



# The Open Psychology Journal

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## RESEARCH ARTICLE

### Choking Susceptibility and the Big Five Personality Traits

Burgandy Thiessen<sup>1,\*</sup>, Philip Sullivan<sup>1</sup>, Kimberley Gammage<sup>1</sup> and Lori Dithurbide<sup>2</sup>

<sup>1</sup>Applied Health Sciences, Brock University, St. Catharines, Canada

<sup>2</sup>School of Health and Human Performance, Dalhousie University, Halifax, Canada

#### Abstract:

##### Background:

Choking susceptibility is the likelihood or potential of an individual choking under pressure. Choking susceptibility can be influenced by personality traits.

##### Objective:

The purpose of this study is to examine the differences between the Big Five personality traits on choking susceptible and choking non-susceptible individuals from a Canadian University using a cross-sectional design. It was hypothesized that choking susceptibility could be predicted by the Big Five personality traits.

##### Methods:

A protocol developed by Mesagno and colleagues, comprising a self-consciousness scale, sports anxiety scale, and coping style scale, was used to measure choking susceptibility. The protocol has only been used within athlete populations. This study is the first to use the choking susceptibility protocol outside of sports, specifically for undergraduate students (N = 177).

##### Results:

A logistic regression revealed that the personality traits could significantly predict choking susceptibility. Neuroticism was the sole significant predictor. Higher neuroticism values significantly increased the probability of an individual choking susceptible.

##### Conclusion:

According to the current study, neuroticism predicted choking susceptibility. Future research should address choking susceptibility in different contexts and more closely examine the relationship between choking susceptibility and actually choking under pressure.

**Keywords:** Choking susceptibility, Big five personality traits, Neuroticism, Choking under pressure, Performance under pressure, Personality.

#### Article History

Received: April 30, 2022

Revised: August 30, 2022

Accepted: September 20, 2022

## 1. INTRODUCTION

The difference between success and failure often depends on an individual's ability to perform effectively 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 [1 - 3]. For example, Cao and colleagues [4] 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 the 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 as *choking* hereafter). To understand the processes involved in choking, the complex neurological mechanisms and factors behind poor or suboptimal performance must first be identified. Choking was initially defined as substandard performance in pressure situations where any performance decrement caused by an increase in anxiety was considered choking [5]. However, in recent years, researchers have adopted a more contemporary

\* Address correspondence to this author at the Applied Health Sciences, Brock University, St. Catharines, Canada; E-mail: [bthiessen@brocku.ca](mailto:bthiessen@brocku.ca)

definition of choking that includes a substantial decrease in performance which would be considered out of the norm for the individual [1, 6]. As defined by Mesagno and Hill, Choking 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” [6]. Pressure is defined as a factor or blend of factors that intensify the importance of performing well under certain situations [5]. Pressure sources typically include spectators, evaluation, rewards, skill level, and time constraints [4, 7]. These sources evoke variables such as distraction, limited automaticity, self-consciousness, excessive arousal, and anxiety, inducing the phenomenon of choking [8 - 10]. Excessive stress can have a profound impact on an individual's performance [10]. For example, Mesagno and colleagues [11] found that experienced basketball players who scored high in fear of negative evaluation exhibited a significant decrease in performance when the pressure went from low to high. 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 [12]. There is converging evidence that pressure-induced anxiety causes shifts in attention that lead to decrements in performance [13]. The two dominant explanations for performance disruptions or choking have been the self-focus and distraction theories [14]. These theories have been presented as competing mechanisms of attentional disturbance and motor skill failure under performance stress. Clarke and colleagues [15] discovered that 67.7% of an overall sample of 155 golfers and archers had experienced choking. Given the high prevalence rate, understanding choking may be useful for performers such as athletes, musicians, surgeons, politicians, business people, and students to prevent its occurrence and enable performers to achieve their potential under pressure [12]. The existence of choking highlights the fragility of expert performance in an individual, demonstrating that constant and consistent rehearsal and execution do not guarantee skilled performance in crucial moments.

Personality may 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 [15 - 18]. However, research assessing the role of the Big Five personality model and choking is sparse, with only one article examining decision-making under pressure [19] and one examining the psychological traits of the yips and choking [15]. The Big Five personality dimensions include openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. This widely accepted model of personality traits has been associated with performance in several domains, including personal, interpersonal, and social [19 - 22]. 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 [23]. A study by Byrne and colleagues [19] examined whether the Big

Five personality traits could predict who thrives or chokes under pressure during a two-option dynamic decision-making task. They discovered that individuals higher in neuroticism may increase pressure-related intrusive thoughts that decrease working memory resources, which thus impacts performance. Additionally, Byrne and colleagues [19] also suggest the possibility that pressure-induced anxiety may tax working memory resources in more agreeable individuals. This implies that performance pressure may provide a situation that elicits anxiety in these highly agreeable individuals. When exploring levels of neuroticism, Clarke and colleagues [15] reported no differences between those who experienced breakdowns in performance and those who did not. They 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 experienced athletes. Clarke *et al.*'s 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.

Another Big Five personality trait associated with choking is conscientiousness. Clarke and colleagues [15] discovered lower levels of conscientiousness were a significant predictor of both choking and yips. This would suggest that those who attempt to refrain from acting within the social norms are less conscientious, tend to be risk takers, and are more likely to experience yips and choking [15]. 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 [24, 25]. 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. Furthermore, identifying additional characteristics of choking susceptibility could more accurately predict choking.

If choking is a considerable deterioration in performance in the presence of anxiety when self-expected standards are normally achievable [6], then choking susceptibility is the likelihood or prospect of that happening to an individual [11]. Many variables can contribute to an individual being more susceptible to choking compared to others who are not. These variables can include anxiety [26], handedness [2], self-consciousness [27], fear of negative evaluation [11], dominant left-hemispheric activation [28], and perfectionism [29]. Mesagno *et al.* [30, 31] developed a protocol to identify individuals who are susceptible to choking based on an individual's relative scores on certain scales of self-consciousness, anxiety and coping. Specifically, individuals who score above the 75<sup>th</sup> percentile on two out of the Self-Consciousness Scale (SCS), Sport Anxiety Scale (SAS), and the Coping Styles Inventory for Athletes (CSIA) and above the 50<sup>th</sup> percentile on the remaining score are deemed choking susceptible. Therefore, a choking susceptible participant would be high in self-consciousness, trait anxiety, and have a positive differential CSIA score (*i.e.*, approach coping - avoidance

coping = differential score) [32]. The three scales of this protocol have been thoroughly researched and shown to predict choking susceptibility in athletes by Mesagno *et al.* [30] and Wang *et al.* [33]. Those high in self-consciousness are more likely to report increased anxiety in pressure conditions [30, 33, 34]. Additionally, individuals high in trait anxiety may perform poorly under pressure due to elevated state anxiety, interpret neutral stimuli as threatening, or when attention shifts from task-relevant to irrelevant cues, as suggested by the distraction theory of choking [35 - 37]. Coping style is related to choking susceptibility and performance under pressure as it Wang *et al.*, found that an approach coping style has been associated with increased perceptions of pressure, where as an avoid coping style reduces that perception of threat in pressure situations [33].

Research on the relationship between the Big Five personality traits and sports performance has shown that high conscientiousness and low neuroticism significantly predict success in sports performance [38, 39]. However, the literature regarding extraversion, agreeableness, and openness is mixed. This cross-sectional design aims to provide more information on the relationship between the Big Five personality traits and choking susceptibility. It is hypothesized that the Big Five traits will predict the dichotomous outcome of choking susceptibility, as shown in Fig. (1).

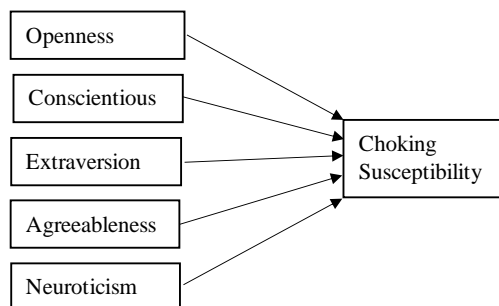


Fig. (1). Hypothesized regression model.

## 2. MATERIALS AND METHODS

### 2.1. 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? There is consistent empirical evidence to support that neuroticism is significantly related to choking susceptibility, however, the evidence on the other Big Five traits is either linked to sports performance as opposed to choking susceptibility, and/or are inconclusive. Therefore, due to conflicting results, we will only hypothesize that the Big Five personality traits will be able to predict choking susceptibility.

### 2.2. Participants

A total of 177 male ( $n=61$ ,  $M=21.15$ ,  $SD=1.92$ ) and female ( $n=116$ ,  $M=20.99$ ,  $SD=3.71$ ) post-secondary undergraduate

students were recruited for this study. The sample had a mean age of 21.05 (3.20) years. Out of the entire sample, roughly 17% ( $n=30$ ) were considered choking susceptible. We followed Mesagno *et al.*'s [30, 31] choking susceptibility protocol, which has been used with equal-sized groups [40, 41]. The university research ethics board approved this study before undergoing any data collection. Any entries that had completed less than 90% of the study were removed. Missing data analysis revealed that < .01% of the data was missing at random; this was filled using means of nearby points [42].

### 2.3. 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 through an email distributed by course professors. For inclusion in 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 the participation in this study. All interested participants were directed to 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 before completing the questionnaires. Demographic variables included athletic status, gender, and age. The five questionnaires were presented in the order as seen in the measures below. Upon completion of the study, participants were presented with a debriefing form 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<sup>1</sup>.

The proven choking susceptibility protocol by Mesagno *et al.* [30, 31] was used. The choking susceptibility protocol is made up of the Self-Consciousness Scale (SCS) [34], the Sport Anxiety Scale (SAS) [43], and the Coping Styles Inventory for Athletes (CSIA) [44]. To determine choking susceptibility, participants had to score in the 75<sup>th</sup>-100<sup>th</sup> percentile on at least two out of three choking susceptible inventories based on the initial sample of individuals 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 50<sup>th</sup>-100<sup>th</sup> percentile range of the scores surveyed. For the current study, individuals who scored over the 73<sup>rd</sup> percentile on 2 out of the 3 choking susceptible questionnaires (*i.e.*, SCS, SAS, & CSIA) were considered susceptible to choke. 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').

<sup>1</sup> 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.

2.4. 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.

2.4.1. Big Five Inventory-10

Personality was assessed using the Big Five Inventory-10 [BFI-10; 45], 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 BFI-10 scale retains significant levels of reliability and validity and has better test-retest reliability than other 10-item personality measures [45]. Part-whole correlation results indicate substantial correlations between the BFI-44 and the BFI-10 [45]. See Table 1 for reliability values for the present study.

2.4.2. Self-Consciousness Scale

The 23-item Self-Consciousness Scale (SCS) [34] 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 [34]. There is also considerable evidence for both the construct and discriminant validity of the distinct subscales of self-consciousness [34]. For the current study, the SCS displayed good reliability overall ( $\alpha = 0.85$ ; see Table 1).

2.4.3. Sport Anxiety Scale

To assess trait anxiety, the 21-item Sport Anxiety Scale [SAS; 43] 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 they reported good internal consistency results and adequate validity [43, 46]. The SAS scale showed good reliability overall for the present study ( $\alpha = 0.95$ ; see Table 1).

2.4.4. Coping Style Inventory for Athletes

The Coping Style Inventory for Athletes (CSIA) [44] is a 16-item questionnaire used to measure participants' approach and coping avoidance 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 [47]. However, the present study reported below-acceptable levels of reliability for the approach ( $\alpha = 0.60$ ) and avoidance ( $\alpha = 0.62$ )

coping subscales (Table 1).

Table 1. Descriptive statistics and reliability analysis of study scales and subscales of full sample.

Scale	M	SD	Reliability Indicator*	Number of Items
BFI: Openness	6.47	1.60	0.35	2
BFI: Conscientiousness	7.80	1.45	0.52	2
BFI: Extraversion	6.51	2.10	0.69	2
BFI: Agreeableness	7.49	1.61	0.23	2
BFI: Neuroticism	7.31	2.06	0.64	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. \* For two-item scales, Spearman-Brown's prophecy formula is reported for reliability, for all other scales, Cronbach's alpha is reported.

3. RESULTS

Data were analyzed using SPSS version 25. Correlations among the variables and tolerance and VIF levels were all within acceptable levels, and there was no problem with model convergence. Therefore, there was no concern for multicollinearity. A logistic regression was conducted to predict the dichotomous outcome of choking susceptibility from the Big Five personality traits [48]. The results showed that the model was significant ( $\chi^2_{(5)} = 43.82, p < .001$ ; log-likelihood = 152.45; Nagelkerke  $R^2 = .33$ ). The sole significant predictor was neuroticism ( $W_{(1)} = 26.56, p < .001, Exp(B) = 2.03$ ). Table 2 summarizes the model.

Table 2. Regression of big five personality traits and choking susceptibility.

Variable	B	SE	W	p	Exp(B)
Openness	0.05	.13	0.15	0.70	1.05
Conscientiousness	0.01	.14	0.01	0.92	1.01
Extraversion	-0.11	.11	1.00	0.32	0.90
Agreeableness	-0.09	.13	0.48	0.49	0.92
Neuroticism	0.71	.14	26.56	<0.001	2.03

4. DISCUSSION

The primary purpose of the current study was to investigate the differences in the Big Five personality traits according to choking susceptibility. Logistic regression revealed that neuroticism was the sole Big Five personality trait capable of predicting choking susceptibility. The odds ratio (Exp(B)) of the model suggests that as neuroticism increases, the probability of a case being choking susceptible significantly increased. Specifically, for every unit increase in neuroticism as measured by the BFI-10 there is a 103% increase in the odds of choking susceptibility.

Previous research has linked higher levels of neuroticism to poor performance under pressure. This has been seen in decision-making tasks [19, 49], musical performance [12], emotional performance [50] and cognitive testing [51]. Additionally, research has also shown that high

conscientiousness and low neuroticism significantly predict success in fields such as sport, sales, and surgical performance [38, 39, 52, 53]. The current results add to this literature in that they link neuroticism not just to poor performance but to choking susceptibility - a stable attribute that indicates the propensity of an individual to choke. It is not surprising that neuroticism was found to be associated with choking susceptibility as choking susceptibility is composed of meeting high levels of anxiety and self-consciousness, as well as having an approach coping style. Individuals who score high in neuroticism tend to respond poorly to environmental stressors and often are self-conscious, shy, irritable, depressed, anxious, and have difficulty controlling urges and impulses when upset [54, 55]. Individuals with high neuroticism also show high vulnerability to stress and exhibit poor coping strategies [56]. Furthermore, Costa and McCrae [57] highlight that neuroticism is made up of sub-factors such as anxiety, self-consciousness, depression, and vulnerability. This is noteworthy as choking susceptibility is partly characterized by having high levels of anxiety and self-consciousness.

The other four personality traits did not differ significantly between choking susceptible and non-susceptible participants. This is consistent with previous literature [58]. However, these findings are inconsistent with the results of Byrne *et al.* [19], and Clarke *et al.* [15], who found that agreeableness is related to performance under pressure and conscientiousness is higher in non-chokers than chokers, respectively. Neuroticism and conscientiousness are considered the best personality predictors of performance [59]. Taken together with the results of neuroticism discussed above, there appears to be support for a relationship between some of the Big Five personality traits and performance under pressure, choking, or choking susceptibility. The larger pattern is that the personality traits of conscientiousness, agreeableness, and, most importantly, neuroticism are related to how individuals perform under pressure. Additionally, the current study and others [15, 19] all found openness to experience and extraversion to be the variables that had no or little effect on choking or choking susceptibility [10, 15, 60]. It is important to determine the factors that predict choking susceptibility, given that choking can cause muscle stiffness [61], confusion [12], cortisol secretion [62], changes in attention, perceptions, and memory recall [63 - 65], as well as increase anxiety [66].

Additionally, the choking susceptibility literature solely incorporates athlete samples, as the only way to measure this concept is through Mesagno *et al.*'s [30, 31] choking susceptibility protocol. The current study is the first to the authors' knowledge that has used Mesagno's choking susceptibility protocol within a predominantly non-athlete sample. Given the relationship between choking and neuroticism [12, 15, 19], the relationship between choking susceptibility and neuroticism found in the current study is evidence that using Mesagno's protocol can be considered effective when used in a non-athlete sample. This is important to note because choking can potentially occur to any individual in any performance situation [*e.g.*, 64, 67, 68]. Therefore, the use of the choking susceptibility protocol can and should be broadened to more populations outside of sport and, thus, provide more literature regarding choking susceptibility in non-

athletes.

There were several limitations in the current study. Unfortunately, the reliability of the BFI subscales for this study were questionable, particularly agreeableness and openness to new experiences. According to Rammstedt and John, the BFI-10 subscales retain significant levels of reliability and validity. Clarke and colleagues also used the BFI-10 and given their research were similar to the current study, the decision to employ the measure seemed adequate. Additionally, given the current study had many self-report measures, the short nature of the BFI-10 was appealing, so participants did not fatigue during the study. There is ample debate about the appropriate way to assess the reliability of two-item scales [69, 70], but future studies examining the Big Five personality traits should consider using another larger scale, such as the BFI-44 [71]. Additionally, the current sample was predominantly (64%) female, and there are known gender differences in extraversion, agreeableness, and neuroticism [72], as well, females tend to have higher reported rates of anxiety and lower levels of self-confidence compared to males [73, 74]. Research examining choking has seen mixed results between genders and choking prevalence [75]. Caution needs to be taken into expanding to other contexts and generalizing the results from this study as it comprised a relatively small sample size containing participants from one university. Further repetition is needed with larger and more diverse samples. Finally, it should be noted that choking is a temporal phenomenon; it occurs over time. Although the current study focuses on choking susceptibility as opposed to choking, the current cross-sectional design may be a limitation and we suggest that future research should explore the effects of choking susceptibility through a longitudinal lens where choking susceptibility can be explored and how it develops over time.

## 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 of choking susceptibility. It is also the first study to use Mesagno's choking susceptibility protocol outside of an athlete population. Although neuroticism was found to have a significant effect on choking susceptibility, it is important to note that all five personality traits can potentially contribute to choking susceptibility to some degree, especially given the mixed literature regarding performance under pressure and the Big Five personality traits. This demonstrates that the Big Five personality traits and choking susceptibility need to be further researched. There may not be one personality trait that predicts choking susceptibility but possibly more than one.

## LIST OF ABBREVIATIONS

NBA	=	National Basketball Association
SCS	=	Self-Consciousness Scale
CSIA	=	Coping Styles Inventory for Athletes
SAS	=	Sport Anxiety Scale

## ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study was approved by the ethical committee of Brock University.

## HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans were used in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013 (<http://ethics.iit.edu/ecodes/node/3931>).

## CONSENT FOR PUBLICATION

Each participant read and reviewed a consent form before agreeing to participate in the study.

## STANDARDS OF REPORTING

STROBE guidelines were followed.

## AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings of the article is available in the Zenodo Repository at <https://zenodo.org/record/7552142>

## FUNDING

None.

## CONFLICT OF INTEREST

There are no known conflicts of interest regarding this study.

## ACKNOWLEDGEMENTS

I would like to thank my supervisor, Dr. Philip Sullivan, for his patience and expertise throughout this project. Additionally, I appreciated the assistance and guidance I received from Dr. Kimberley Gammage and Dr. Lori Dithurbide.

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