumption was violated a non-parametric equivalent of t-test, Mann-Whitney U was performed to examine gender differences for State and Trait Anxiety. No significant gender differences were found for both State [$U_{State} = 18988$, $p = 0.235$] and Trait anxiety scores [$U_{Trait} = 19251$, $p = 0.335$].

Reliability

Split half reliability was calculated separately for form Y1 and Y2 to examine the internal consistency of the State-Trait Anxiety Inventory. Both the forms were found to be internally consistent with $r = 0.66$ for Y1 and $r = 0.65$ for Y2. Cronbach alpha coefficients were also computed for the two forms Y1 and Y2 separately. Both Y1 ($\alpha = .85$) and Y2 ($\alpha = .82$) are found to be highly reliable.

Convergent Validation of STAI with Measures of Personality, Affective Control, and Risk Propensity

In the next step of the study, convergent validation of STAI with measures of personality, affective control, and risk propensity was conducted. Correlation analysis was first performed to examine the relationship between state/trait anxiety and scores on NEO-FFI 3, affective control scale, and risk propensity scale. Multiple regression analysis was then conducted to select the set of variables for moderation analysis. These analyses were done on SPSS 20 (IBM SPSS

Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA)). Finally, moderation analysis was performed.

Method

Participants

The convergent validation of STAI was conducted with 60 participants (random assignment) who had taken part in a standardization study (36 male, 24 females; mean age: (Male = 21.10 ± 2.22 years; Female = 20.81 ± 2.17 years), recruited from the University of Allahabad. The questionnaires including Neo-FFI Personality inventory, Risk propensity scale, and Affective Control Scale, which were individually administered in about 30-40 minutes for each participant. The questionnaires were administered in random order across participants to minimize any order effects. Since the N is small, a Shapiro-Wilks test was conducted to test the normality assumption, all variables except extraversion [$W(60) = 0.948, p = 0.013$] and anxiety sub-component of ACS [$W(60) = 0.952, p = 0.020$] were found to be normally distributed. There was no significant effect of gender measures of personality, affective control, and risk propensity. Hence, the scores of males and females were combined for further analysis. (See supplementary 1 for the results of normality test and gender differences).

Measures

(1) NEO-FFI 3 (Costa and McCrae, 1992): The NEO Five-Factor Inventory-3 (NEO-FFI-3) is the updated version of the NEO-FFI. It provides a quick, reliable, and accurate measure of personality across five domains: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. It is a 60-item version of the NEO-PI-3, having 12 questions for each of the five domains. Each subcomponent is scored separately.

(2) Affective Control Scale (Williams et.al, 1997): The ACS is a 42-item self-report measure that assesses distress about and fears of losing control while experiencing strong affective states such as anxiety, depression, anger, and positive affective states. The total score is computed by calculating the mean score of all 42 responses, and subscale scores are derived by computing the means of the items that comprise each subscale; higher scores indicate greater distress of emotional response.

(3) Risk propensity Scale (Meertens and Lions, 2008): Risk propensity measures the general risk-taking tendencies of an individual. The main purpose of the scale is to capture the everyday risk-taking that would be either in choosing a risky holiday destination, choosing between medical treatments or environmental risks. The questionnaire did not mean to measure the risk that involves the violation of the social norms. It consists of nine items, which assess the risk propensity on a nine-pointer scale.

Results

Correlation analysis

A two-tailed Pearson correlation analysis was performed between STAI and the scores NEO-FFI3, ACS, and RPS (see Table 2). In correspondence with previous literature, Neuroticism was positively correlated with both State ($r = 0.424, p < .001$) and Trait Anxiety ($r = 0.474, p < .001$) as well as Affective Control ($r = 0.373, p = 0.003$). Affective control was found to be positively correlated with state anxiety ($r = 0.265, p = 0.04$). Increased openness to experience was related to lower levels of state ($r = -0.344, p = 0.007$) and trait anxiety ($r = -0.277, p = 0.027$). Higher levels of conscientiousness are associated with lower risk propensity ($r = -0.276, p = 0.033$). A greater level of agreeableness is related to better affective control in

young adults ($r = -0.271, p = 0.036$). Since a higher score on the Affective Control Scale means greater emotional reactivity in stressful situations it was correlated with lesser risk-taking tendencies ($r = -0.339, p = .008$).

<Insert Table 2 here>

Regression analysis

In the second step of convergent validation, a multiple regression analysis was performed. The multiple regression model allows managing large amounts of potential predictor variables and fine-tuning of the model to choose the best predictor variables from the available options. We looked at two regression models. In the first model, Affective Control was the dependent variable while facets of NEO-FFI3, Risk Propensity quotient, and State and Trait Anxiety were predictors. Two participants whose standard residuals were greater than 3 were removed from the analysis. The model was significant with $F(8, 49) = 7.590, p < 0.001$. The correlation coefficient was 0.744 and the model was significant with 55.06% of the variance in affective control explained by the risk propensity, state anxiety, neuroticism, and conscientiousness. Risk Propensity (RPS) significantly predicted affective control ($\beta = -0.497, p < 0.001$), as did state anxiety (S) ($\beta = 0.426, p = 0.002$), neuroticism (N) ($\beta = 0.314, p = 0.014$) and conscientiousness (C) ($\beta = -0.249, p = 0.023$).

The resulting equation of the model is:

$$Y(\text{ACS}) = 5.124 - 0.497 \cdot \text{RPS} + 0.426 \cdot \text{S} + 0.314 \cdot \text{N} - 0.249 \cdot \text{C}$$

The second model was with RPS as the dependent variable, while facets of NEO-FFI3, Affective Control quotient, State and Trait anxiety scores were taken as predictors. The

correlation coefficient was 0.63 and the model was significant, $F(8, 51) = 4.230, p < 0.001$, with 39.9% of the variance in risk propensity explained by state anxiety, trait anxiety, and by the personality dimensions such as conscientiousness and agreeableness. Affective Control (ACS) significantly predicted risk propensity ($\beta = -0.461, p < 0.001$) as did state anxiety (S) ($\beta = 0.376, p = 0.011$), trait anxiety (T) ($\beta = -0.342, p = 0.024$), conscientiousness (C) ($\beta = -0.376, p = 0.002$), and agreeableness (A) ($\beta = -0.376, p = 0.002$).

The resulting equation is:

$$Y \text{ (RPS)} = 9.863 - 0.461*ACS + 0.376*S - 0.376*C - 0.342*T - 0.228*A$$

Moderation analysis

Moderation implies an interaction effect, where introducing a moderating variable changes the direction or magnitude of the relationship between the independent and dependent variables. The predictors obtained from multiple regression analyses were further taken for moderation analysis with State and Trait Anxiety as moderating variables and Affective Control and Risk Propensity as dependent variables respectively. All the moderation analyses were performed in R version 3.5.2. Outliers were calculated and removed using Mahalanobis, Leverage, and Cook's distance method. The independent variables and the moderator variable in every model were transformed into z scores before entering into the model.

Affective Control: With Affective Control as the dependent measure, we observed different models with neuroticism (N), risk propensity (RP), conscientiousness (C) as independent variables (IVs) respectively and state/trait anxiety as moderator (M) variables. With risk

propensity (RP) or conscientiousness (C) as the IVs, we did not find the moderating effect of state/trait anxiety (no significant interaction between anxiety and the IVs) on affective control.

In a model with neuroticism, trait anxiety, and affective control; neuroticism and trait anxiety were significant predictors of affective control, $F(3, 51) = 5.826, p = 0.002, R^2 = 0.255$. Greater neuroticism predicted poorer affective control, $b = 0.399, t(51) = 3.011, p = 0.004$. While affective control was not affected by higher levels of trait anxiety, $b = 0.084, t(51) = 0.628, p = 0.533$. Affective control was also predicted by the interaction between neuroticism and trait anxiety, $b = 0.237, t(51) = 1.926, p = 0.059$. Figure 1 presents the moderation model and Figure 2 shows the interaction between the predictors. To interpret the interaction, we used the regression equation to estimate affective control means for participants who were low (-1 SD) versus high (+1 SD) on neuroticism and among those who were comparatively low (-1 SD) versus high (+1 SD) on trait anxiety. Among low trait anxious (-1 SD) individuals, neuroticism was not a strong predictor of affective control, $b = 0.143, t(51) = 0.717, p = 0.476$. While among high trait anxious (+1 SD) individuals, neuroticism's predicted affective control, $b = 0.656, t(51) = 3.011, p < 0.001$. Thus, trait anxiety enhances the relationship between neuroticism and affective control. Greater levels of trait anxiety increase the disabling effect of neuroticism on affective control.

<<Insert Figure 1 and 2 here>>

Risk Propensity: With Risk Propensity as the dependent measure, we observed different models with affective control (AC), conscientiousness (C) as independent variables (IVs) respectively and state/trait anxiety (S/T) as moderators (M). With affective control as the independent

variable, we did not find the moderating effect of state/trait anxiety (no significant interaction between anxiety and independent variables; AC*S, AC* T) on risk propensity.

Secondly, we tested the model for Conscientiousness, Trait Anxiety, and Risk propensity. Conscientiousness and trait anxiety were significant predictors of risk propensity, $F(3, 54) = 5.124, p = 0.003, R^2 = 0.22$. Risk propensity decreases with higher conscientiousness, $b = -0.333, t(54) = -2.92, p = 0.005$. While risk propensity is not affected by higher trait anxiety, Trait Anxiety, $b = -0.046, t(54) = -0.331, p = 0.744$. However, risk propensity was predicted by the interaction between conscientiousness and trait anxiety, $b = 0.340, t(54) = 2.59, p = 0.012$. Figure 3 presents the moderation model and Figure 4 shows the interaction between the predictors. To interpret the interaction, we used the regression equation to estimate risk propensity means for participants who were low (-1 SD) versus high (+1 SD) on conscientiousness among those who were comparatively low (-1 SD) versus high (+1 SD) trait anxiety. Among low trait anxious (-1 SD) individuals, conscientiousness was a strong predictor of risk propensity, $b = -0.673, t(54) = -3.70, p < 0.001$. Among high trait anxious (+1 SD) individuals, there was no such relationship, $b = -0.007, t(54) = -0.043, p = 0.966$. Therefore, risk propensity is least for low trait anxiety levels with high conscientiousness. While at higher levels of trait anxiety both low and high conscientiousness shows similar tendencies towards risk propensity.

<<Insert Figure 3 and 4 here>>

Discussion

The current study aimed to standardize and validate the State-Trait Anxiety Inventory (STAI) using the convergent validation method to investigate how anxiety as a predisposing

factor would moderate the relationship between the other measures of individual differences such as dimensions of personality, risk propensity, and affective control. Personality and risk propensity is more closely associated with pre-dispositional tendencies whereas affective control is a higher-order cognitive-affective process.

In the process of validating STAI with the Indian population, we examined the psychometric properties of the tool in terms of reliability and derived the norms to categorize individuals with high, medium, and low levels of trait and state anxiety. Results show that STAI is both valid and reliable (Cronbach alpha Y1 = 0.85, Y2 = 0.82) for the Indian population, with psychometric properties close to what has been reported in the literature (Spielberger, 1985). In the present study, we did not find any significant gender differences on STAI as observed in previous studies (Andrade et al., 2001; Nakazato & Shimonaka, 1989). One reason could be that the current study included a much-concentrated age group (Males = 21.10 ± 2.22 years; Females = 20.81 ± 2.17 years) compared to the previous studies. Secondly, the context (career, social, and peer pressure) may exert a similar kind of effect on males and females among young adults.

Anxiety, affective control, and neuroticism

The present study showed a positive correlation between neuroticism and affective control. Neuroticism came as a significant predictor of affective control. This relationship between neuroticism and affective control is moderated by trait anxiety. The relation between these three acts as a triad for mood and affective disorders. Models such as the tripartite model give importance to personality factors such as neuroticism and their role in the development of affective disorders via increased use of negative styles of emotion regulation (Aldao et al., 2010; Uliaszek et al., 2009). High levels of neuroticism tend to mediate self-referential processing

styles of emotion regulation like rumination, an active defense mechanism in individuals with anxiety or anxiety disorders (Cremers et al., 2010). Neuroticism always presents at the core and having a predisposition such as anxiety or an anxiety-like trait increases the risk for affective irregularities (Bishop & Forster, 2013; Uliaszek et al., 2009). The association between neuroticism and anxiety is well established in literature since neuroticism is related to the development of trait anxiety in interaction with other factors such as stress vulnerability (Hofmann et al., 2012; Sandi & Richter-Levin, 2009). Higher neuroticism in adolescence leads to a 7-fold risk of anxiety disorders in adulthood, with a greater psychopathological burden. (Aldinger et al., 2014). It can be assumed that alterations in emotional experience constitute a mechanism relating neuroticism development to psychopathology.

We also found a significant correlation between state anxiety and affective control. Further state anxiety comes out as one of the significant predictors of affective control. Higher state anxiety in young adults is associated with increased distress and reactivity due to depressed mood ($r = 0.34$, $p = 0.007$). While lower levels of distress are connected to emotional understanding and coping-related self-efficacy (Melka et al., 2011). In young adults, temporary unpleasant emotional arousal can be due to factors such as high workload, fear of failure, and academic expectations. To reduce this arousal and distress, they may engage in addictive activities or maladaptive emotional regulation strategies. However, cognitive emotion regulation strategies of positive reappraisal and less rumination helps in building resilience (Mehroof & Griffiths, 2009; Min et al., 2013). The relationship between state anxiety and affective control reflects the role of acute day-to-day stressful factors in the maintenance of negative reactivity to emotional events. Mismanagement of stressful events can further lead to embracing more maladaptive ways of emotion regulation rather than acceptance of events.

Anxiety and openness to experience

In the present study, both trait and state anxiety were negatively correlated with Openness to Experience. Openness to experience dampens the effect of anxious apprehension and perceived stress by having lesser physiological reactivity and better recovery from social stress. Openness to experience also enables the person to be more tolerant of uncertainty. Those who are high on openness to experience can perform better even in case of a sudden change in task context (Herrald & Tomaka, 2002; Lepine et al., 2000; Lü et al., 2016; Schneider et al., 2012). Openness to experience enables emotion-focused coping strategies like reappraisal, which leads to greater resilience and less vulnerability to adverse effects of stress and anxiety (Williams et al., 2009). Thus, openness to experience encourages young adults to approach the stressful situation with challenges resulting in gaining mastery over the situation. It helps in maintaining a higher positive affect by experiencing lesser threat in such situations. In young adults, openness can act as a protective factor and may result in better adaptability in adverse situations (Walsh et al., 2009; Kaplan et al., 2015; van der Veen et al., 2017).

Anxiety, Conscientiousness and Risk Propensity

Risk propensity was negatively correlated and was further predicted by conscientiousness. Conscientiousness is a personality dimension associated with constraint, orderliness, academic success, and competence (Costa et al., 1991; Chamorro-Premuzic & Furnham, 2003; Bogg & Roberts, 2013; Ivcevic & Brackett, 2014). A higher level of conscientiousness in adults is usually associated with higher levels of perceived risk and lower levels of perceived benefits for risk in domains like health/safety and ethics-related decision-making (Chauvin et al., 2007; Weller & Tikir, 2011). The traits linked with conscientiousness are also related to the behavioral component of self-regulation (goal-directedness & effortful

control). Thus, young adults lacking in deliberative self-control, are less concerned with the fulfillment of their societal duties and are more likely to seek out risky activities in general (Hong & Paunonen, 2009). Therefore, low conscientiousness makes it easier to cross the cognitive barriers of need for control, deliberation, and conformity, which leads to greater risk propensity (Hoyle, 2010; Nicholson et al., 2005). Interestingly, we found that anxiety moderates the relationship between conscientiousness and risk propensity such that with low trait anxiety and high conscientiousness, individuals have lower levels of risk propensity. While with higher levels of trait anxiety both high and low conscientious individuals may have comparable risk propensity as reflected in the moderation model (see figure 4). High trait anxiety leads to intolerance of uncertainty when current goals are being threatened. Conscientiousness has also been linked to facets of time urgency like orderliness or competence, which might interact with trait anxiety. This is to say that when current goals are threatened or blocked, conscientiousness (sense of achievement) might lead to more or equal risk-taking than for those with low conscientiousness to maintain task focus and achieve task goals (Vollrath & Torgersen, 2002; Weller & Thulin, 2012). Highly conscientious individuals should be capable of determining which stimuli are salient, given their goals, and which stimuli are spontaneously salient (due to affective significance or prediction error) and worth attending (Rueter et al., 2018). We did not find a significant relationship between risk propensity and personality dimensions like extraversion and openness to experience, which suggests that risk propensity in young adults could be a result of challenges taken for the completion of goals or goal attainment.

Affective control and risk propensity

Affective control emerged as a strong predictor of risk propensity, although its effects were not moderated by state or trait anxiety. A high score on the Affective Control Scale reflects

poor affective control and greater emotional reactivity in stressful situations. The negative association between affective control and risk propensity suggests that lower emotional reactivity and better affective control in stressful situations may predict better control over risk situations and thus greater risk propensity. Heilman, Cris, and Houser (2010) demonstrated that emotion regulation influences risk attitude. The use of mature strategies such as reappraisal may result in better emotional control and thus reduce the aversion for risky decisions. Thus, those with higher affective control may perceive better control in a risky situation. Perception of control can be defined as one's belief about the extent to which they can predict or influence the outcomes of the events. Such perceptions result from the belief that there is a contingent connection between one's behaviors and the resulting outcomes and the belief that one can perform the required behavior successfully. Perceiving oneself "in control" may cause underestimations of riskiness and encourage more risky behavior while feelings of loss of control might be accompanied by a sense of threat and the motivation to restore perceptions of control (Beisswingert et al., 2016). An increase in perceived self-efficacy also influences the prospect of success and failure by amplifying the perceived likelihood of gains and reduce the perceived likelihood of losses (Krueger & Dickson, 1994). Thus, people when led to believe that they are very competent at decision-making, see more opportunities in risky choices, and take more risks.

State and Trait anxiety as separate constructs

The current study strengthens STAI as a measure of state and trait anxiety in healthy population (Indian context) by providing norms, comparable with the original norms. Through convergent validation of STAI, we add evidence for the relationship of state and trait anxiety with personality, affective control, and risk propensity and that it varies across dimensions of personality, affect regulation and risk taking. We find State Anxiety as a strong predictor for

affective control and risk propensity, while Trait Anxiety was found to moderate the relationship between personality and higher-order variables such as affective control. In the current literature, the default mode networks are known to be associated with self-referential thoughts, rumination, and mind-wandering, whereas salience processing involves cognitive control resources when facing stimuli/stressors to adapt to environmental changes. The structural nodes are altered while the functional network is durably disturbed in trait anxious individuals, and thus the cognitive system can no longer serve efficiently the functional connections within the emotion regulation system (Pacheco-Unguetti et al., 2010; Saviola et al., 2020). Hence, it appears that the primary influence on one's level of cognitive functioning is the individual's average 'trait-level' anxiety, and not his or her current level of state anxiety (Meissel & Salthouse, 2016).

While experiencing state anxiety, the brain transiently changes functional connections and generates maladaptive behavior by making relevant emotional decisions. State anxiety was also found to mediate the relationship between ventrolateral prefrontal cortex (vlPFC) and Quality of Life with greater left vlPFC activity to emotional stimuli with greater state anxiety. As vlPFC regulates the strategic use of goal-directed behavior, this reflects inefficient attentional control of emotion and greater reactivity in individuals with higher state anxiety (Greenberg et al., 2017). Association of state anxiety with affective control is also reflected in one's increased reactivity to stressful situations. The results of the current study emphasize the need to examine the differential effects of types of anxiety and to investigate the structure of STAI with Trait and State Anxiety not simply as two sides of the same coin but themselves as different constructs.

Conclusion

The current study adds to the evidence that STAI is a valuable measure for investigating the effect of anxiety in healthy adults across populations/cultures and anxiety is correlated with cognitive-affective-predisposition factors; personality, affective control, and risk propensity. State anxiety emerged as a significant predictor for both affective control and risk propensity. While trait anxiety moderated the relationship between personality and affective control as well as personality and risk propensity. Given that the population examined consisted of young adults, the personality dimensions showing a significant relationship with anxiety seem relevant to the young adults, which could be one of the limitations of the study and future work may include a wider age range. It would be interesting to examine if the interaction between measures of individual differences is moderated by age. The relationship between anxiety, personality dimensions, and affective control as observed in the current study, suggests that personality traits associated with anxiety and negative affect may influence emotion regulation via reappraisal and may have implications for affective disorders. Lastly, the study has implications for research on anxiety-cognition interactions particularly, anxiety and affect regulation and/or decision-making under risk and uncertainty.

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Figure1. Unstandardized regression coefficients for relationship between neuroticism (N) and affective control (AC) as moderated by trait anxiety (TA). N * TA is the interaction effect of variables on AC. The b values ($b = 0.34^*$) of interaction effect as compared to negative b values of independent effect ($b = 0.33^{***}$) can be interpreted as increase of N's direct estimated effect across levels of TA.

Figure2. Simple interaction slopes for Neuroticism predicting Affective Control for 1 SD below the mean of Trait Anxiety, mean of Trait Anxiety (zT), and 1 SD above the mean of Trait Anxiety. Neuroticism and Trait Anxiety scores are transformed into z-scores. Effects of neuroticism are greatest for high levels of trait anxiety (1 SD above the mean).

Figure3. Unstandardized regression coefficients for relationship between conscientiousness (C) and risk propensity (RP) as moderated by trait anxiety (TA). C * TA is the interaction effect of variables on RP. The positive b values ($b = 0.34^*$) of interaction effect as compared to negative b values of independent effect ($b = -0.33^{**}$) can be interpreted as a reduction of C's inverse estimated effect across levels of TA.

Figure4. Simple interaction slopes for Conscientiousness predicting Risk Propensity for 1 *SD* below the mean of Trait Anxiety, mean of Trait Anxiety (*zT*), and 1 *SD* above the mean of Trait Anxiety. Conscientiousness and Trait Anxiety scores are transformed into z-scores. Effects of conscientiousness are greatest for low levels of trait anxiety (1 *SD* below the mean).

Table1. Descriptive statistics for forms Y1 (State Anxiety) and Y2 (Trait Anxiety) for male (N = 224) and female (N = 183) participants.

	MALE		FEMALE	
	STATE	TRAIT	STATE	TRAIT
Mean	39.37	41.99	38.75	41.56
Standard Deviation	8.24	8.14	10.08	8.22
Skewness	0.301	-0.047	0.694	0.517
Std. error of skewness	0.163	0.163	0.180	0.180
Kurtosis	-0.279	-0.333	0.395	0.638
Std. error of kurtosis	0.324	0.324	0.358	0.358
15th Percentile	39.84	39.86	40.26	40.85
45th Percentile	48.33	48.77	47.21	48.15
55th Percentile	50.76	51.22	51.19	50.58
85th Percentile	60.47	61.05	58.54	60.31

Table 2: A two-way Pearson correlation between components of personality (NEO-FFI 3), affective control (Affective Control Scale) risk (Risk Propensity Scale), and anxiety (State-Trait Anxiety Inventory). Below is shown the descriptive statistics for the variables. Here N is Neuroticism, E is Extraversion, O is Openness to Experience, A is Agreeableness, and C is Conscientiousness facet of NEO-FFI 3 scale. ACS is the total score on the Affective Control Scale, ANG is Anger, POSAFF is Positive Affect, DEPMD is Depressed Mood, and ANX is Anxiety facet of Affective Control Scale. ACA refers to the total score after removing the anxiety facet score. RPS refers to Risk Propensity quotient. STATE refers to State Anxiety score (Y1) and TRAIT to Trait Anxiety score (Y2) on the State-Trait Anxiety Inventory.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
(i) N	—													
(ii) E	-0.280 *	—												
(iii) O	0.019	-0.214	—											
(iv) A	-0.238	0.239	-0.039	—										
(v) C	-0.050	0.162	-0.095	-0.067	—									
(vi) ACS	0.373 **	-0.235	-0.017	-0.271 *	-0.091	—								
(vii) ANG	0.154	-0.146	-0.065	-0.278 *	0.046	0.748 ***	—							
(viii) POSAFF	0.214	-0.059	0.072	-0.244	-0.079	0.838 ***	0.607 ***	—						
(ix) DEPMD	0.373 **	-0.303 *	-0.142	-0.363 **	0.030	0.755 ***	0.432 ***	0.519 ***	—					
(x) ANX	0.424 ***	-0.258 *	0.022	-0.079	-0.202	0.844 ***	0.444 ***	0.544 ***	0.571 ***	—				
(xi) ACA	0.287 *	-0.186	-0.038	-0.348 **	-0.011	0.946 ***	0.820 ***	0.891 ***	0.756 ***	0.626 ***	—			
(xii) RPS	-0.200	0.008	0.169	-0.098	-0.276 *	-0.339 **	-0.406 **	-0.216	-0.242	-0.254	-0.341 **	—		
(xiii) STATE	0.424 ***	-0.023	-0.344 **	-0.085	-0.012	0.265 *	0.184	0.085	0.344 **	0.219	0.254	-0.005	—	
(xiv) TRAIT	0.474 ***	-0.016	-0.277 *	0.031	-0.156	0.084	0.074	-0.025	0.085	0.131	0.044	-0.212	0.549 ***	—

* p < .05, ** p < .01, *** p < .001

Descriptive Statistics

	N	E	O	A	C	ACS	ANG	POSAFF	DEPMD	ANX	ACA	RPS	STATE	TRAIT
Mean	23.450	27.600	29.200	26.683	31.217	3.640	4.092	3.588	3.550	3.468	3.717	4.869	37.650	40.817
Std. Deviation	6.207	5.932	5.999	4.455	5.654	0.654	0.896	0.701	0.805	0.874	0.651	0.912	8.856	8.728