

The Big Five Personality Traits and Choking Susceptibility

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Abstract

Choking susceptibility is the likelihood or potential of an individual choking under pressure (Mesagno et al., 2012). Choking susceptibility may be influenced by personality traits. The purpose of this study was to examine the differences between the Big Five personality traits on choking susceptible and choking non-susceptible individuals. A protocol developed by Mesagno et al. (e.g., 2008; 2009), comprised of a self-consciousness scale, sport anxiety scale, and coping style scale, was used to measure choking susceptibility. Personality traits were measured using the Big Five Inventory-10. A total of 60 post-secondary students were analysed in this study; 30 were choking susceptible and 30 were choking non-susceptible. A MANOVA showed a significant effect of the personality traits on choking susceptibility. Separate univariate tests on the outcome variables (i.e., neuroticism, openness, extraversion, agreeableness, and conscientiousness) revealed a significant effect for neuroticism. Additionally, a discriminant function analysis further showed that neuroticism contributed the most to choking susceptibility compared to the other four personality traits. According to the current study, individuals higher in neuroticism are more choking susceptible than those lower in neuroticism. Therefore, individuals who are neurotic may benefit from interventions designed for their personality to combat the likelihood of choking under pressure. This study is the first to use Mesagno's choking susceptibility protocol outside of sport.

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Introduction

The difference between success and failure in achievement situations may be dependent on an individual's ability to effectively perform under heightened levels of pressure. Worry, doubt, and fear induced by pressure may threaten an individual's long-rehearsed and highly developed skills. Experiencing pressure can negatively alter how an individual performs an otherwise automatic motor task (Geukes et al., 2012; Mesagno et al., 2019; Roberts et al., 2019). For example, Cao and colleagues (2011) examined National Basketball Association (NBA) free throw data from the 2002-2010 seasons and discovered that NBA players shoot on average 8.8 percentage points worse than league average in the last 15 seconds when down one point in a game. Whether it is a championship game or a final exam, experiencing pressure is inevitable for individuals. For some, the pressure can be overwhelming and result in what is known as choking under pressure (referred to *choking* hereafter). To understand the processes involved in choking, the complex mechanisms and factors behind poor or suboptimal performance must first be identified.

Choking was initially defined as the substandard performance in pressure situations where any performance decrement caused by an increase in anxiety was considered choking (Baumeister, 1984). However, researchers have adopted a more contemporary definition of choking that included a substantial decrease in performance that would be considered out of the norm for the individual (e.g., Geukes et al., 2013; Mesagno & Hill, 2013). Choking, as defined by Mesagno and Hill (2013), is “an acute and considerable decrease in skill execution and performance when self-expected standards are normally achievable, which is the result of increased anxiety under perceived pressure” (p. 273). Pressure is defined as a factor or blend of factors that intensifies the importance of performing well under certain situations (Baumeister,

1984). Pressure sources typically include spectators, evaluation, rewards, skill level, perceived importance, and time constraints (Cao et al., 2011; Murayama & Sekiya, 2015). These sources evoke variables such as distraction, self-consciousness, and anxiety, inducing the phenomenon of choking. Clarke and colleagues (2020) discovered that 67.7% of an overall sample of one hundred and fifty-five golfers and archers had experienced choking. Given the high prevalence rate, understanding choking may be useful for performers such as athletes, musicians, surgeons, politicians, businesspeople, and students to prevent its occurrence and enable performers to achieve their potential under pressure (Furuya et al., 2021). The existence of choking highlights the fragility of expert performance in an individual, demonstrating that constant and consistent rehearsal and execution does not guarantee skilled performance in crucial moments.

Psychological, physiological, and behavioural changes can occur when an individual is stressed and under pressure. Performance under pressure can trigger abnormalities in motor, sensory, and cognitive skills and bring about abnormal ways of thinking and malfunctions in the autonomic nervous system, resulting in a decline in performance and ultimately choking (Furuya et al., 2021). Psychological changes that can occur are an increase in anxiety (Chanwimalueang et al., 2017; Mullen et al., 2005), decrease in self-efficacy (Williams et al., 2002), and changes in attention, perception, and memory recall (Beilock & Carr, 2001; Beilock & Carr, 2005; Mullen et al., 2005). Physiological changes include increase in heart rate (Chanwimalueang et al., 2017), systolic blood-pressure (Gramer & Saria; 2007), muscle stiffness (Ioannou et al., 2016), and cortisol secretion (Salvador et al., 2003). Furthermore, behavioural aspects include change in pre-performance routine (Mesagno et al., 2008), erroneous motor actions during performance, and perceptual confusion (Furuya et al., 2021).

Personality may also be associated with how an individual responds to a pressure situation. Previous research has examined how nervousness, negative thoughts and feelings, fear of negative evaluation, anxiety sensitivity, and perfectionism have been related to choking (Clarke et al., 2020; Geukes et al., 2013; Murayama et al., 2010). However, research assessing the role of the Big Five personality model and choking is sparse with only one article examining at decision-making under pressure (Byrne et al., 2015) and one examining the psychological traits of the yips and choking (Clarke et al., 2020). The yips have been defined as a “psycho-neuromuscular impediment affecting the execution of fine motor skills during sporting performance” (Clarke et al., 2015, p. 177). For example, experiencing an involuntary wrist spasm while trying to perform a putt during golf would be considered the yips. Clarke and colleagues (2020) investigated a range of psychological traits (e.g., fear of negative evaluation, anxiety sensitivity, perfectionism) and their ability to predict susceptibility to choking and the yips in 155 experienced athletes. Their findings revealed that all predictors stemmed from social sources (i.e., perfectionistic self-presentation) for the yips, whereas choking was associated with anxiety and perfectionism, as well as social traits. Reviews of choking and the yips suggest investigating the role of personality traits is warranted as potential predictors of identifying individuals who may be more susceptible to choking (Clarke et al., 2015; Hill et al., 2010). Limited research has assessed the role of the Big Five and performance under pressure and has highlighted inconsistencies within the field.

The Big Five personality dimensions include openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Openness is characterized by curiosity, originality, and a preference for novelty and variety. Conscientiousness is reflected by being disciplined, organized, and achievement oriented. Extraversion is exhibited through a high degree of

sociability, assertiveness, and talkativeness. Agreeableness can be described as being helpful, cooperative, trusting, and sympathetic towards others. Neuroticism refers to degree of emotional stability, impulse control, and anxiety (John et al., 1991). The Big Five personality framework is a widely accepted model of personality traits that has been associated with performance in several domains, including personal, interpersonal, and social (Allen et al., 2013; Byrne et al., 2015; John & Srivastava, 1999; Kaiseler et al., 2019). As stated previously, little is known regarding how the Big Five personality model plays a role in choking. However, research has established that neuroticism is positively associated with trait anxiety (Muris et al., 2005). Therefore, a potential connection between neuroticism and choking can be made as perceived pressure elevates anxiety levels (Mesagno et al., 2009). A study by Byrne and colleagues (2015) examined whether the Big Five personality traits could predict who thrives or chokes under pressure during a two-option dynamic decision-making task. Using undergraduate students, two experiments were performed; the first examined social pressure and the second examined a combination of social pressure and time pressure. The decision-making task provided two options that offered points on each trial to maximize the number of points gained over the course of the experiment. The goal of the task was to cumulate the largest number of points by figuring out an optimal strategy. Social pressure was manipulated by informing participants that they were paired with another participant who reached the objective of the task and if they reached their goal, both would receive a monetary bonus. However, if they did not reach the goal, neither the participant nor the fictitious partner would receive the bonus reward. A multiple regression analysis revealed that individuals higher in neuroticism were more likely to perform poorly during social pressure on the decision-making task in the first experiment. During the second experiment, individuals higher in neuroticism were more likely to perform poorly during a

combination of social and time pressure on the task. The second experiment also found that agreeableness predicted performance under time pressure. Neurotic individuals tended to select the immediately rewarding and less taxing working memory option under pressure instead of keeping track of the rewards offered by options on previous trials to figure out the best strategy for the task. These results may be due to the pressure load taxing cognitive resources of the individuals high in neuroticism that allows for more impulsive behaviour (Byrne et al., 2015). Individuals high in neuroticism may increase pressure-related intrusive thoughts that decrease working memory resources (Byrne et al., 2015). Furthermore, personal traits such as neuroticism, public self-consciousness, and a lack of confidence have been linked to performance failures in musicians (Furuya et al., 2021). However, when exploring levels of neuroticism, Clarke and colleagues (2020) reported no differences between those who experienced breakdowns in performance and those who did not. They used a self-report that identified if the participants “had ever experienced a dramatic drop in performance that had been out of their control” and if they “had ever experienced the yips or target-panic” while performing their sport (i.e., golf or archery). Additionally, Byrne and colleagues (2015) also suggest the possibility that pressure may tax working memory resources in more highly agreeable individuals compared to lower agreeable individuals.

Another Big Five personality trait that has been found to be associated with choking is conscientiousness. Clarke and colleagues (2020) discovered low levels of conscientiousness were a significant predictor of both choking and the yips. This would suggest that those who attempt to refrain from acting within social norms, are less conscientious, and tend to be risk takers, are more likely to experience yips and choking (Clarke et al., 2020). This is not surprising as conscientiousness refers to when individuals are goal-directed, delay gratification, and follow

norms and rules (Roberts et al., 2009). Given the lack of literature examining choking, performance and the Big Five personality traits, it is evident that this area of research is in its infancy and exhibits inconsistencies. This gap is further amplified when examining choking susceptibility more specifically.

If choking is a considerable deterioration in performance in the presence of anxiety when self-expected standards are normally achievable (Mesagno & Hill, 2013), then choking susceptibility is the likelihood or prospect of that happening to an individual (Mesagno et al., 2012). Many variables can contribute to an individual being more susceptible to choking compared to others who are not. These variables can include anxiety (Wilson, 2008), handedness (Mesagno et al., 2019), self-consciousness (Wang et al., 2004b), fear of negative evaluation (Mesagno et al., 2012), dominant left-hemispheric activation (Hatfield et al., 2013), and perfectionism (Frost & Henderson, 1991). Additionally, state-like factors such as feelings of physical fatigue and heaviness, abnormal physical sensations, ego relevance, and changes in motor control have been related to increasing the probability and susceptibility of choking (Murayama & Sekiya, 2015; Wang, 2002). According to Mesagno and colleagues (2008; 2009), choking susceptibility is measured through assessing self-consciousness, state and trait anxiety, and coping strategies.

High self-conscious individuals are susceptible to poor performance under pressure (Fenigstein, 1975; Wang et al., 2004b). Those high in self-consciousness are more likely to report increased anxiety in pressure conditions (e.g., Fenigstein, 1975; Mesagno et al., 2008; Wang et al., 2004b). This could be due to self-conscious individuals believing themselves to be the target of others' observations and this over-sensitivity subsequently leads to further self-focus (Fenigstein, 1975). Additionally, research involving athletes has discovered that those with high

levels of trait and state anxiety are more susceptible to choking (e.g., Mesagno et al., 2019; Wang et al., 2004b; Wilson, 2008). Individuals high in trait anxiety may perform poorly under pressure due to elevated state anxiety, interpreting neutral stimuli as threatening, or shifting attention from task-relevant to irrelevant cues, as suggested by the distraction theory (Eysenck et al., 2007; Horikawa & Yagi, 2012; Wang et al., 2004b). Furthermore, choking may be associated with the way individuals use inappropriate coping strategies under pressure. Approach and avoidance coping styles have been the most common categorization of coping styles (Wang et al., 2004a). An approach coping style refers to the use of coping strategies that direct efforts toward reducing the intensity of the stressful situation. In contrast, an avoidance coping style refers to the use of coping strategies that direct efforts away from the stressful or threat-related situation (Wang et al., 2004a). Wang and colleagues (2004a; 2004b) discovered that individuals with an approach coping style, rather than avoidance coping style, may increase the perceived threat in pressure situations. In other words, individuals who actively seek to reduce anxiety actually experience an increase in anxiety rather than a reduction, therefore, increasing susceptibility to choke. Self-consciousness, trait anxiety, and coping styles all contribute to choking susceptibility and will be measured in the following study.

Purpose

It remains unknown in what manner choking susceptibility is related to the innate personality traits of an individual. Therefore, the purpose of this study is to examine the differences in the Big Five personality traits between choking susceptible and non-susceptible individuals. We wish to answer the following question: Is there a significant difference in Big Five personality traits between choking susceptible and non-susceptible individuals? Previous literature has examined some personality traits but due to conflicting results we will only

hypothesize that individuals higher in neuroticism will be more choking susceptible compared to individuals lower in neuroticism.

Method

Participants

We acquired a total of 230 responses, however, 53 participants were removed due to failure to complete a majority of the measures ($n = 48$), if it was clear the participant attempted the study more than once ($n = 4$), or if they did not provide their gender ($n = 1$). In the end, we obtained a sample size of 177 with a total of 61 males and 116 females. An a priori sample-size calculation (G*Power; Faul et al., 2007) using a moderate effect size (Clarke et al., 2020), alpha of .05 and beta of .70 with 2 groups and 5 dependent variables suggested a total target sample size of 174. Out of the entire sample, roughly 17% ($n = 30$) were considered choking susceptible. We followed Mesagno et al.'s (e.g., 2008; 2009) choking susceptibility protocol that has been used with equal groups (Mesagno, 2006; Mesagno & Marchant, 2013). Therefore, 30 non-choking susceptible individuals were randomly selected from the sample to create an equal sample size of the two groups, thus, our final sample size was 60 participants. We chose not to stratify gender for its simplicity and to avoid bias as each individual had the same probability of being selected. The choking susceptible group (23 females and 7 males) had a mean age of 20.77 (2.11) years and the choking non-susceptible group (15 females and 15 males) had a mean age of 21.73 (4.60) years.

Procedure

Postsecondary students from a Canadian university were recruited to participate in a study on personality and performance under pressure. Participants received a recruitment script

(see Appendix A) through an email distributed by kinesiology course professors. For inclusion of this study, participants must have been 18 years or older. As compensation, participants chose to be entered in a draw to win 1 of 4 \$50 Amazon gift cards or receive course credit (professor permitted) for participation of this study. All interested participants were directed to a survey software (i.e., Qualtrics) to complete all the questionnaires online. Email addresses were obtained to determine which participants were eligible for bonus course credit and the gift card draw. After the draw, email addresses were deleted to eliminate any identifying information linked to participation data. All participants were asked to read a consent form (see Appendix B) before completing the questionnaires. Demographic variables included gender and age (see Appendix C). The five questionnaires were presented in the order as seen in measures below. Upon completion of the study, participants were presented with a debriefing form (see Appendix H) where they were provided further information about the study and provided details about sources of support if needed. The study took an average of 63 minutes for participants to complete.¹

Given the purpose of this study was to determine differences between choking susceptible and non-susceptible individuals, a choking susceptibility protocol by Mesagno et al. (e.g., 2008, 2009) was used. The choking susceptibility protocol is made up of the Self-Consciousness Scale (SCS; Fenigstein et al., 1975), the Sport Anxiety Scale (SAS; Smith et al., 1990), and the Coping Styles Inventory for Athletes (CSIA; Anshel & Kaissidis, 1997). To determine level of choking susceptibility, participants had to score in the 75th-100th percentile on at least two out of three choking susceptible inventories based on the initial sample of individuals

¹ Qualtrics estimated the study would have taken 18 minutes to complete. However, due to the study being online, participants could have taken breaks throughout, extending the total duration of the study. Further explanations discussed in limitations.

tested. That is, each participant would be high in self-consciousness (SCS), high in trait anxiety (SAS), and have a positive differential CSIA score (e.g., approach coping – avoidance coping = differential score) to be considered choking susceptible. The remaining score would be in the 50th-100th percentile range of scores surveyed. For the current study, individuals who scored over the 73rd percentile² on 2 out of the 3 choking susceptible questionnaires (i.e., SCS, SAS, & CSIA) and scored over the 50th percentile on the remaining questionnaire were considered susceptible to choke under pressure. The three scales of choking susceptibility have been chosen and shown to predict choking susceptibility in athletes by Mesagno et al., (2008), Mesagno et al., (2009), Wang et al., (2004a), and Wang et al., (2004b). Given that the choking susceptibility questionnaires were athlete specific, wording of some items were changed from sport-specific situations to be more generalized (i.e., items including the word ‘competition’ were changed to ‘performance situation’; e.g., “My mind wanders during a performance situation”).

Measures

Questionnaires measured participant demographic information, Big Five personality traits, and choking susceptibility. Demographics included questions regarding gender, age, and athletic status. Choking susceptibility was determined using a combination of measures examining self-confidence, trait anxiety, and coping styles.

Big Five Inventory-10

Personality was assessed using the Big Five Inventory-10 (BFI-10; Rammstedt & John, 2007; see Appendix D) which measures the Big Five personality dimensions. Responses are recorded on a 5-point Likert scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*). The

² The 73rd percentile was used as there was not a 75th percentile.

BFI-10 scale retains significant levels of reliability and validity and had better test-retest reliability than other 10-item personality measures (Rammstedt & John, 2007). Part-whole correlation results indicate substantial correlations between the BFI-44 and the BFI-10 (Rammstedt & John, 2007). For the present study, the BFI-10 subscale neuroticism ($\alpha = 0.70$) showed good reliability (Cronbach's $\alpha > 0.70$). The subscale's openness ($\alpha = -0.11$), conscientiousness ($\alpha = 0.24$), extraversion ($\alpha = 0.66$) and agreeableness ($\alpha = 0.17$), fell below the accepted levels of reliability (see Table 1). Correlations ranged between 0.30 – 0.80 for the BFI-10 subscales.

Self-Consciousness Scale

The 23-item Self-Consciousness Scale (SCS; Fenigstein et al., 1975; see Appendix E) measures three distinct subscales of self-consciousness (i.e., private self-consciousness, public self-consciousness, and social anxiety). Items are rated on a scale of 0 (*extremely uncharacteristic*) to 4 (*extremely characteristic*) where those with higher scores report higher levels of public self-consciousness, private self-consciousness, and social anxiety. Acceptable internal consistency ($\alpha > .73$) has been reported for all subscales (Fenigstein et al., 1975). There is also considerable evidence for both the construct and discriminant validity of the distinct subscales of self-consciousness (Fenigstein, 1987). For the current study, the SCS displayed good reliability overall ($\alpha = 0.85$; see Table 1).

Sport Anxiety Scale

To assess trait anxiety, the 21-item Sport Anxiety Scale (SAS; Smith et al., 1990; see Appendix F) was used. The SAS is made up of three subscales that specifically measure somatic anxiety, worry, and concentration disruption. Statements and responses are based on a 4-point

Likert scale, ranging from 1 (*not at all*) to 4 (*very much so*). Total scores range from 21 to 84 with higher scores indicating high trait anxiety. The SAS has undergone validation procedures, where the authors reported good internal consistency results and adequate validity (Dunn et al., 2000; Smith et al., 1990). The SAS scale showed good reliability overall for the present study ($\alpha = 0.95$; see Table 1).

Coping Style Inventory for Athletes

The Coping Style Inventory for Athletes (CSIA; Anshel & Kaissidis, 1997; see Appendix G) is a 16-item questionnaire used to measure participants' approach and avoidance coping strategies on a 5-point Likert scale. Responses range from 1 (*very untrue*) to 5 (*very true*). Total scores range from 8 to 40 on each of the two subscales, and higher scores indicate a greater propensity to use that particular coping style. High construct and predictive validity have been reported, as well as acceptable internal consistency (Kaissidis-Rodafinos et al., 1997). However, the present study reported below acceptable levels of reliability for the approach ($\alpha = 0.60$) and avoidance ($\alpha = 0.62$) coping subscales (see Table 1).

Table 1*Descriptive Statistics and Reliability Analysis of Study Scales and Subscales of Full Sample*

Scale	<i>M</i>	<i>SD</i>	Cronbach's Alpha	Number of Items
BFI: Openness	6.47	1.60	-0.11	2
BFI: Conscientiousness	7.80	1.45	0.24	2
BFI: Extraversion	6.51	2.10	0.66	2
BFI: Agreeableness	7.49	1.61	0.17	2
BFI: Neuroticism	7.31	2.06	0.70	2
SCS	58.49	12.10	0.85	23
SAS	57.41	15.32	0.95	21
CSIA: Approach Coping	29.26	4.93	0.60	8
CSIA: Avoidance Coping	22.27	4.80	0.62	8

Note: BFI: Big Five Inventory; SCS: Self-Consciousness Scale; SAS: Sport Anxiety Scale;

CSIA: Coping Style Inventory for Athletes.

Results

Data were analyzed using SPSS version 25. A MANOVA was conducted to explore the differences of the Big Five personality traits between those in the choking susceptible and choking non-susceptible groups. A discriminant function analysis was conducted to test which variables best contributed to choking susceptibility.

A one-way multivariate analysis of variance (MANOVA) was conducted to test the hypothesis that there would be one or more differences between choking susceptibility (choking susceptible and choking non-susceptible) and Big Five personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism). MANOVA was used over a series of ANOVA tests because MANOVA tends to have greater power than ANOVA when

detecting effects as it calculates the correlations between outcome variables (Huberty & Morris, 1989; refer to Table 2). Secondly, it protects against Type I errors that can occur from doing multiple ANOVA's when conducted independently (Leary & Altmaier, 1980). Additionally, by measuring several dependent variables in a single experiment, there is a better chance of discovering which factor is truly important when using MANOVA (French et al., 2008).

Table 2

Correlations of the BFI Subscales

		Openness	Conscientious- ness	Extraversion	Agreeable- ness	Neuroticism
Openness	<i>r</i>	1	0.18	0.24*	0.15	-0.03
Conscientiousness	<i>r</i>	0.18	1	0.14	0.30**	-0.17
Extraversion	<i>r</i>	0.24*	0.14	1	0.34**	-0.20
Agreeableness	<i>r</i>	0.15	0.30**	0.34**	1	-0.13
Neuroticism	<i>r</i>	-0.03	-0.17	-0.20	-0.13	1

Note: * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

To test for normal distribution, z-scores were calculated from skewness and kurtosis. This was obtained by dividing the statistical values by the statistical errors. The scores indicated that the BFI subscales openness, conscientiousness, agreeableness, as well as, SAS, and the two subscales of the CSIA had z-scores that fit the assumption of normal distribution at ± 1.96 . Three variables (extraversion, neuroticism, and SCS) exceeded ± 1.96 , however Kim (2013) suggests that critical values for rejecting the null hypothesis need to be different according to the sample size and notes that medium sized samples ($50 < n < 300$) can use a z-value of ± 3.29 . Therefore, all measures used in this study fit the assumption of normal distribution. Values are presented in Table 3.

Table 3*Evidence of Normality: Z-Scores of Study Variables*

Variables	Skewness	SE	Zskewness	Kurtosis	SE	Zkurtosis
BFI: Openness	0.12	0.26	0.45	0.13	0.51	0.24
BFI: Conscientiousness	-0.17	0.26	-0.66	-0.72	0.51	-1.41
BFI: Extraversion	0.07	0.26	0.26	-0.76	0.51	-1.47
BFI: Agreeableness	-0.51	0.26	-1.96	-0.22	0.51	-0.43
BFI: Neuroticism	-0.63	0.26	-2.40	-0.29	0.51	-0.55
SCS	-0.60	0.26	-2.30	-0.01	0.51	-0.03
SAS	-0.40	0.26	-1.53	-0.73	0.51	-1.41
CSIA: Approach Coping	-0.28	0.26	-1.08	-0.26	0.51	-0.51
CSIA: Avoidance Coping	0.07	0.26	0.28	0.04	0.51	0.08

Note: BFI: Big Five Inventory; SCS: Self-Consciousness Scale; SAS: Sport Anxiety Scale; CSIA: Coping Style Inventory for Athletes.

To test homogeneity of variance matrices, the Box Test was conducted. The Box's M value of 19.44 was associated with a p value of 0.28 which was interpreted as non-significant. Thus, the covariance matrices between the groups were assumed to be equal for the purposes of the MANOVA.

Using Pillai's trace, it showed there was a significant effect of the personality traits on choking susceptibility, $V = 0.26$, $F(5, 54) = 3.82$, $p = 0.005$, partial $\eta^2 = 0.261$. Separate univariate tests on the outcome variables revealed a significant effect for neuroticism, $F(1, 58) = 16.98$, $p < 0.001$, partial $\eta^2 = 0.226$. There were no other significant main effects between the other dependent variables and choking susceptibility. Neuroticism showed a moderate to large effect size Results are presented in Table 4.

Table 4*Summary of General Linear Model Results for Personality Traits and Choking Susceptibility*

BFI Subscale	df	<i>F</i>	<i>p</i>	η^2
Openness	1, 58	0.646	0.425	0.011
Conscientiousness	1, 58	0.107	0.745	0.002
Extraversion	1, 58	0.979	0.326	0.017
Agreeableness	1, 58	1.623	0.208	0.027
Neuroticism	1, 58	16.981	<0.001	0.226

Note: BFI: Big Five Inventory

The MANOVA was followed up with a discriminant function analysis. Since there was only one function, it accounted for 100% of the between group variance, canonical $R^2 = 0.51$. The discriminant function significantly predicted group membership, $\Lambda = 0.74$, $\chi^2(5) = 16.81$, $p = .005$. The correlations between outcomes and the discriminant function revealed that neuroticism contributed the highest to the variate ($r = 0.91$). Agreeableness ($r = -0.28$) and extraversion ($r = -0.22$) were the next highest to contribute. The least contributors to the variate were openness ($r = 0.18$) and conscientiousness ($r = -0.07$).

Discussion

The primary purpose of the current study was to investigate the differences in the Big Five personality traits between choking susceptible and choking non-susceptible individuals. It was hypothesized that individuals higher in neuroticism would be more choking susceptible compared to individuals lower in neuroticism. After analyzing the data, an ANOVA revealed a significant effect for neuroticism between choking susceptibility and choking non-susceptibility. There were no other significant differences of personality on choking susceptibility.

Additionally, a discriminant function analysis indicated that neuroticism positively contributed the most to choking susceptibility followed in order of magnitude by agreeableness, extraversion, openness, and conscientiousness. Openness was positively related to choking susceptibility; all other traits were negatively related.

Neuroticism refers to a tendency or disposition to experience negative emotional states. It is characterized by anxiety, anger, guilt, worry, irritability, and depression (Lahey, 2009; Widiger, 2009). Choking usually occurs from a combination of stress, worry, and anxiety that decreases the individual's performance substantially. The characteristics of neuroticism intensify these feelings. Given that individuals higher in neuroticism have increased arousal and worry related thoughts, their cognitive processing is impaired which could contribute to their susceptibility to choking (Saylik et al., 2018). Individuals who score high in neuroticism tend to respond poorly to environmental stressors and often are self-conscious, shy, and have difficulty controlling urges and impulses when upset (Widiger, 2009). Individuals with high neuroticism also show high vulnerability to stress and exhibit poor coping strategies (Vollrath & Torgersen, 2000). Therefore, it is not surprising that neuroticism has been shown to be associated with choking susceptibility as choking susceptibility is constructed by anxiety, self-consciousness, and coping style questionnaires (Mesagno et al., 2008; 2009).

The self-focus theory claims that performance pressure creates self-consciousness that causes the individual to attend to and attempt to control the processes involved in performing a task, disrupting the automated processes, and thereby causing poorer performance (Baumeister, 1984; Gropel & Mesagno, 2017). Mastered skills are usually processed outside conscious attention and outside working memory, therefore, conscious step-by-step attentional control of an automated skill leads to comparatively poor performance (Baumeister, 1984; Geukes et al.,

2012). Given the cognitive processing of a neurotic individual being impaired by their innate personality trait, they are more likely to interrupt the automatic processes of the task. This could be due to focusing their attention on their anxiety or self-consciousness and combating that cognitive process by putting too much attention toward the task or skill they are attempting to execute.

The results of the current study are consistent with past research that examined the Big Five personality traits in relation to choking and choking susceptibility (e.g., Byrne et al., 2015; Fuyura et al., 2021). Byrne and colleagues (2015) revealed that neuroticism predicted poor performance under social pressure during decision-making tasks. Furuya and colleagues (2021) similarly reported that neuroticism was likely linked to performance failures in musicians. However, Clarke et al. (2020), did not report any effects of neuroticism on choking. They also found that conscientiousness negatively contributed the most to choking using a discriminant function analysis. This is interesting because the discriminant function analysis performed in the current study identified conscientiousness as the variable that least contributed to choking susceptibility. Furthermore, agreeableness was identified as the second variable that contributed the most to choking susceptibility in the current study. Byrne et al. (2015) did find a significant result regarding agreeableness and performance under time pressure, however, it was only correlated with, not significantly predictive of performance under social pressure during decision-making contexts. Results from Clarke et al. (2020) and Byrne et al. (2015) investigating the Big Five personality factors are inconclusive and mixed. More research is needed to come to a consensus and determine what personality traits are linked to choking in pressure performances.

The current study and related studies (Byrne et al., 2015; Clarke et al., 2020) all found openness to experience and extraversion to be the variables that had no or little effect to choking susceptibility. Openness to experience is reflected in a strong intellectual curiosity and adventure, as well as a preference for novelty and variety (McCrae & Costa, 1985). Individuals high in extraversion tend to be more active, outgoing, social, and assertive (Kandler, 2012). A study performed by Jonassaint and colleagues (2009) discovered that individuals higher in extraversion had lower cardiovascular reactivity during stress tasks compared to individuals who were higher in neuroticism, showing that being extraverted may help individuals cope with emotional stress. Additionally, Williams et al. (2009) revealed that individuals higher in openness were more likely to have less blood pressure reactivity during a stressor compared to those lower in openness, suggesting greater stress resilience among individuals high in openness. Therefore, it is unsurprising that extraversion and openness have not been shown to be related to choking and choking susceptibility. These traits may provide individuals with the tools to combat pressure and consequently avoid the prospect to choke.

Additionally, the current study is the first of the authors knowledge that has used Mesagno et al.'s (e.g., 2008; 2009) choking susceptibility protocol within a predominantly non-athlete sample. Given the relationship between choking and neuroticism (Byrne et al., 2015; Clark et al., 2020; Furuya et al., 2021), theoretically, the relationship between choking susceptibility and neuroticism found in the current study is evidence that using Mesagno's protocol for choking susceptibility can be considered effective when used in a non-athlete sample. This is important to note because choking can occur to any individual in any performance situation (e.g., exams, music recitals, public speaking, etc.), therefore, the use of the choking susceptibility protocol can and should be broadened to more populations outside of

sport. The protocol should also be used to identify whether choking susceptibility is generalizable; whether individuals who choke in one setting may also choke in others.

There were several limitations in the current study. Unfortunately, the majority of the Cronbach's alphas for the BFI-10 subscales for this study were low. A low Cronbach's alpha means the items within the scale are not acceptable or reliable (Tavakol & Dennick, 2011). Reliability refers to whether an instrument measures consistently and gives the same results each time it is used (Tavakol & Dennick, 2011). Few scale items may contribute to low alpha values and unreliability as the value of alpha is reduced if the test length is too short (Streiner, 2003). This was the case for the BFI-10 as there were only two items per subscale resulting in low Cronbach's alphas and low correlations between the items. Similar to the current study, Clarke and colleagues (2020) also found inadequate support for the BFI-10 subscales agreeableness and openness. The Cronbach's alphas for the two CSIA subscales, approach coping and avoidance coping, were below good reliability ($\alpha = 0.70$; Cortina, 1993). However, Ursachi et al. (2015) states that an α of 0.6-0.7 can be considered an acceptable level of reliability which is reached for both CSIA subscales in this study. Additionally, other research involving the use of the CSIA have not reported any issues with the reliability of the subscales (e.g., Anshel & Kaissidis, 1997; Mesagno et al., 2008; Mesagno et al., 2009).

The study averaged 63 minutes for participants to complete. The online survey tool, Qualtrics, estimated the study would only take 18 minutes to complete. However, the data of the current study was part of a larger study that contained a cognitive task and additional questionnaires which would have extended the duration of the study. Due to Covid-19, the study had to be online and technical issues arose with the task resulting in a low response rate for that part of the study. Therefore, it was decided to remove that portion. Additionally, due to the

online delivery, participants could have taken breaks throughout, extending the total duration of the study. We know all participants finished the study; however, we do not know why the study took so long to complete. To avoid this, future studies should implement a time limit and inform participants how long they have to complete the study. Additionally, doing the study in a lab, rather than online could minimize the duration of the study as there would be fewer distractions and participants can consult with the researchers if needed.

The measures for choking susceptibility were sport specific and have only been used within athlete populations (Anshel & Kaissidis, 1997; Mesagno et al., 2008; Mesagno et al., 2009; Mesagno et al., 2013; Mesagno et al., 2019; Wang et al., 2004a; Wang et al., 2004b). Although the current study is preliminary evidence that Mesagno et al.'s (2008; 2009) choking susceptibility protocol works outside of sport, only university students were used for this study. Many individuals in music, business, public speaking, academics, and other performance-based fields choke under pressure and experience performance anxiety (e.g., Beilock & Carr, 2005; DeCaro et al., 2010; Engelhard et al., 2012; Furuya et al., 2021). For the purposes of the current study, the wording of some scale items in the choking susceptibility protocol were changed from sport-specific situations to generalized situations. This may have influenced the validity and reliability of the measures. Thus, future research should continue to examine choking susceptibility in other populations to assess generalizability. Additionally, Mesagno's choking susceptibility protocol is relatively new and requires further research to increase its dependability and reliability.

Out of the total 60 participants, only 36% of the sample size were male. This may have altered the results as the choking susceptibility questionnaires included measures on anxiety and self-confidence. Research has shown that females tend to have higher reported rates of anxiety

and report lower levels of self-esteem and self-confidence compared to males (e.g., Casale, 2020; McLean et al., 2011). Females also reported higher extraversion, agreeableness, and neuroticism scores than males (Weisberg et al., 2011). Furthermore, Cohen-Zada and colleagues (2017) found that in professional tennis, men consistently choke under competitive pressure where the results were mixed for women. Therefore, future research should examine whether there are differences in choking susceptibility between males and females.

Future studies should examine whether choking susceptible individuals are the same individuals that actually do choke under pressure. Many individuals may be susceptible to choking based off a combination of characteristics, however that does not mean they are guaranteed to choke when experiencing pressure. Clarke et al. (2020) briefly examined this and discovered that conscientiousness and private self-consciousness were the largest contributors to successfully predicting 71% of the sample into correct groups (whether an individual had experienced a choke or not). Identifying those who are more susceptible to choke may assist the individuals who end up choking under pressure within a performance situation.

Future research should also inspect how pressure inducing tasks can affect performance. Observing the differences between high- and low-pressure could provide some insight to who may be susceptible to choke under pressure. The existing research largely uses sport specific tasks when looking at performance under pressure and choking susceptibility (e.g., Mesagno et al., 2009; Mesagno & Hill, 2013). Therefore, using non-sport specific pressure-inducing tasks could provide more generalizable results for the differences between high- and low-pressure situations to non-athletes, which in turn can help determine who may be more susceptible to choke.

Future research examining the Big Five personality traits and choking susceptibility should aim to use a personality questionnaire including enough items to avoid poor reliability within the subscales. Use of the BFI-44 should be considered above the BFI-10 if the researcher is not limited by the duration of the study. Using the BFI-44 could eliminate the reliability issues presented in the current study as there are more items in the questionnaire.

Implications

Identifying who may be more susceptible to choking could help understand who will actually choke under pressure, what kind of interventions could help these individuals, and how the interventions are delivered. These interventions could include techniques to strengthen self-consciousness, limit anxiety levels, and learn appropriate coping strategies. More specifically, anxiety-reducing approaches such as breathing techniques, meditation, confidence building, and techniques to shift thought processes could be beneficial. Specific techniques and/or interventions to decrease or prevent choking would benefit the many individuals who experience choking and hence suffer diminished enjoyment, or anxiety.

Additionally, the use of choking susceptibility testing in athletics, businesses, medicine, and schools would help assist not only the organization but the individual. Administering the choking susceptibility protocol would identify which individuals may be more susceptible to choking. This would be particularly important if a mental performance consultant was tasked to help a subgroup of individuals from an organization. However, choking susceptibility is a range and implies that even though some individuals are more susceptible to choke, it does not mean that individuals low in susceptibility will not choke. Therefore, providing interventions to limit choking could be beneficial to all individuals.

Conclusion

The role of personality traits in predicting choking susceptibility is still a new area of research. The current study is the first to explore choking susceptibility and the Big Five personality traits using Mesagno's definition for choking susceptibility. It is also the first study to use Mesagno's choking susceptibility protocol outside of an athlete population. Though neuroticism was found to have a significant effect and contribute the most to choking susceptibility it is important to note that all five personality traits contributed to choking susceptibility to some degree. This demonstrates that the Big Five personality traits and choking susceptibility needs to be further researched as there may not be one personality trait that predicts choking susceptibility but possibly a combination of them.

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Appendix A

Recruitment Script

Title of Study: Personality and Performance Under Pressure in Student-Athletes

Principal Investigator: Burgandy Thiessen, Master of Science Candidate, Department of Applied Health Sciences, Brock University

Faculty Supervisor: Philip Sullivan, Professor, Department of Applied Health Sciences, Brock University

You are invited to participate in a research project titled Personality and Performance Under Pressure in Student-Athletes.

The purpose of this research project is to explore different attributes related to performance under pressure to further understand why optimal performance may be altered in a pressure state. Results from this research may provide information on how to develop applied interventions for individuals who struggle with performance under pressure. Should you choose to participate, you will be asked to respond truthfully to a variety of online questionnaires and complete an online cognitive task.

The expected duration of the study is 20 minutes.

If you wish to participate, you will be entered into a draw to win 1 out of 4 \$50 gift cards to Amazon.

If you have any pertinent questions about your rights as a research participant, please contact the Brock University Research Ethics Officer (905 688-5550 ext 3035, reb@brocku.ca)

If you have any questions, please feel free to contact me (see below for contact information).

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(905) 688-5550 Ext.4787

This study has been reviewed and received ethics clearance through Brock University's Research Ethics Board (20-173).

Appendix B

Consent Form



Project Title: Personality and Performance Under Pressure in Student-Athletes

Principal Investigator (PI): Burgandy Thiessen, Master of Science Candidate
Department of Applied Health Sciences
Brock University
bthiessen@brocku.ca

Faculty Supervisor: Philip Sullivan, Professor
Department of Applied Health Sciences
Brock University
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(905) 688-5550 Ext.4787

INVITATION

You are invited to participate in an online study that involves sport psychology research. The purpose of this study is to explore different attributes related to performance under pressure to further understand why optimal performance may be altered in a pressure state. Results from this research may provide information on how to develop applied interventions for individuals who struggle with choking under pressure. You must be 18 years of age or older to participate in this research.

WHAT'S INVOLVED

As a participant, you will be asked to respond truthfully to a variety of questionnaires, as well as perform a cognitive task. All components of the study will be completed online. Participation will take approximately 20 minutes of your time.

POTENTIAL BENEFITS AND RISKS

Participants will be entered into a draw to win 1 out of 4 \$50 Amazon gift cards for participating in the study. Although the researchers have made every effort to ensure minimal negative emotional reactions, it is possible that some participants might experience feelings of uneasiness when they are completing the study questionnaires and cognitive task. If you experience a need for additional support, you may contact Brock University's Student Wellness and Accessibility Services or other resources using the information provided below.

Brock University Student Wellness and Accessibility Services
Room: ST 400

(T): 1-833-276-2533 (1-833-BROCK33)

(W): www.brocku.ca/health-wellness-accessibility/personal-counselling-services

Canadian Mental Health Association

Ontario Division

(T): 1-866-531-2600

(W): www.ontario.cmha.ca

CONFIDENTIALITY

All information you provide is considered confidential; your name will not be included or in any other way associated with the data collected in the study. Furthermore, because our interest is in the average responses of the entire group of participants, you will not be identified individually in any way in written reports of this research.

Data collected during this study will be stored electronically in password protected files. Data will be kept for one year after publication after which all data will be deleted.

If you wish to be eligible to win one of the gift cards, your email address will be linked to your data. Your email address will not be used for anything more than the gift card draw and will be deleted after the draw.

Access to this data will be exclusively accessible to the principal investigator, Burgandy Thiessen and the faculty supervisor, Philip Sullivan.

VOLUNTARY PARTICIPATION

Participation in this study is voluntary. If you wish, you may decline to answer any questions or participate in any component of the study. Further, you may decide to withdraw from this study at any time and may do so without any penalty or loss of benefits to which you are entitled.

PUBLICATION OF RESULTS

Results of this study may be published in professional journals and presented at conferences. Feedback about this study will be available August 2021. If you wish to learn about the results of this study, please contact Burgandy Thiessen at bthiessen@brocku.ca

CONTACT INFORMATION AND ETHICS CLEARANCE

If you have any questions about this study or require further information, please contact Burgandy Thiessen or Philip Sullivan using the contact information provided above. This study has been reviewed and received ethics clearance through the Research Ethics Board at Brock University 20-173. If you have any comments or concerns about your rights as a research

participant, please contact the Research Ethics Office at (905) 688-5550 Ext. 3035, reb@brocku.ca.

Thank you for your assistance in this project. Please keep a copy of this form for your records.

CONSENT

I agree to participate in this study described above. I have made this decision based on the information I have read in the Information-Consent Letter. I have had the opportunity to receive any additional details I wanted about the study and understand that I may ask questions in the future. I understand that by agreeing to participate in this study I am giving my consent and that I may withdraw this consent at any time.

Please select whether or not you wish to participate in this study.

If you wish to be entered into the draw to win 1 of 4 \$50 Amazon gift cards, provide your email address here:

Appendix C

Demographic Questionnaire

1. Please indicate your gender.
2. Please indicate your age in years.
3. What sport do you take part in?

Appendix D

Big Five Inventory-10 (BFI-10; Rammstedt & John, 2007)

Instruction: How well do the following statements describe your personality?

I see myself as someone who ...	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
... is reserved	(1)	(2)	(3)	(4)	(5)
... is generally trusting	(1)	(2)	(3)	(4)	(5)
... tends to be lazy	(1)	(2)	(3)	(4)	(5)
... is relaxed, handles stress well	(1)	(2)	(3)	(4)	(5)
... has few artistic interests	(1)	(2)	(3)	(4)	(5)
... is outgoing, sociable	(1)	(2)	(3)	(4)	(5)
... tends to find fault with others	(1)	(2)	(3)	(4)	(5)
... does a thorough job	(1)	(2)	(3)	(4)	(5)
... gets nervous easily	(1)	(2)	(3)	(4)	(5)
... has an active imagination	(1)	(2)	(3)	(4)	(5)

Appendix E

The Self-Consciousness Scale (CSC; Fenigstein et al., 1975)

Please read each item carefully and select the number that best applies to you.

		Extremely Uncharacteristic				Extremely Characteristic
1.	I'm always trying to figure myself out.	0	1	2	3	4
2.	I'm concerned about my style of doing things	0	1	2	3	4
3.	Generally, I'm not very aware of myself	0	1	2	3	4
4.	It takes me time to overcome my shyness in new situations.	0	1	2	3	4
5.	I reflect about myself a lot.	0	1	2	3	4
6.	I'm concerned about the way I present myself.	0	1	2	3	4
7.	I'm often the subject of my own fantasies.	0	1	2	3	4
8.	I have trouble working when someone is watching me.	0	1	2	3	4
9.	I never scrutinize myself.	0	1	2	3	4
10.	I get embarrassed very easily.	0	1	2	3	4
11.	I'm self-conscious about the way I look	0	1	2	3	4
12.	I don't find it hard to talk to strangers.	0	1	2	3	4
13.	I'm generally attentive to my inner feelings.	0	1	2	3	4
14.	I usually worry about making a good impression.	0	1	2	3	4
15.	I'm constantly examining my motives.	0	1	2	3	4
16.	I feel anxious when I speak in front of a group.	0	1	2	3	4
17.	One of the last things I do before I leave my house is look in the mirror.	0	1	2	3	4
18.	I sometimes have the feeling that I'm off somewhere watching myself.	0	1	2	3	4
19.	I'm concerned about what other people think of me.	0	1	2	3	4

20.	I'm alert to changes in my mood.	0	1	2	3	4
21.	I'm usually aware of my appearance.	0	1	2	3	4
22.	I'm aware of the way my mind works when I work through a problem.	0	1	2	3	4
23.	Large groups make me nervous	0	1	2	3	4

Appendix F

Sport Anxiety Scale Questionnaire (SAS; Smith et al., 1990)

Please think of a **performance situation** that you may feel anxious about while responding to the following questions (e.g., writing an exam, public speaking, music recital, sport competition, etc.). Please read each item carefully and select the number that best applies to you.

		Not At All	Somewhat	Moderately So	Very Much So
1.	I feel nervous	1	2	3	4
2.	During the performance situation, I find myself thinking about unrelated things	1	2	3	4
3.	I have self-doubts	1	2	3	4
4.	My body feels tense	1	2	3	4
5.	I am concerned that I may not do as well in the performance situation as I could	1	2	3	4
6.	My mind wanders during the performance situation	1	2	3	4
7.	While performing, I often do not pay attention to what's going on	1	2	3	4
8.	I feel tense in my stomach	1	2	3	4
9.	Thoughts of doing poorly interfere with my concentration during	1	2	3	4
10.	I'm concerned about choking under pressure	1	2	3	4
11.	My heart races	1	2	3	4
12.	I feel my stomach sinking	1	2	3	4
13.	I'm concerned about performing poorly	1	2	3	4
14.	I have lapses of concentration during the performance situation because of nervousness	1	2	3	4
15.	I sometimes find myself trembling before or during a performance situation	1	2	3	4
16.	I'm worried about reaching my goal	1	2	3	4
17.	My body feels tight	1	2	3	4
18.	I'm concerned that others will be disappointed in my performance	1	2	3	4
19.	My stomach gets upset before or during a performance situation	1	2	3	4
20.	I'm concerned I won't be able to concentrate	1	2	3	4
21.	My heart pounds before competition	1	2	3	4

Appendix G

Coping Style Inventory for Athletes (CSIA; Anshel & Kaissidis, 1997)

This survey consists of questions relating to your typical reactions to stressful events (i.e., making a mistake during performance) that you have experienced in sports competition, writing an exam, public speaking, music recital, etc. Select the number that best describes how much each statement reflects your immediate reaction to the stressful experience (stressor).

Note: There are no right or wrong answers, so please be as honest as possible.

Very Untrue	Somewhat Untrue	Undecided	Somewhat True	Very True
1	2	3	4	5

1. I thought that I was just having a bad day, so it did not upset me. _____
2. I was concerned on what I had to do next. _____
3. I immediately turned my attention to the next physical task at hand. _____
4. I became very critical after the unpleasant experience. _____
5. I did not take the unpleasant experience very seriously. _____
6. I quickly became more aggressive or enthusiastic for the purpose of confronting the stressor. _____
7. I quickly became more aggressive or enthusiastic for the purpose of improving my performance situation. _____
8. I tried to forget about the unpleasant experience. _____
9. I immediately became angry, but then quickly continued without thinking about it. _____
10. I thought about the unpleasant experience for quite some time. _____
11. I tried to analyse the reasons for the unpleasant experience. _____
12. I felt like talking to another person about the unpleasant experience. _____
13. I felt like giving up. _____
14. I became more “psyched up” and excited after the unpleasant experience. _____
15. I did not let the unpleasant experience bother me. I reasoned that it was just part of the performance situation. _____

16. I tried to learn from the unpleasant experience.

—

Appendix H



Debriefing Form

Thank you for participating in the study conducted by Burgandy Thiessen under the supervision of Dr. Philip Sullivan.

This research examines how personality can play a role in performance under pressure and choking susceptibility. Research such as this can help us understand how athletes differ in regard to their personality and what makes some athletes more at risk for choking under pressure.

For this study, we randomly assigned participants to a low-pressure group and a high-pressure group using a cognitive modular arithmetic task to categorize a difference between pressure groups. You may have been told you had a chance to win \$10 if you and a random partner both performed well on the task. This was untrue and was only part of the study as an attempt to increase a feeling of pressure. We could not explain this to you specifically ahead of time as it may have influenced your responses.

Any responses you have provided will remain confidential. We ask that you please do not talk about this study with other student-athletes in case they might also decide to participate.

Although we have made every effort to minimize any negative emotional reactions, there is a possibility that some participants may experience feelings of uneasiness during the process of completing the study questionnaires and cognitive task. If you feel the need for additional support, contact information for Brock University's Student Wellness and Accessibility Services or other resources are provided below:

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