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Who Chokes Under Pressure?

Identifying result-determining factors in high pressure situations.

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Abstract

In high-pressure environments, individuals often fail to perform at their usual level and show catastrophic performance declines. This concept, known as choking under pressure, can be observed in various domains such as sports or business settings. While underlying mechanisms and potential moderators have gained increased attention in research, there are still gaps regarding what factors ultimately cause choking. There is also a research gap with respect to how these findings can be utilized for organizational settings.

To address these research gaps, this thesis empirically investigates potential moderators and evaluates how the findings from the analysis can be applied to organizational contexts. Secondary data from penalty shootouts in the three international football tournaments, World Cup, European Championship, and Copa América were used to study the effect of situational, contextual, and individual moderators on penalty performance. The effect of multiple moderators (shooting order, score situation, tournament stage, audience size, club rank, historical period, upcoming transfer, age, and region of origin) on the penalty outcome was tested using binary logistic regression.

The findings of the analysis show that (1) choking occurred more frequently in recent times, (2) performance declines most strongly when situations are perceived as irreversible, and that (3) middle-aged players were most prone to choking. A systematic translation of these findings to organizational settings led to practical suggestions for organizations. These include (1) the need for targeted training that teaches how to manage performance pressure, (2) the right team composition based on experience levels, and (3) creating a corporate culture that reduces the fear of failure.

Zusammenfassung

In Umfeldern, in denen Menschen starkem Leistungsdruck ausgesetzt sind, gelingt es ihnen häufig nicht, ihr gewohntes Leistungsniveau abzurufen, und sie zeigen drastische Leistungseinbrüche. Dieses Konzept, bekannt als "Choking under Pressure", lässt sich in verschiedenen Bereichen wie beispielsweise im Sport oder in beruflichen Kontexten beobachten. Obwohl die zugrunde liegenden Mechanismen und Moderatoren zunehmend Aufmerksamkeit in der Forschung erhalten haben, gibt es noch immer Lücken bezüglich der Faktoren, die letztendlich zum beschriebenen Phänomen führen. Außerdem gibt es eine Forschungslücke darin, wie sich diese Erkenntnisse auf organisationale Kontexte übertragen lassen.

Um diese Forschungslücken zu adressieren, untersucht diese Thesis potenzielle Moderatoren empirisch und bewertet, wie die Erkenntnisse im organisationalen Kontext angewandt werden können. Hierfür wurden Sekundärdaten aus Elfmeterschießen der drei internationalen Fußballturniere Weltmeisterschaft, Europameisterschaft und Copa América verwendet, um den Einfluss situativer, kontextueller und individueller Moderatoren auf die Elfmeterleistung zu untersuchen. Der Effekt potenzieller Moderatoren (Schussreihenfolge, Spielstand, Turnierphase, Zuschauerzahl, Clubrang, historisches Zeitfenster, anstehender Wechsel, Alter und Herkunftsregion) auf die Elfmeterleistung wurde mittels binärer logistischer Regression getestet.

Die Ergebnisse der Analyse zeigen, dass (1) Choking in jüngerer Zeit häufiger vorkam, dass (2) Leistungsabfälle dann am stärksten auftreten, wenn Situationen als unumkehrbar wahrgenommen werden, und dass (3) Spieler mittleren Alters am anfälligsten für Choking waren. Die systematische Übertragung dieser Ergebnisse auf organisationale Kontexte führte zu praktischen Empfehlungen für Unternehmen. Dazu gehören (1) das gezielte Training für den Umgang mit Leistungsdruck, (2) die richtige Zusammensetzung von Teams auf Basis von Erfahrungsniveaus und (3) das Schaffen einer Unternehmenskultur, die die Angst vor dem Scheitern reduziert.

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List of abbreviations

CCM	Cusp Catastrophe Model of Anxiety and Performance
CPH	Consciousness Processing Hypothesis
EMH	Explicit Monitoring Hypothesis
FIFA	Fédération Internationale de Football Association
MMTS	Mindfulness Meditation Training for Sport
NBA	North American professional basketball league
OR	Odds Ratio
PET	Processing Efficiency Theory
PPRs	Pre-Performance Routines
R.S.S.F	Rec.Sport.Soccer Statistics Foundation
UEFA	Union of European Football Associations

1 Introduction

After 120 minutes, there was still no winner in the European Championship final between the English and the Italian national teams on July 11, 2021. The penalty shootout was to decide who would become European champion in London's Wembley Stadium. Despite their technical proficiency, the English players Marcus Rashford (23 years old at the time), Jadon Sancho (21 years old at the time) and Bukayo Saka (19 years old at the time) failed to convert their penalties. This resulted in England's loss in front of a home crowd at Wembley Stadium (UEFA, 2021). How could it be that the players, two of whom were substituted especially for the penalty shootout, missed their shots? Was the outcome merely a function of the Italian goalkeeper's superior individual performance on that night, or is there another explanation for the failure?



Figure 1: Jadon Sancho (left) and Marcus Rashford (right) in European Cup final 2021. Source: Carl Recine/Pool via Reuters.

In competitive environments, where the stakes are highest, individuals sometimes fail to perform at their usual level. This happens, even though the required skills are usually fully mastered. This *paradoxical performance effect*, also known as *choking under pressure* (the two terms will be used interchangeably in this thesis), was first conceptualized by Baumeister (1984) and has since become a key research topic in sport psychology. The case of the missed penalties that is discussed in this

introduction shows how performance pressure can disrupt processes that are usually executed automatically.

While the shootout provides an example from elite sport, similar mechanisms also occur in a broader range of professional contexts. Executives giving high-stakes presentations, surgeons performing under time pressure, or employees facing career-determining situations. All individuals in these examples may operate under intense situational stress. In such moments, cognitive load, anxiety, and self-focus can disrupt otherwise routine actions (Beilock & Carr, 2001). Understanding these dynamics is therefore not only relevant to sports but also to other domains where outcomes depend on individual performances, including organizational settings.

1.1 Problem Statement, Research Question & Relevance of the Topic

Even though the concept of choking under pressure has been studied extensively in sport psychology, the findings remain partly inconsistent or fragmented. The main aim of this thesis is therefore to re-examine some of the factors that influence the occurrence of choking under pressure and to explore potential additional moderators that have received little attention so far. Hence, the thesis analyzes both already identified and newly introduced moderators. In order to achieve this, data from penalty shootouts in professional football are used. This real-life context is ideal for this purpose as it offers a natural and quantifiable environment for performance under pressure.

Beyond the sports domain, this thesis evaluates how the gained insights can be transferred to organizational settings. This addresses a research gap, as various moderators for choking have been identified, but their relevance for performance in business and management context has not been explored yet. The transfer among the two domains is a central part of the thesis, as the work is positioned within the Strategic Management Subject Area. Given this context, the research question guiding this thesis is twofold:

1. What factors moderate choking under pressure?
2. How can these insights be applied to organizational settings?

The main objective is to determine those factors that have a significant influence on performance under pressure and to evaluate how this knowledge can be used for organizational practice. The results

from the transfer of the empirical analysis is supposed to have practical relevance for leadership and management. It aims to help with the development of specific interventions in high-pressure environments.

The fact that choking still happens in elite sports shows the importance of the topic. The missed penalties in the 2020 UEFA European Championship final are a well-known example. Even though a lot of research has been done on the subject, professionals in various domains still choke under pressure. This suggests that preventive strategies are not sufficiently effective yet. At the same time, there is a growing attention on mental health and psychological resilience, which makes it increasingly important to further understand the mechanisms behind choking and the factors that lead to it. While choking under pressure may not be prevented entirely, applying evidence-based coping strategies can help individuals in all kinds of domains to maintain a stable performance under pressure.

1.2 State of Research

The concept of choking under pressure has been widely studied within social and sport psychology. Baumeister (1984) first outlined the concept in a systemic way. Following research tried to explain why performance deteriorates under pressure. This led to the development of several theoretical models (see Chapter 2.2), aiming to explain the underlying mechanisms of choking. Attentional theories have become the dominant framework, as the earlier introduced drive theories were confronted with more limitations (Hill et al., 2010; Beilock & Gray, 2007). Based on these theoretical models, researchers have identified multiple moderators that influence the likelihood of choking under pressure. Exemplary moderators are public status (Hill et al., 2010), experience (Beilock & Carr, 2001), or the audience (Boudreaux et al., 2017).

Due to the attention that the concept has received in academic research, there is now a broad understanding of the main mechanisms and moderators that lead to choking. More recent research has shifted the focus toward choking prevention and the conceptualization of clutch performance (Hufton et al., 2024).

1.3 Structure of the Thesis

The thesis has two main parts, which are the theoretical foundations and the empirical analysis. Chapter 1 includes the research problem, specifies the objectives, and introduces the research question of this scientific work. Chapter 2 then provides the theoretical foundations on which the analysis is built. The theoretical part examines psychological performance pressure, the mechanisms of choking under pressure, and the moderating factors identified in previous research. It then gives an overview of coping theories that explain how individuals can prevent or mitigate paradoxical performance effects and explores the transferability of sport-psychological concepts to organizational settings. Chapter 3 describes the research methodology, including the general methodological approach, data sources and processing, variable and hypothesis selection, as well as the analytical procedure. The results and interpretations of the empirical analysis are presented in Chapter 4. Finally, Chapter 5 reflects on the implications of the findings for organizational settings, highlights the limitations and proposes future fields of research.

2 Theoretical Foundations

This part of the thesis presents the theoretical foundations that the scientific work is based on. It starts by defining the concept of performance pressure and describing how it affects individual performance. Based on this, the main ideas of choking under pressure are discussed. This is followed by an overview of the moderators that influence the occurrence of the concept. The next section focuses on coping mechanisms that help to manage pressure situations effectively. Finally, an examination of the transferability of findings from sports psychology to organizational settings will be made. This concluding part of the theoretical foundations forms the transition to the empirical part of the thesis.

2.1 Performance Pressure

Before examining the concept of choking under pressure, it is essential to first define the broader construct of performance pressure as the contextual foundation for choking. The following chapter introduces the theoretical background of performance pressure.

2.1.1 Stress vs. Pressure

In both academic and popular discourse, the terms stress and pressure are often used interchangeably, despite representing different psychological constructs. The differentiation between these two terms is necessary because stress has been applied across such diverse research fields that a common definition is difficult to establish (Bienertova-Vasku et al., 2020). It is essential to have a fundamental understanding of homeostasis, which is an important concept in physiological research, as a starting point. It is the body's natural way to keep its internal conditions in balance through different regulatory mechanisms (Cannon, 1929). When this balance is disturbed, an organism experiences stress. The external or internal factor that threatens this equilibrium is defined as the stressor (Schneiderman et al., 2005). Selye (1956) popularized this concept in *The Stress of Life* and defined every effect of a seriously harmed homeostasis as stress. He notes that not all stress is the same and came up with the concept of *eustress* (beneficial) and *distress* (harmful). Later research challenged this distinction. Lu et al. (2021) presented another form of stress, which is *sustress* (understimulation). They argued that positive stress is essential for learning to manage environmental demands. Bienertova-Vasku et al. (2020) argue that the term eustress should be eliminated because it is not possible to classify stress as either positive or negative.

Shifting to a cognitive perspective, Weisinger and Pawliw-Fry (2015) describe stress as a situation in which available resources (e.g. time, money, or energy) cannot meet the external demands. Similarly, the European Agency for Safety and Health at Work (2009) describes that work-related stress occurs, when job requirements exceed an individual's ability to cope. Across definitions and approaches, the common element is that stress always includes an imbalance between external demands and internal resources of an individual.

Pressure, on the other hand, may but does not necessarily lead to stress. It refers to situations where an individual's performance is perceived as important for achieving a certain outcome. Weisinger and Pawliw-Fry (2015) describe pressure as present when success or failure depends on the actions of an organism. Baumeister (1984, p.610) defines it as "any factor or combination of factors that increases the importance of performing well on a particular occasion". According to Baumeister (1984), the intensity of pressure depends on the subjective importance of the situation. This implies that the amount

of perceived pressure may differ among different individuals. Mitchell et al. (2018) add that pressure arises when individuals perceive a need to improve performance to avoid significant negative consequences. Likewise, Baumeister & Showers (1986, p.362) refer to pressure as “the presence of situational incentives for optimal maximal or superior performance”.

Performance pressure therefore emerges, wherever expectations regarding an individual’s output are subjectively high and outcomes are visible. This may occur in sports competitions, professional settings, or academic evaluations. While performance pressure may act as a stressor that triggers a stress response (Mitchell et al., 2019), the two constructs of performance pressure and stress are differing from each other. Stress refers to a condition where environmental demands exceed an individual’s ability to cope, whereas performance pressure describes the perceived significance and consequences of performing in a high-stakes situation. (Weisinger & Pawliw-Fry, 2015).

2.1.2 Sources of Performance Pressure

Following the definition of pressure as the perceived importance and consequence of performance, the following section discusses some of the factors that raise this subjective perception. Like stressors (Chrousos, 2009), performance pressure can originate from internal (e.g., perfectionism) or external (e.g., audience) sources. Since the focus of this thesis lies on the mechanisms and moderators of choking under pressure, this section just briefly discusses the internal sources of performance pressure. Some external sources, such as the audience or monetary incentives will be discussed later in the context of choking moderators (Chapter 2.3).

Performance pressure from internal sources refers to traits or cognitive patterns that a person brings into a performance situation. Such internal characteristics determine how performance pressure is perceived and experienced by this person. They can intensify or alleviate the performance pressure, which illustrates the subjective nature (Wallace et al., 2005).

Among the most prominent internal sources are perfectionism, fear of failure, and ego involvement (Flett & Hewitt, 2005). However, they represent only examples of characteristics and cognitive patterns that may lead to an individual experiencing pressure. Some individuals tend to set high standards for themselves or tie their self-worth to performance outcomes. They are more likely to make their personal value depend on their performance. While this character trait can initially enhance

motivation, it often turns counterproductive once the attention shifts from task execution to self-evaluation (Flett & Hewitt, 2005). Fear of failure amplifies pressure in a similar way. It causes individuals to think of performance outcomes as a possible loss instead of an opportunity. When mistakes are seen as threats to one's self-image, physiological arousal and self-monitoring increase. This in turn heightens the chances of performance disruption (Fox, 2008; Hill et al., 2010). Low confidence, unstable self-esteem and negative reactions to mistakes can also have similar effects (Flett & Hewitt, 2005).

Internal sources of performance pressure show that it is subjective by nature. It arises not just from the external situation but from the meaning that an individual assigns to it. What is interpreted as an opportunity for one person may be felt as a threat to another individual. When talking about sources of performance pressure, it is important to note that these factors may also act as choking moderators. They do not only determine whether pressure is perceived but also influence how strongly it affects performance.

2.2 Concept of Choking Under pressure

Following the differentiation between performance pressure and stress in the preceding chapter, the following chapter introduces the concept of paradoxical performance effects. It first gives a definition for the concept of choking before outlining the fundamental theoretical models that explain its underlying mechanisms.

2.2.1 Definition

Baumeister (1984, p.610) defines choking as “performance decrements under pressure circumstances “. This definition was later expanded with the condition that the decrease must occur “despite striving and incentives for superior performance” (Baumeister & Showers, 1986, p. 361). According to their foundational definitions, several further components are essential to categorize a performance decline as choking:

1. The individual must have the intention and motivation to perform well.
2. The individual must possess the ability to perform better.
3. The individual must perceive the importance of the situation.

4. The individual must be aware of the incentives and consequences of the performance.

Despite these specifications, there are still discrepancies regarding the precise definition of the concept. In their review on choking, Hill et al. (2010) note that the suggested definition was challenged in research. Some suggest that choking implies a severe and significant decline in performance, not just any sub-optimal outcome (Gucciardi & Dimmock, 2008). The absence of a common definition brings challenges for research because different interpretations can produce inconsistent or incomparable outcomes. Nevertheless, most of the academic work underpinning this thesis continues to refer to the comprehensive definitions provided by Baumeister (1984) and Baumeister and Showers (1986).

The concept is especially present and visible in sensorimotor or action-based skills (Beilock & Carr, 2001). Additionally, fields such as professional sports offer favorable research conditions due to clear incentives and public scrutiny. However, choking is not limited to competitive sport. The concept occurs across various domains, including everyday life, such as academic contexts, cognitive problem-solving, or business settings. In essence, choking under pressure may occur in all situations in which individuals are subject to internally or externally induced pressure.

To maintain conceptual clarity, it is important to distinguish choking under pressure from other forms of performance failures or declines. Hill et al. (2010) distinguish the concept from three closely related concepts: Panic, the *Yips*, and *Slumps*. Panic describes a breakdown of rational thoughts that leads to erratic decisions and loss of control. The Yips are caused by muscular spasms and are rather a physiological than psychological disruption. Finally, Slump refers to a longer period of poor performance that is not directly tied to high-stake pressure (Hill et al., 2010).

2.2.2 Fundamental Theories

The following section introduces the fundamental psychological theories that attempt to explain the underlying mechanisms of choking. All models can broadly be classified into two superordinate categories: drive theories and attentional theories (Hill et al., 2010).

2.2.2.1 Drive Theories

Drive theories assume that the level of arousal or drive is the decisive factor for the performance (Baumeister & Showers, 1986). According to Baumeister and Showers (1986), arousal refers to a state

of heightened motivation in which an individual's drive to perform well increases. Drive theories are commonly grounded in the Yerkes-Dodson law (Inverted 'U' Curve as can be seen in *Figure 2*), which states that performance improves with increasing arousal up to an optimal level. If this optimum is exceeded, performance begins to decrease (Yerkes & Dodson, 1908).

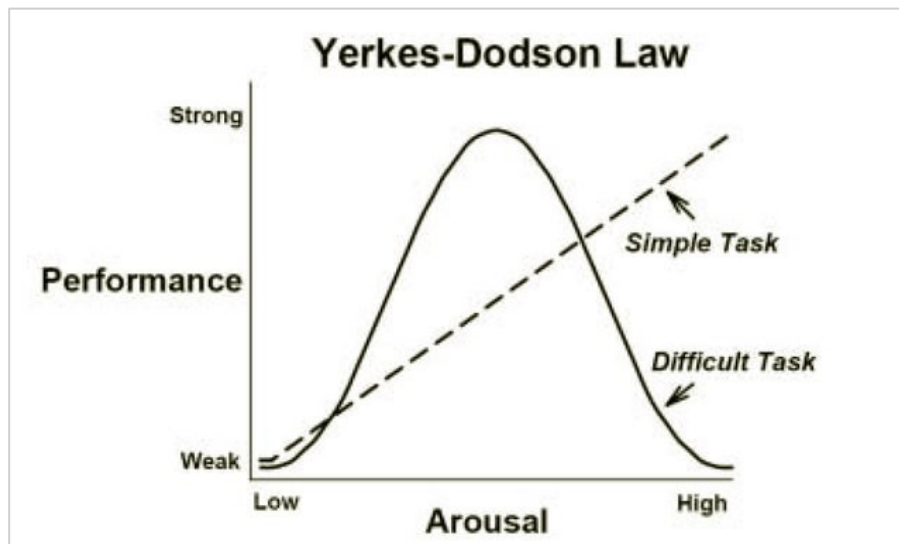


Figure 2: Inverted 'U' model (Phillips-Wren & Adya, 2009)

The optimal level of arousal depends on the type of the task. According to Philips-Wren and Adya (2009), the optimal level of arousal is lower for tasks that depend mainly on cognitive abilities because they require concentration. For endurance or strength-based tasks, it is higher, as they require motivation and activation.

The Yerkes-Dodson law provided a crucial foundation for research on the relationship between arousal and performance. However, it has been criticized for being purely descriptive (Hardy & Parfitt, 1991). It does not explain how arousal affects performance mechanisms or why some individuals perform better under pressure than others (Beilock & Gray, 2007).

A second category of drive theories is the dominant response theory, also known as theory of social facilitation. Zajonc (1965) demonstrated that the presence of an audience leads to enhanced performance on well-learned tasks and impaired performance on new or complex ones. In line with this, the theory proposes that arousal strengthens the performer's dominant response. The dominant response is the most likely behavior or reaction in a pressure situation. Therefore, it enhances performance on well-learned tasks and impairs it on less-practiced ones (Baumeister & Showers, 1986). Like the Yerkes-

Dodson law, this theory also does not explain the paradoxical performance effect, since even experienced performers choke on well-learned tasks.

Fazey & Hardy (1988) developed the Cusp Catastrophe Model of Anxiety and Performance (CCM) based on previous models. The CCM, like the Inverted 'U' model, proposes that performance goes up with arousal until it reaches a certain point. When this level is exceeded, the performance is expected to drop quickly and not to decrease gradually. This drop is referred to as a "catastrophic" decrease in performance that occurs once a critical threshold is exceeded (Beilock & Gray, 2007). The CCM therefore addresses criticism regarding the symmetry of the Inverted-U model, which according to Fazey & Hardy (1988) is a major limitation. It also considers that arousal is not purely physiological but has a psychological component. The model posits that performance is affected by the interplay between cognitive anxiety and physiological activation (Hardy et al., 2004).

The CCM provides a broader rationale for abrupt performance breakdowns. However, it has also faced criticism regarding its restricted empirical testability (Tenenbaum & Becker, 2005). Woodman and Hardy (2005) stated that the model was not meant to make definite predictions based empirical findings, but rather to be a conceptual framework.

In summary, drive theories provide the historical basis for understanding the connection between arousal and performance. They provided initial explanation for general performance changes (Hill et al., 2010; Baumeister & Showers, 1986). Yet these models remain insufficient when it comes to fully explaining choking under pressure. While they explain that arousal disrupts skill execution, their main limitation lies in the lack of a mechanism that describes how it is disrupted (Hill et al., 2010; Beilock & Gray, 2007).

2.2.2.2 Attentional Theories

The second category of theories explaining the mechanisms behind choking are attentional theories. Attentional theories have gained more recognition due to the limitations of drive theories discussed above. While drive theories link performance declines to the level of arousal, attentional theories assume that shifts in attention are responsible for the decline. In both, cognitive and sensorimotor tasks, the focus of attention plays a decisive role, as the outcome is strongly affected by what the performer focuses

on (Yu, 2015). Within this category, two dominant approaches have emerged: distraction theories and self-focus theories (Hill et al., 2010), which will be discussed in the following section.

2.2.2.2.1 Distraction Theories

Distraction theories assume that pressure causes the attention to shift to factors that are not related to the task itself (Beilock & Carr, 2001). Wine (1971) examined the effects of test anxiety on performance and found that those task-irrelevant thoughts often are ruminative and self-evaluative worries about the situation or potential outcomes.

According to Baumeister and Showers (1986), distractions can occur through two different processes. The first way is that the performer may fail to focus attention to task-relevant cues because of the inability to filter irrelevant information leads to an overload of processed stimuli. In the second way, the performer may process a normal amount of information but neglects important, task-relevant features because focus is shifted toward irrelevant cues. This shift consequently creates a dual-task environment in which the task-irrelevant information competes with the attention that is necessary to actually execute the task (DeCaro et al., 2011).

Research shows that individuals who rely strongly on explicit knowledge are more prone to performance declines under pressure (Liao & Masters, 2001). This effect is especially visible in tasks that depend to a large extent on working memory. An example is solving a math problem, where distractions compete with task-relevant cues for working memory capacities (Yu, 2015). Consequently, individuals with high working memory capacities are more vulnerable in cognitively demanding situations. Beilock and Carr (2001) also demonstrated this in their studies on mathematical problem solving. They found that paradoxical performance effects only occurred among those individuals that had a high working-memory capacity and only in those tasks that demanded this capacity significantly. Other studies have found that the relationship between pressure and performance also depends on the difficulty of a task and on the strategy that is used to solve it (Wang & Shah, 2014). It is still widely accepted that pressure affects individuals differently depending on their cognitive abilities. Importantly, distraction does not always impair performance. Sanders and Baron (1975) found that distraction led to performance declines on difficult tasks but improved it on simple ones. They attributed this effect to increased arousal and motivation.

Within the distraction theories, the Processing Efficiency Theory (PET) is the most widely recognized framework (Eysenck & Calvo, 1992). PET describes the relationship between performance effectiveness and effort. Performance effectiveness depends on how much of the available working memory capacity is consumed by task-irrelevant thoughts versus task-relevant ones (Hill et al., 2010). When attention is shifted toward irrelevant thoughts, less capacity remains for the task, which reduces performance effectiveness (Derakshan & Eysenck, 2009). According to PET, this inefficiency can be compensated for by increased effort. However, when anxiety levels become too high or the task too demanding, an increased effort can no longer compensate the inefficiency. This in turn leads to performance breakdown (Williams et al., 2002).

2.2.2.2.2 Self-Focus Theories

The second major subcategory of attentional theories are self-focus theories. Self-focus theories assume that pressure increases self-consciousness and performance anxiety (Beilock & Carr, 2001). This heightened self-awareness leads to an increased focus on skill execution, which ultimately results in paradoxical performance effects (Baumeister, 1984). Hill et al. (2010) highlight that this process is closely linked to the theoretical stages of learning.

To better understand self-focus theories, it is useful to briefly revisit the distinction between *explicit* and *implicit learning and knowledge*. Explicit learning follows an intentional and structured process, in which the individual is aware that one is participating in a learning activity (Yang & Li, 2012). This can, for instance, be a running coach teaching athlete the specific movements. Contrary, implicit learning happens without conscious awareness of learning (Yang & Li, 2012). An example of implicit learning is when children learn to ride a bicycle without getting explicit instructions. Explicit knowledge therefore refers to facts and rules that can be articulated, whereas implicit knowledge consists of information that is known but not consciously accessible or verbalizable (Masters, 1992). Implicit learning will be further elaborated in the context of coping theories later in this thesis.

This distinction is critical in understanding paradoxical performance effects. Once a skill becomes well-learned, it is typically processed automatically outside the working memory and like an implicitly learned task. Skilled performers can execute complex actions without actually thinking about the specific steps. Novices, on the other hand, rely on explicit, step-by-step procession (Anderson, 1982).

Self-focus theories propose that pressure-induced anxiety and self-consciousness cause a performer to focus attention back to the mechanics of the task and process it again through working memory (Wilson et al., 2007). This shift disrupts what would normally happen automatically and leads to a performance decline. Consistent with this theory, Masters (1992) found that individuals with a large amount of explicit knowledge are more likely to fail under pressure than those who use implicit knowledge to execute a task. It is therefore suggested that the way a skill is learned influences how resilient it is to choking.

Two widely recognized self-focus theories are the Explicit Monitoring Hypothesis (EMH) and the Consciousness Processing Hypothesis (CPH). While both share many conceptual similarities, Hill et al. (2010) highlight an important distinction. EMH suggests that performers consciously observe each step of their movement. On the other hand, CPH, states that performance breakdowns happen because of a conscious attempt to control the execution itself. This difference can be illustrated through the example of a penalty shootout, the situation that is examined in the empirical research of this thesis. According to EMH, a player might mentally monitor each component of the action: (1) placing the ball on the penalty spot, (2) stepping back to prepare for the run-up, (3) waiting for the referee's signal, (4) approaching the ball, (5) taking the shot. Under CPH, however, the player consciously controls these individual components. For example, by deciding exactly how or where to hit the ball. Jackson et al. (2006) note that while the explicit monitoring of skill execution may have a general disruptive effect, consciously controlling it may intensify this disruptive effect.

Although distraction and explicit monitoring propose different mechanisms for choking under pressure, they are not mutually exclusive. Beilock and Carr (2001) suggest that both mechanisms can take place, depending on the nature of the task. They argue that choking due to distraction is more likely in tasks that depend on working memory. Choking due to explicit monitoring, on the other hand, occurs more often in tasks that are largely automatic and usually executed outside the working memory. DeCaro et al. (2011) support this view, also suggesting that the relevant mechanism depends on the nature of the task. They argue that distraction most likely occurs in tasks that need attention and high cognitive load, while explicit monitoring is more likely when performers are being observed or evaluated during tasks that normally run automatically.

The distinction between distraction and explicit monitoring provides a useful framework for finding explanations for paradoxical performance effects. However, it is still difficult to evaluate and not observable under which circumstances what mechanism has the stronger influence. Toma (2017) points out that researchers are still far from being able to predict the likelihood of paradoxical performance effects based on an individual's psychological profile. This observation still remains valid today.

2.3 Potential Moderators for Choking Under Pressure

After laying out the basic theories, the following chapter discusses moderators that have been examined in the existing literature regarding their influence. Understanding the extent to which these moderators affect the strength and direction of their impact not only helps to better explain the mechanisms of choking under pressure. It also enables the development of prevention measures that mitigate its occurrence. To provide a more structured understanding of how different factors influence this relationship, the potential moderators were categorized according to their theoretical level of influence. Three moderator clusters were developed for this purpose: *situational*, *contextual* and *individual* moderators. This categorization later also serves as the structure for the empirical analysis and the discussion of findings. It is supposed to ensure a conceptual consistency throughout the thesis. The following section provides an overview of the potential moderators that have been identified in the existing literature. It does not aim to cover all factors but rather focuses on those that are most relevant for the empirical analysis.

2.3.1 Situational Moderators

The situational moderators are factors that arise in acute situations that directly shape the pressure of the moment. This includes, for example, the score situation, the stage of the competition, or the order of execution.

2.3.1.1 Game Phase and Temporal Proximity to Outcome

The timing within a match can amplify perceived pressure and therefore act as a situational moderator of choking. Empirical research shows consistently that performance declines are most likely to occur in decisive moments. Cao et al. (2011) found that NBA players missed more shots when the game

approaches the end. The observation was especially visible when their teams were leading or trailing by a very small margin. The potential explanation is that shots that are closer to the end have a more direct impact on the outcome. Worthy et al. (2009) made similar findings, observing a higher choking probability for teams leading by a single point. This observation was not made when the margin exceeds two points. Toma (2017) found that performance drops significantly in the last 30 seconds of close basketball games.

The findings suggest that the impact of performance pressure depends on the timing of the situation. However, the effect appears to depend on the type of sport as well. In contrast to the results from basketball, Teeselink et al. (2020) found only limited evidence for performance declines under pressure in darts. This contradiction implies that the likelihood of choking during high-stakes phases is not only influenced by the significance of the performance outcome but also by the nature of the task itself.

2.3.1.2 Shooting Order

The order in which players perform in sequential tasks has been shown to influence performance outcomes. In their analysis of 1,343 penalties, Apesteguia and Palacios-Huerta (2010) found that 60.5% of the winning teams had kicked first. They present this outcome as a proof for the first-mover advantage, suggesting that psychological pressure intensifies for the second mover who must equalize the score. Vandebroek et al. (2018) describe this mechanism as lagging-behind pressure and conclude that the strength of the effect increases with the difficulty of the task and the importance of the situation. However, other studies report mixed results. Kocher et al. (2012) re-examined the effect with an expanded dataset and found no significant performance advantage for the first mover. Palacios-Huerta (2014) again confirmed its existence. Experimental evidence by Feri et al. (2013) even goes into the opposite direction. Under reduced anxiety levels, the second mover even outperformed the first mover. This suggests that the advantage depends on the degree of situational pressure. Examining ice hockey shootouts, Kolev et al. (2015) did not find significant difference between the first- and the second mover. Overall, the literature suggests that the shooting order functions as a situational moderator of choking. The impact depends on the perceived psychological relevance of the moment and the outcome of the

previous attempts. The closer the situation moves toward an irreversible decision, the stronger the perceived pressure on the following performer.

2.3.2 Contextual Moderators

Contextual moderators reflect environmental and more systemic influences that determine how pressure is perceived and managed over time, such as audience size, monetary incentives, team or club status, or the broader competitive settings of a match or tournament. Unlike situational moderators, which arise during the moment, contextual moderators come from the broader environment.

2.3.2.1 Audience

A large number of research has investigated the impact of audience presence on athletic performance. There is a widespread consensus that quantifiable effects are present. Studies, however, vary regarding the direction of the influence that an audience has on performance. Some indicate that an audience enhances and others that it impairs performance (Hill et al., 2010). Cao et al. (2011) utilized free-throw data from the North American professional basketball league (NBA) identifying a minor but significant negative relationship between audience size and free-throw success rate. They estimate a decline of just over one percentage point for every 10,000 additional viewers. Böheim et al. (2019) demonstrated similar findings, indicating that a 10-percentage-point increase in crowd size resulted in a 6.9-percentage-point decrease in the scoring probability for home teams. This effect was exclusively observed for trailing home teams. There was no noticeable effect observed for away teams. Dohmen (2008), on the other hand, found no proof that changes in the size of the audience affect choking.

In addition to the size of the audience, it also plays a role, whether an athlete plays in front of a home or away crowd. However, just like pressure in general, audience support is perceived subjectively. What one performer perceives as supportive may be seen as additional pressure for other individuals. Wallace et al. (2005, p.430) define a supportive audience as one “whose members want the performer to succeed and convey their wishes to the performer”. This definition is adopted here. Since perception and pressure tolerance vary across individuals, the generalizability of audience effects remains limited and empirical evidence remains mixed. The *social support hypothesis* predicts that a friendly audience enhances performance, whereas the *social pressure hypothesis* argues that any evaluative audience,

whether hostile or friendly, impairs performance (Dohmen, 2008). Nevill and Holder (1999) connected the home advantage mainly to crowd support and several other studies have also found improved outcomes for teams playing at home compared to away (Bray et al., 2002). Yet, Wallace et al. (2005) showed that home audiences may also heighten concerns about accuracy and therefore foster overcautious performance execution. According to their findings, audience support increases pressure to avoid failure instead of striving for success. In line with these findings, Dohmen (2008) showed that football players perform worse when taking penalties in front of their home crowd. Similarly, Harb-Wu and Krumer (2019) found that elite biathletes had a higher rate of missed shots during competitions in their home country than when competing overseas. This effect is probably caused by the idea that performing at home raises public expectations.

All in all, the effect of audience support on performers is a complex matter. There is evidence that indicates that supportive audiences can have asymmetric effects on performance. An audiences increased expectations can heighten the perceived psychological pressure (Baumeister, 1984). This may have a negative effect on concentration-dependent tasks, while enhancing performance for effort-dependent tasks (Goldman & Rao, 2012). Future research should therefore aim to examine under which conditions and for which individual characteristics evaluative audiences shift from a motivational to detrimental effect.

2.3.2.2 Monetary Incentives

To encourage peak performance, financial incentives are often used in professional sports and in organizational contexts. This can result in more positive performance outcomes. However, it has been controversially discussed that financial incentives can also increase the likelihood of choking.

The incentive theory proposes that greater rewards result in greater effort and improved performance (Dohmen, 2008). This concept aligns with findings from labor economics. According to Paarsch and Shearer (1999) and Lazear (2000), the shift from fixed wages to performance-based compensation resulted in substantial productivity gains. This was especially the case for simple and effort-dependent tasks. However, it is worth noting that these studies focused on workplace settings and not on athletic environments. Performance outcome in those workplace settings is normally less influenced by acute psychological pressure.

Findings from professional football reveal a more practical distinction. High financial stakes alone do not appear to lead to choking among experienced players (Dohmen, 2008). Instead, performance declines are more often linked to social pressure, for instance through expectations of the home audience. It is therefore likely not primarily monetary incentives, but social evaluation that serves as the decisive source of performance pressure.

2.3.2.3 Level of Professionalism

Another potential choking moderator is an athlete's level of skill or professionalism. Teeselink et al. (2020) analyzed performance patterns in youth, amateur, and professional darts players. The results of the analysis showed that only the first two groups had notable performance declines in decisive moments, whereas professional players appeared to be far less affected. This pattern suggests that the ability to cope with pressure can be strengthened through systematic training and gained experience.

Still, a potential selection bias cannot be ruled out. Athletes that are able to perform reliably under pressure are more likely to reach the professional level. Those who struggle in high-stakes environments often drop out earlier on their career path. Consistent with this idea, Deutscher et al. (2018) reported that professional darts players maintained their performance even in critical situations. Toma (2017) found no significant difference between college and professional basketball players. He noted, however, that college players who later go professional showed higher choking rates. This observation can possibly be explained by heightened expectations in decisive moments, for instance through coaches or scouts. Hill et al. (2010) emphasize that the susceptibility to choking depends not only on the performer's skill level, but also on the nature of the task.

Overall, the professional status or a performer's experience seems to raise the level at which pressure leads to choking. When it does occur, however, the performance drop may even be stronger.

2.3.2.4 High Public Visibility

Increased visibility increases the extent to which athletes are exposed to social evaluation and public scrutiny. Athletes who attract high public attention, such as internationally recognized players, have to deal with higher expectations from fans and the media. This mechanism is closely linked to the factor public status, which represents an individual's level of recognition and the according expectations.

Jordet (2009a) found that internationally decorated players were more likely to miss penalties than those with a lower public status. Jordet (2009b) argues that the performance decline likely results from added performance pressure, which manifests in escapist self-regulatory behaviors. Similarly, Baumeister et al. (1985) showed that heightened public expectations and the expectation of success increase the perceived pressure and reduce performance.

The mechanism of high public visibility, however, is not limited to an athlete's public status. It also connects to the discussed findings on audience size. Even though the evidence remains mixed, research shows that the presence of larger audiences can heighten self-awareness and fear of failure (Dohmen, 2008; Cao et al., 2011; Böheim et al., 2019). However, this mechanism is not only relevant for physical audiences. Media coverage of sport has grown enormously over the past decades (Pilar et al., 2019). This is driven by the growing commercialization of sport and the rise of social media. The increased media exposure has made athletes more visible than ever in history. This development can have both positive and negative consequences. While it can amplify visibility and success, it can also intensify public pressure (Jarvie, 2013). Research on factors that lead to high public visibility suggests that heightened exposure consistently enhances evaluation pressure. The effects, however, depend on the context.

2.3.3 Individual Moderators

Finally, individual moderators refer to stable or experience-based characteristics of the performer that have an influence on how pressure is managed internally. This includes moderators such as gender, age, or level of professionalism.

2.3.3.1 Age and Level of Experience

Research suggests that older athletes may have more difficulties with high-stress situations, partly because task-relevant cognitive abilities tend to decline with age (Bäckman & Molander, 1986). Fried and Tauer (2011) reported a similar pattern, describing a U-shaped relationship between age and performance under pressure. According to their interpretation, growing experience initially enhances resilience. From a certain point on, however, the negative effects of aging become more significant than its benefits. This leads to a decline in the ability to cope with pressure.

Building on the premise that skill level influences performance outcomes (McGarry and Franks, 2000), Jordet et al. (2007) proposed that success under pressure depends more on task-specific experience than on age alone. Their results showed no clear link between age and success, indicating that chronological age alone is not a reliable predictor of performance declines under pressure.

Overall, age appears to affect performance under pressure only when accompanied by certain types of experience. It is suggested that the benefits of age depend on how much task-specific experience is present. General experience appears to have less of an importance.

2.3.3.2 *Region of Origin*

The existing theory suggests that a player's region of origin may influence the likelihood of performance declines through various differing mechanisms. Hill et al. (2010) argue that the concept of *stereotype threat* helps to explain how the region of origin might influence performance under pressure. The idea is that belonging to a certain social or cultural group associated with specific stereotypes can shape how individuals experience and deal with pressure (Stone et al., 1999). Also, the cultural context can determine how pressure is perceived and internalized. In cultures that attach great importance to success and see failure as something negative, athletes often cultivate a more intense fear of failure (Yoon et al., 2021). Over time, this can lead to perfectionism and ultimately heighten their vulnerability to choking. Jordet (2009a) proposes a related but slightly different mechanism. He suggests that national public status, rather than cultural orientation itself, increases the social expectations and thereby intensifies pressure.

Taken together, existing evidence suggests that the region of origin shapes how athletes experience pressure. Not through geography in general but through the cultural and social narratives that determine how success and failure are perceived (Stone et al., 1999).

2.3.3.3 *Gender*

The results from research on gender as a potential moderator are mixed. Shurchkov (2012) found that women underperformed compared to men in high-pressure math tasks, while Jetter and Walker (2015) found no gender difference in similarly challenging situations. On the other hand, Paserman (2023) demonstrated that men's performance declines at least as much as women's during decisive moments

in tennis. Toma (2017) also did not observe any systematic gender differences in basketball free throws and suggested that earlier findings may have been influenced by selection effects, as male-dominated environments tend to filter out individuals that are prone to choking more consequently. Finally, Cohen-Zada et al. (2017) reported stronger performance drops for men, which they attributed to faster cortisol responses.

The results suggest that gender cannot be considered a reliable predictor for choking. The findings vary by sport, type of task, and context, indicating that other moderators are likely to outweigh gender-related effects.

As outlined in the beginning of this chapter, the literature identifies a wide range of potential moderators for choking under pressure and not all could be addressed within the scope of this chapter. Further potential moderators may include self-consciousness, dispositional reinvestment, trait anxiety or coping style (Hill et al., 2010). Additionally, the outlined internal sources of performance pressure (*Chapter 2.1.2*) can act as choking moderators as well. The discussion of the moderators shows that it is usually not one single factor that leads to choking. Often it is a combination of situational, contextual, and individual conditions. Also, the type of the task plays a crucial role. That is why it is difficult, if not impossible, to assess whether choking will occur based on looking at an isolated factor. It makes it possible, however, to assess the influence of a particular factor on the probability of choking occurring.

2.4 Coping Theories to Avoid Choking

The preceding chapters discussed the mechanisms of paradoxical performance effects, as well as moderators that influence the occurrence of the concept. One purpose for better understanding those mechanisms and moderators is to then develop appropriate measures that counteract the occurrence of paradoxical performance effects. Based on the two dominating theories that explain the occurrence of choking, Gröpel and Mesagno (2017) categorize coping interventions into distraction- and self-focused-based interventions. Distraction-based interventions are designed to reduce both internal and external distractions so that an individual can focus on cues that are relevant to the task, whereas self-focus-based interventions focus on preventing the reinvestment of explicit knowledge. In addition to those categories, Mesagno et al. (2015) define acclimatization interventions. This intervention category focuses less on the effect of pressure and more on the experience with it. This is reflected in training

that leads to pressure situations not being perceived as such anymore. In line with the theoretical foundations, this chapter is structured into those three main categories of coping interventions. The categorization also follows the two dominant theoretical explanations of choking as outlined in Chapter 2.2.2, which are distraction and self-focus theories. First, self-focus-based interventions are outlined. They aim to prevent the underlying mechanism, which is the reinvestment of explicit knowledge during performance (Beilock & Carr, 2001). Second, distraction-based interventions are discussed. They target the reduction of both internal and external distractions to keep focus on task-relevant cues (Eysenck & Calvo, 1992; Wine, 1971). Third, acclimatization and emotion regulation approaches are discussed. These coping approaches are less about reducing attentional effects of pressure and more about becoming familiar with pressure situations (Oudejans & Pijpers, 2009, Mesagno et al., 2015).

2.4.1 Self-Focus-Based Interventions

As outlined in the introduction to this chapter, self-focus-based interventions aim to prevent the performer from consciously monitoring and controlling automated skills during task performance. The most established self-focus-based intervention strategy is the earlier introduced implicit learning. Hill et al. (2009) emphasize implicit and *analogy learning* as the most effective strategies identified at the time. As discussed in Chapter 2.2.2.2, implicit learning is defined as the acquisition of motor skills without accumulating explicit, verbalizable rules that describe how the specific movement should be executed (Masters, 1992). In contrast, explicit learning involves rule-based instructions that can be consciously articulated and recalled during the performance of a task (Gröpel & Mesagno, 2017).

The theoretical rationale for implicit learning is based on the reinvestment theory (Masters, 2000). According to this theory, performers under pressure often attempt to consciously control movements that would normally be executed automatically. This overloads working memory and impairs performance (Beilock & Carr, 2001). By minimizing the amount of explicit knowledge that is gained during learning, implicit methods reduce the possibility of conscious reinvestment and therefore the likelihood of choking. In other words, when the performer of a task requires little explicit knowledge to recall, the negative effect of self-focus cannot occur. One specific approach to achieve the acquisition of implicit knowledge is analogy learning. Here, complex technical rules are replaced with a single metaphorical instruction (Liao & Masters, 2001). For instance, instead of instructing a table tennis player

to adjust the angle, rotate the wrist and brush the ball upwards, coaches may simply use an analogy such as “swing the racket as if drawing a right-angled triangle” (Liao & Masters, 2001). This image gives a sense of the movement without generating multiple explicit rules. Besides analogy learning, several other approaches have been used to promote implicit skill acquisition. One common method is *dual-task training*, in which a performer completes a second activity at the same time, so it occupies the working memory and therefore reduces the chance of explicit rule formation (Masters, 1992). Finally, adopting an *external focus of attention* has consistently been shown to increase performance stability (Wulf et al., 2001). Here, athletes concentrate on what the movement produces (e.g. the flight of the ball) instead of how their body moves. Although dual-task training and an external focus of attention are discussed here within the context of implicit learning, their underlying mechanisms also share characteristics of distraction-based approaches. Both approaches reduce the availability of working memory for conscious movement control by occupying working memory capacity with external cues. Many empirical studies have shown proof for the positive effects that implicit learning has on task performance under challenging conditions. Masters (1992) trained novice golfers both explicitly with technical instructions, and implicitly by instructing them to perform a simultaneous second task during practice. The explicit group’s performance declined under pressure, while the implicit group maintained their performance or even improved it. Similar effects were shown by Liao and Masters (2001) in table tennis, Lam et al. (2009) in basketball free throws, and Maxwell et al. (2001) in golf putting.

Despite strong evidence, the results are not consistent. Some studies report no clear advantage of implicit learning methods. For instance, Bobrownicki et al. (2015) found no significant differences in high jump performance between athletes that were trained through analogy and those that were trained explicitly. Zhu et al. (2011), reported that implicitly trained golfers were more accurate than their explicitly trained counterparts, although the difference was not moderated by pressure. Overall, reviews emphasize that while implicit learning often improves resilience under pressure, the results are not consistent and the effectiveness depends on the context and the type of task (Gröpel & Mesagno, 2017). While implicit learning has been the most extensively studied self-focus-based intervention, other approaches have similarly shown potential in reducing explicit reinvestment. *Quiet Eye Training* encourages the performer to keep a stable fixation of the gaze on a critical target area just before the

movement is started (Vickers, 2007). The purpose of this approach is to stabilize the visual attention on cues that are relevant for the task. For example, maintaining a steady focus on the rim when shooting a free throw in basketball or on the target when taking a penalty kick in football. Research shows that athletes who undergo Quiet Eye Training perform more accurately under pressure in comparison to technically trained athletes (Vine et al., 2011; Lebeau et al., 2016; Causer et al., 2011). Like some of the implicit learning approaches, the underlying mechanisms of Quiet Eye Training also reflect principles of distraction-based interventions. Other self-focus-based intervention approaches include *process goal training* and *neurofeedback training* (Gröpel & Mesagno, 2017). However, these methods will not be discussed in further detail, as the chapter focuses on the most established and widely applied approaches. Self-focused-based interventions such as implicit learning approaches or Quiet Eye Training can be effective strategies to reduce the risk of choking under pressure that are applied not during performance but during practice.

2.4.2 Distraction-Based Interventions

Distraction-based intervention approaches are grounded in the assumption that paradoxical performance effects occur because task-irrelevant thoughts consume critical resources of a performer's working memory. This cognitive overload subsequently results in performance decrement (see distraction theories in Chapter 2.2.2.2.1). Distraction-based intervention approaches therefore aim to help performers to filter out worries and other stimuli that are not relevant for task execution. The following intervention approaches aim to fill a space in the working memory, which would be susceptible to task-irrelevant thoughts, by introducing a controlled distraction (Eysenck & Calvo, 1992). In other words, one tries to avoid that there is cognitive capacity available that could otherwise be used for harmful thoughts.

In their systematic review of choking interventions in sport, Gröpel and Mesagno (2017) identified *Pre-Performance Routines (PPRs)* as the dominant distraction-based intervention approach. Across the analyzed studies, PPRs include five recurring components: “relaxing, mental imagery, cue words, external focus, and temporal consistency.” (Gröpel & Mesagno, 2017, p.189).

They consist of systematic, task-relevant thoughts and actions that athletes perform before they execute a skill (Rupprecht et al., 2021). The primary purpose of a PPR is to direct attention onto the

routine itself and therefore binding cognitive capacity that might otherwise be used for harmful or task-irrelevant thoughts. PPRs have consistently been showing a positive effect on performance, with evidence across different sports (Mesagno et al., 2008; Cotterill, 2010; Rupperecht et al., 2021). While not all studies report significant performance improvements, none have demonstrated a decline in performance (Gröpel & Mesagno, 2017).

Several other distraction-based interventions have been researched as independent approaches, that may also be interpreted as components within a PPR. One is the *left-hand contraction*, which involves a squeeze of the left hand before performance. This activates right-hemispheric motor processes to avoid verbal-analytic control. It also reduces self-monitoring in pressure situations. Current research shows that choking can be effectively prevented through this technique (Beckmann et al., 2013).

Another simple but effective strategy is *listening to self-selected music* before entering the performance situation. Doing so can regulate arousal levels and steer attention away from anxiety-related thoughts. Studies have shown that music can improve focus and emotional readiness in high-pressure situations (Pates et al., 2003; Karageorghis & Priest, 2012). Similarly, *structured self-talk* allows performers to use task-relevant or motivational phrases to steer their attention and avoid negative inner dialogue. This technique has been found to maintain performance stability in pressure situations (Theodorakis et al., 2000; Hatzigeorgiadis et al., 2011). All discussed approaches, despite differences in their form, share the common mechanism of protecting working memory from interference.

2.4.3 Acclimatization and Emotion Regulation Approaches

The discussed coping theories focused on re-directing or blocking attention during task performance. Beyond the two categories, researchers have defined additional approaches that do not directly fit the distraction or self-focus strategies. Acclimatization interventions (Gröpel & Mesagno, 2017) and emotion regulation have emerged as categories. Strategies within these categories aim to reduce the probability of choking. Instead of trying to reduce the immediate attentional or self-conscious effects of pressure, however, these approaches focus on changing the performer's experience and response to performance pressure itself.

Acclimatization to pressure involves systemically exposing performers to pressure in practice situations so they become familiar to it over time (Beseler et al., 2016). For example, this can be

practiced through *simulated competition scenarios* (Gould et al., 1993; Pensgaard & Ursin, 1998), *repeated exposure to stressors* (Anshel & Delany, 2001; Holt & Hogg, 2002), or *training under unexpected events* (Dugdale et al., 2002). These training methods are grounded in stress inoculation theory (Meichenbaum, 2007), which suggests that it helps to build psychological resilience when exposure to challenging situations is increased gradually.

Several studies have tested acclimatization interventions in sport. Oudejans and Pijpers (2009) found that basketball players who practice under evaluative conditions (being observed, timed, and evaluated) maintained better shooting accuracy than those players who trained in low anxiety induced settings. The findings suggest that practice under conditions with induced anxiety can prevent choking under pressure in perceptual-motor performance for experts. The explanation is that one becomes used to situations where anxiety is perceived. In a longitudinal study, Bell et al. (2013) demonstrated the effectiveness of pressure acclimatization training by repeatedly exposing elite youth cricket players to punishment during training. This approach helped players to improve their adaption to high-pressure situations. According to a review by Low et al. (2021) of 14 studies in different sports and other fields, training under simulated pressure improved the real-world performance among individuals with different levels of experience.

Combined, these results indicate that regular integration of pressure into training can strengthen an athlete's resilience and help maintain the regular performance level in stressful situations. This conclusion is supported by the meta-analytic evidence that indicates that acclimatization functions as an effective training approach for minimizing choking under pressure in multiple domains (Low et al., 2021).

Acclimatization approaches aim to improve performance by getting an individual feel used to the pressure situation. In contrast, emotion regulation strategies focus on managing the emotional response to stress. According to the *transactional model of stress and coping* (Folkman & Lazarus, 1985), emotion regulation describes efforts to control or reduce stressful emotions and not to influence the stressful situation itself. Consequently, the focus is on dealing with the emotional response that the stressor provokes rather than on eliminating or reducing the stressor.

Based on these theoretical foundations, several studies have examined how athletes can regulate their emotions to maintain performance under pressure. *Reappraisal and reinterpretation* are among the approaches that have been studied very frequently. With this approach, the performer reinterprets emotions in such a way that arousal is seen as a challenge instead of a threat. The empirical evidence supports this approach. Brooks (2014) conducted a series of studies in the areas of public speaking, math performance, and karaoke singing. Examining these three areas, he found that viewing anxiety as excitement improved confidence, perceived control, and overall performance under pressure. Likewise, Jamieson et al. (2010) demonstrated a positive effect of cognitive reappraisal on performance under pressure in an academic context.

Mindfulness and acceptance-based approaches have gained increasing interest in the field of sport psychology. The goal of these approaches is to regulate the emotions of a performer by promoting neutral awareness of thoughts and feelings in the present moment (Wong et al., 2022). Baltzell and Akhtar (2014) found that female Division I athletes who completed a *Mindfulness Meditation Training for Sport (MMTS)* program, showed a significant increase in mindfulness. Under pressure, participants in the training group maintained stable levels of negative influence, whereas the control group reported a significant rise. Similar results were found in a recent study by Wang and Zhang (2025), who showed that eight weeks of mindfulness training significantly improved athletes' mindfulness, mental toughness, and ultimately free-throw performance under pressure.

The outlined coping interventions in this chapter were structured along the three categories self-focus-based interventions, distraction-based interventions and acclimatization and emotion regulation approaches. As already mentioned, the distinction between whether an intervention technique is self-focus or distraction-based is not always clear, as it may sometimes include elements of both (e.g. dual-task training). Hill et al. (2010) mention that at the time of their research only implicit and analogy learning were relevant interventions. This thesis argues that by now there are more proven coping approaches that take place on different levels. Some approaches, such as implicit and analogy learning fundamentally change how a skill is learned to make it more resistant to breakdown under pressure. Other approaches focus on suppressing the mechanisms that cause choking in the moment of performance. Finally, there are approaches that influence how an individual experiences and manages

performance pressure. These approaches show that there are levels of measures aimed at reducing the likelihood of choking under pressure.

2.5 The Use of Sport Psychology in Business Settings

The concept of paradoxical performance originated in the field of sport psychology. This chapter examines how knowledge from this area can help to explain and improve personal performance under pressure in organizational settings. The goal is to create a theoretical basis for applying concepts from sport psychology in business and management contexts, as this addresses the second part of the research question. First, the historical development of cross-domain transfer of sport psychology is outlined, followed by an overview of conceptual parallels between elite sport and organizational performance. The chapter aims to build the bridge between the theoretical foundations and the empirical analysis. It connects the concept of choking under pressure in sport with its potential implications for strategic management and organizational settings.

2.5.1 Historical Development and Cross-Domain Transfer of Sport Psychology

The idea of applying sport psychology insights to business originated in the 1970s and is linked to the work of Gallwey (1974). The coach and author released *The Inner Game of Tennis*, a book that presents the concept that mental factors play a role that is as significant in performance as physical ones (Gallwey, 1974). Gallwey's concept of the *inner game* changed how performance was understood. It shifted the focus of attention to the importance of mental processes, rather than just physical processes. These ideas were later applied to other types of sport and domains such as music (Green & Gallwey, 1986). Eventually it was extended to the corporate world with *The Inner Game of Work* (Gallwey, 2001). While others have made the transition from sports to the business domain, their involvement was mostly limited to motivational speaking, reinforcing the misconception that sport psychology primarily concerns motivation rather than coping and performance regulation (Ievleva & Terry, 2008).

In the following decades, the transfer of sport psychology knowledge into business settings was executed in a more structured way. Early work in this field focused on applying techniques that shared a clear conceptual overlap with sport psychology. This included fields like goal setting, team cohesion, leadership, or communication (Weinberg & McDermott, 2002). Jones (2002) pointed out that both sport

and business deal with similar challenges such as organizational effectiveness, stress management, leadership, high-performing teams, and 1-to-1 coaching.

By the early 2000s, ideas and concepts from sport psychology had become increasingly utilized in business consulting and leadership development. Loehr and Schwartz (2001) introduced the *corporate athlete framework*, which marked a significant milestone. The framework argues that enduring business success relies on the same balance of physical energy, emotional resilience, and mental recovery found in elite sports. Additional research, including that of Lloyd and Foster (2006) and Gordon (2007), demonstrated the successful application of mental skills training techniques in corporate settings. Over the last two decades, the application of sport psychology to business or organizational settings has developed into an own interdisciplinary field that is often referred to as performance psychology (Barker et al., 2016). This development from early applications to a structured discipline shows that the connection between sport and organizational performance is conceptually grounded.

2.5.2 Conceptual Parallels Between Sport and Organizational Performance

Both sport and organizational settings are characterized by goal-oriented behavior, high performance demands, and social interdependence (Gordon, 2007). The conceptual parallels between elite sport and organizational performance are based on the premise that individuals in both domains operate in high-performance environments and that there are similar psychological pressure and structural demands on individuals, teams, and leaders (Jones, 2002). After outlining the historical development in the previous section, this section will review the conceptual parallels between sport and organizational performance across three different levels: individual, team, and leadership. This structure was chosen to systematically categorize the psychological mechanisms discussed in the literature, as there is currently no consistent framework for structuring the various areas of conceptual overlaps.

2.5.2.1 Individual-Level

On the individual level, it is important for both athletes and professionals in business to maintain performance under pressure, manage stress, and recover efficiently. Jones (2002) recognizes stress as a key challenge in both areas, as pressure can negatively affect performance at any level and area. Studies focusing on professional athletes have shown that stressors go beyond competition, including insecurity

about contracts, public expectations, and conflicts within the team (Noblet & Gifford, 2002). These stressors can be linked to work-related stressors such as job insecurity or organizational change. In their *Corporate Athlete Model*, Loehr and Schwartz (2001) argue that consistent performance in business settings requires similar skills of energy management and recovery as in elite sport. Their *High-Performance Pyramid*, as can be seen in Figure 3, argues that physical, emotional, mental, and spiritual alignment is the foundation of consistent top-level performance. The framework illustrates that top performance results from balancing stress and recovery. This concept, the researchers argue, is central to both sport training and consistent performance in organizational settings.

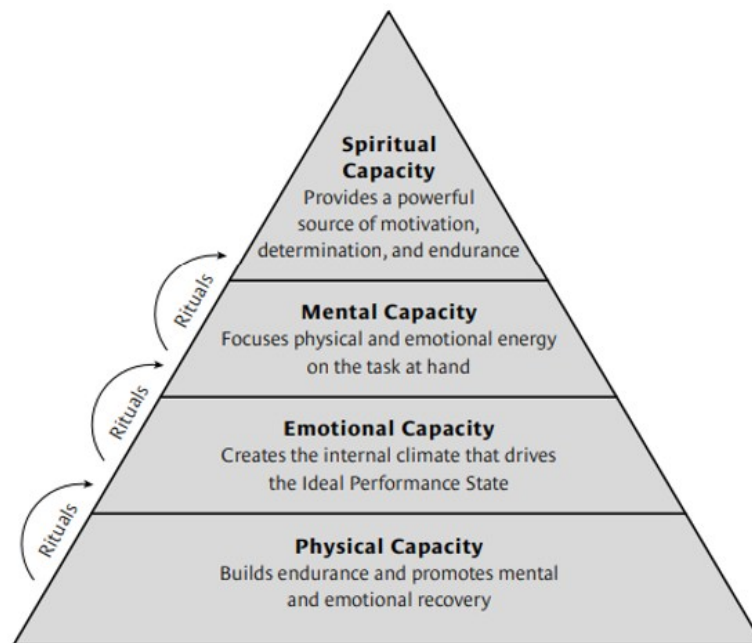


Figure 3: The High-Performance Pyramid by Loehr & Schwartz (2001)

From a psychological standpoint, approaches such as goal setting, imagery, self-talk, and attentional control have shown to enhance performance in both domains (Lloyd & Foster, 2006; Gordon, 2007). The mechanisms from these approaches can be easily transferred across domains, as they target universal cognitive and emotional processes like focus, confidence, and emotion regulation. These processes are equally relevant in sport and organizational settings.

2.5.2.2 Team-Level

At the team-level, sport and other domains show significant parallels, especially regarding team dynamics and performance. In both domains, team performance does not mainly depend on the

individual ability and talent, but on factors such as motivation, respect, responsibility, and communication (Jones, 2002). Among multiple factors, group cohesion has been shown to be a critical determinant for organizational effectiveness (Weinberg & McDermott, 2002). Team cohesion does not only have a significant moderate to large effect on performance (Carron et al., 2002) but also shows to have a positive impact on the bottom-line balance sheet results (Waterman, 1995). In this context, cohesion consists of two dimensions. Task cohesion describes a shared commitment towards common goals and social cohesion refers to attraction and friendship between team members (Carron et al., 2002). This implies that interventions for team development may aim at improving either one of those dimensions.

Jones (2002) developed the simple *create-unite-perform model*, providing a foundational framework for developing high-performing teams. The model defines three phases for effective teamwork. Create (clear roles, communication and shared goals), unite (collaboration based on trust and accountability), and perform (consistent results through creativity and adaptability).

Beyond cohesion, however, leadership and communication also stand out as crucial factors that are linked to organizational success in both domains (Weinberg & McDermott, 2002). Ultimately, team effectiveness in both settings appears to be driven by similar underlying mechanisms.

2.5.2.3 Leadership-Level

In both domains, leadership focuses on creating an environment that allows for optimal performance. Leaders in both sport and business, who are effective, demonstrate emotional intelligence, clear communication skills, and the ability to manage their own emotions and those of others during stressful situations (Gordon, 2007; Fletcher, 2011). According to Jones (2002), there are two distinct types of leadership. Transactional and transformational leadership. Transactional leadership uses control and reward mechanisms to maintain stability and ensure compliance with common goals. Transformational leadership relies on inspiring and developing followers through a shared vision, meaning, and purpose. The goal of the transformational leadership is to drive transformational change and collective performance. It enhances motivation, trust, and resilience, which are key psychological mechanisms that can also be found in successful athletic leadership (Bass, 1990).

Beyond this transformational perspective, coaching as a leadership skill represents another clear parallel between sport and organizational life. Gordon (2007) notes that effective coaches and executives share a common objective. They both try to enhance individual performance through giving feedback, setting goals, and regulating emotional states of individuals. Leadership in both domains, as with the previously discussed individual- and team-level parallels, is grounded in the same psychological mechanisms. In the end, a leaders role follows similar principles, regardless of the domain.

This chapter on the transferability between the two domains shows that sport psychology offers valuable insights for understanding and improving performance under pressure in organizational settings. This is the reason why it has progressed from anecdotal applications to a practice based on theory. There are clear parallels between these domains, such as stress regulation, cohesion, or motivation dynamics. Building on this conclusion, the following empirical part of the thesis aims to derive insights from elite sports and translate them into learnings for organizational settings.

3 Methodology and Data

This chapter builds on the ideas and theories that were discussed in the theoretical part of the thesis. It focuses on the analysis of a real-world example of paradoxical performance effects. The purpose of the analysis is to examine moderators that potentially have an effect on performance declines in high-pressure situations. To recall, the thesis addresses the following twofold research question:

1. What factors moderate choking under pressure?
2. How can these insights be applied to organizational settings?

The first dimension is the identification of moderators. The second dimension is their transferability to organizational contexts. While the first dimension is addressed through a quantitative analysis in this chapter, the second dimension will be outlined in the Discussion (Chapter 5). A quantitative research design was selected to empirically test the potential relationships among the variables. This chapter includes the methodological approach, the tested hypotheses, the sampling and data collection process, and the analytical methods that were used for testing the hypotheses.

3.1 Methodological Approach

I chose a quantitative, correlational, cross-sectional research design to identify statistical relationships between individual, situational, and contextual moderators and penalty performance. The aim of the analysis is to identify significant correlations that help to understand what factors have an influence on performance declines under pressure. Based on previous research and the discussed theoretical frameworks, I formulated nine hypotheses that investigate one potential moderator each. Some hypotheses re-examine moderators that have been researched in previous literature, such as the effect of audience size. Other hypotheses examine new variables that have not been analyzed in this context before, such as the influence of the historical temporal context. By combining established and understudied, potential new moderators, I try to contribute to a better understanding of performance under pressure. It is assumed that the relationships between the different variables can be quantified and statistically analyzed. Therefore, an objective and data-driven approach was chosen.

Quantitative methods were chosen as they allow for the testing of the hypothesized relationships in a systematic and comparable way across the extensive dataset. I use existing sports data since it aligns with the objective of this thesis. Sport offers a well-suited context for this type of research, as it can be viewed as a microcosm of society, reflecting structures and dynamics that are also found in organizations (Eitzen & Sage, 1997; Keidel, 1987). As discussed in Chapter 2.5, performance situations in sport are often like performance situations in organizations. Both involve pressure to perform in front of others. As Wolfe et al. (2005, p.185) describe, sport allows researchers “to observe accurately, measure, and compare variables of interest over time and to test hypotheses with highly motivated respondents in quasi-laboratory conditions”. The specific context of this analysis, the penalty shootout, represents this unique kind of natural experiment. It creates psychological pressure in a controlled and repeatable setting, where performance can be clearly measured, as the player either scores or misses the penalty. However, there are limitations that must be mentioned. The analysis only considers what can be observed. These are factors such as age, audience size, or the score situation. The players’ actual thoughts and feelings are not transparent. The research design is based on correlations. It does not demonstrate causation but rather indicates, if significant statistical patterns exist. This approach, despite

its limitations, provides a robust and realistic understanding of the ways in which different situational, contextual, and individual factors may influence performance under pressure.

In summary, this methodological approach employs quantitative methods and existing sports data to examine some of the theoretical assumptions related to choking under pressure. The following section describes the data collection process, sources, and structure of the dataset used for the empirical analysis.

3.2 Data Generation and Description

Since no freely accessible dataset with the necessary level of detail existed, a new cross-sectional dataset was created from various secondary data sources. As described in the methodological approach, the analysis is based on secondary data. Data on the penalty shootouts from the selected major international tournaments was collected from several archival sources. Based on availability, the data were obtained from the following sources:

- **World Cup data** was sourced from the official FIFA (Fédération Internationale de Football Association) Web Archive, which provides comprehensive information on all World Cup matches, including penalty shootouts.
- **European Championship data** was sourced from the official UEFA (Union of European Football Associations) website, which offers summaries of match data and tournament statistics.
- **Copa América data** was sourced from the Rec.Sport.Soccer Statistics Foundation (R.S.S.F), a non-profit, international online database that collects and archives soccer statistics from around the world.
- **Player- and club-related data**, such as birth dates, nationalities, or upcoming transfers, was sourced from *footballdatabase.eu*, an online football statistics database that provides

information about players, clubs, and competitions. Also, *transfermarkt.de*, another established online football database, was used for information on players and clubs.

- **Club coefficients** were gathered from UEFA's official website to classify players according to their club's international ranking.

The dataset includes all penalty shootouts that have taken place in the three competitions since the introduction of the penalty shootout. The first recorded shootout in one of the analyzed tournaments took place during the 1976 UEFA European Championship in former Yugoslavia. Penalty shootouts were introduced in 1982 for the FIFA World Cup and in 1989 for the Copa América.

The latest observations are from the latest UEFA European Championship and the latest Copa América, which took place in June and July of 2024. The timeline of the dataset therefore spans 48 years (1976-2024). UEFA club coefficients, determining the strength of a club based on their international success, have been calculated only since the 2004/2005 season. Therefore, this variable is available only for observations from that point onward and only for European clubs.

I only included shootouts from the mentioned three international tournaments. These tournaments represent a high and comparable level of competitive pressure. Club competitions like the UEFA Champions League or national competitions also produce penalty data but were not included because of different underlying mechanisms of the competition, which would make it harder to compare the results.

The final dataset includes 92 penalty shootouts. Across these 92 shootouts, a total of 886 penalties were taken, of which 652 were scored and 234 were missed.

The dataset includes both penalty-specific and player-specific information. The variables used in the analyses are described in detail in Table 1 in the following section. These are the dependent variable *penalty outcome* and the independent variables that are structured among the three categories situational, contextual, and individual moderators, as introduced earlier in this thesis. The variables that represent the situational potential moderators are *shooting order*, *score situation* and *tournament stage*. The contextual potential moderators are *audience size*, *club rank*, *historical period* and *upcoming transfer*. And finally, the individual potential moderators are *age* and *region of origin*. This

categorization of the moderators mirrors the structure introduced in Chapter 2.3. There was additional information, such as hosting city or the number of international appearances by each player, obtained during the data collection but ultimately not used for the empirical analysis.

To sum up, the dataset uses data from several reliable sources to create a cross-sectional sample of penalty shootouts from the three most prestigious international football tournaments. It gives a strong empirical basis for testing the hypotheses related to performance under pressure. The next chapter describes how the data were prepared and coded and what hypothesis were developed based on the theoretical foundations.

3.3 Data Collection and Analysis

The data were merged from the sources described in the previous section into a cross-sectional dataset comprising 886 individual penalty observations using Microsoft Excel. The dataset was then prepared in a suitable format for statistical analysis in Stata. Stata was chosen because of its intuitive usability for applying binary logistic regression. Finally, the data were manually cross-checked to ensure consistency.

Concerning missing values, the primary issue was the club rank. As already mentioned, this variable was only available for European clubs from the 2004/2005 season onwards. Additionally, only clubs that participate in a European club competition within the five years prior to the penalty are assigned a coefficient. Observations without a valid club rank were excluded from the specific analyses involving this variable (Hypothesis 5: Players from higher-ranked clubs are more likely to miss a penalty than players from lower-ranked clubs). This resulted in the use of 353 observations for the shooter's club rank. The dataset was checked for completeness and there were no further missing values in the remaining variables of the 886 observations.

To make potential patterns more interpretable, all variables were transformed to categorical levels. The statistical approach of the categorization was based on using the mean and a standard deviation on each side of the mean, as applied in previous studies (e.g. Jordet et al., 2007). This was applied to the variables age, audience size, historical period, and shooting order to allow for a more balanced group comparison. For the club rank, I used an equal distribution to avoid an overrepresentation of high ranking levels because the data were not normally distributed. A comparable procedure was applied for the variable shooting position. This approach ensures approximately equal

group sizes. The resulting thresholds and coding schemes can be seen in Table 1 below. The values to determine the thresholds were rounded to the nearest integer before categorization.

Type	Variables	Coding / Categories	Description
Dependent Variable	<i>penalty outcome</i>	0 = scored 1 = missed	Binary indicator of performance success under pressure.
Situational Moderators	<i>shooting order</i>	Early (Shot 1-3) Middle (Shot 4-6) End (Shot 7 upwards)	Represents the shot's position within the penalty sequence.
	<i>score situation</i>	Advantage Neutral Disadvantage	Derived from the goal difference before the penalty, indicating situational advantage, neutrality, or disadvantage.
	<i>tournament Stage</i>	Round of 16 Quarter-finals Semi-finals Third-place Final	Reflects the competition stage during which the penalty was taken.
Contextual Moderators	<i>audience size</i>	Low (<24,000) Medium (24,000-67,000) High (>67,000)	Reflects the number of spectators present in the stadium.
	<i>club rank</i>	Low (>50) Medium (11-50) High (≤8)	Represents the player's club strength based on the UEFA club coefficient rankings.
	<i>historical period</i>	Early (≤1993) Mid (1994-2018) Recent (≥2019)	Categorical variable capturing the historical context of the observation.
	<i>upcoming transfer</i>	0 = no upcoming transfer 1 = upcoming transfer	Indicates whether a player had an upcoming transfer in the same transfer window.
Individual Moderators	<i>age</i>	Young (≤23) Medium (23-30) Old (>30)	Categorical grouping of players' age to reflect experience levels.
	<i>region of origin</i>	East Asia & Pacific Europe & Central Asia Latin America & Caribbean Middle East & North Africa North America Sub-Saharan Africa	Coded by continent according to the World Bank regional classifications.

Table 1: Overview of variables

The empirical analysis aims to identify significant relationships between the potential moderators and the penalty outcome. Due to the nature of the dependent variable, which can only take two values (1 = missed; 0 = scored), the binary logistic regression model was chosen the method for data analysis, as it is a well-suited method for modelling binary outcomes. In this research context, it captures how the likelihood of missing a penalty changes, depending on the moderators presented above. The model estimates the relationship between these independent variables (X_i) and the logit of the probability of failure ($P(\text{missed})$). The logit function is the natural logarithm of the odds and it ensures that the predicted probabilities lie between 0 and 1. The general form of the model can be expressed as shown below:

$$\ln\left(\frac{P(\text{missed})}{1-P(\text{missed})}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$

Isolated logistic regression models were calculated for each hypothesis to find the specific impacts of the potential moderators. This prevents multicollinearity between constructs that are theoretically similar and makes it easier to understand each effect. The logit function in Stata was used to estimate the models, with robust standard errors to account for heteroskedasticity. Statistical significance was tested at the 5% level ($p < 0.05$). The coefficients are interpreted in terms of odds ratios.

The sub-section below converts the theoretical assumptions into a set of testable hypotheses. All hypotheses originate from the theoretical foundations outlined in Chapter 2, specifically from the discussions on attentional and drive theories, as well as the discussed moderators (Baumeister, 1984; Beilock & Carr, 2001; Hill et al., 2010). The hypotheses aim to test how different individual, situational, and contextual moderators affect penalty performance under pressure.

Hypotheses including situational moderators

Effect of shooting order on penalty outcome

Hypothesis 1: A later shooting position increases the likelihood of a missing a penalty.

Variables	Level of measurement	Characteristic	Statistical Method

Independent: <i>shooting order</i>	ordinal	categorical	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 2: Variable overview - "shooting order" and "penalty outcome"

Existing research indicates that psychological pressure adds up with the progressing shooting sequence. It has been shown that later performers must handle an increasing outcome relevance and must cope with this additional stress (Apesteguia & Palacios-Huerta, 2010; Vandebroek et al., 2018). With this hypothesis, I assume that a later shooting position increases the fear of failure and therefore the likelihood of missing a penalty.

Effect of score situation on penalty outcome

Hypothesis 2: Players are more likely to miss a penalty when their team is behind on score.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>score situation</i>	ordinal	categorical	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 3: Variable overview - "score situation" and "penalty outcome"

The second hypothesis is based on findings that show that performance pressure rises when the score is close and the importance of each action increases. Studies in basketball demonstrate that players are more likely to miss towards the end of the game when their teams are trailing or leading by small margins (Cao et al., 2011). One explanation is that every later attempt has higher consequences for the final result (Worthy et al., 2009; Toma, 2017). Trailing on score may increase the perceived urgency to perform well and therefore also the fear of failure.

Effect of tournament stage on penalty outcome

Hypothesis 3: Later tournament stages increase the likelihood of missing a penalty.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>tournament stage</i>	ordinal	categorical	binary logistic regression

Dependent: <i>penalty outcome</i>	nominal	binary	
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Table 4: Variable overview - "tournament stage" and "penalty outcome"

The relationship between these variables is based on the idea that perceived pressure intensifies when the temporal proximity toward the decisive outcome increases. Studies across different sports show that a performance decline is more likely in critical game phases, when an athlete's action has higher consequences for the final result (Worthy et al., 2009; Cao et al., 2011; Toma, 2017). It is the same assumption as for Hypothesis 1 but focused on the tournament level and not the individual match level.

Hypotheses including contextual moderators

Effect of audience size on penalty outcome

Hypothesis 4: A larger audience size increases the likelihood of missing a penalty.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>audience size</i>	ordinal	categorical	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 5: Variable overview - "audience size" and "penalty outcome"

Existing research suggests that larger audiences increase evaluation pressure and impairs performance. Studies in basketball demonstrate that the success rates decline as audience size grows (Cao et al., 2011; Böheim et al., 2019). However, some studies also find no significant relationship between audience size and performance (Dohmen, 2008). The mixed results highlight the need to re-examine this relationship with new data.

Effect of club rank on penalty outcome

Hypothesis 5: Players from higher-ranked clubs are more likely to miss a penalty than players from lower-ranked clubs.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>club rank</i>	ordinal	categorical	

Dependent: <i>penalty outcome</i>	nominal	binary	binary logistic regression
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Table 6: Variable overview - "club rank" and "penalty outcome"

Earlier research by Jordet (2009a) suggests that internationally decorated players are more likely to miss a penalty than those that are not. Public status increases performance pressure and therefore leads to behavior that is harmful for performance (Jordet 2009b). It seems plausible that players who play for a club with a high club rank have a higher status, which leads to higher expectations and ultimately a higher probability to miss a penalty.

Effect of historical period on penalty outcome

Hypothesis 6: Penalty missing rates are higher in recent periods compared to earlier ones.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>historical period</i>	ordinal	categorical	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 7: Variable overview - "historical period" and "penalty outcome"

Evidence shows that the coverage of sports in the media has expanded significantly over the last decades (Pilar et al., 2019). Reasons for this are the commercialization of many sports and the rise of social media. It is assumed that this attention intensifies the evaluative pressure (Jarvie, 2013) and therefore fear of failure. It seems plausible that the miss rates are higher in more recent periods because media attention and visibility on the internet is much higher than in earlier periods.

Effect of upcoming transfer on penalty outcome

Hypothesis 7: An upcoming transfer increases the likelihood of missing a penalty.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>upcoming transfer</i>	nominal	binary	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 8: Variable overview - "upcoming transfer" and "penalty outcome"

The hypothesis is based on similar mechanisms as discussed for Hypothesis 6 (Effect of historical period on penalty outcome). In both cases, increased media attention is assumed to heighten public visibility and evaluative pressure (Jarvie, 2013). This heightens self-awareness and fear of failure (Baumeister, 1984). Players that face an upcoming transfer may be more likely to experience psychological pressure, because they are more present in the media due to their transfer and might face heightened expectations from fans of the new club.

Hypotheses including individual moderators

Effect of age on penalty outcome

Hypothesis 8: Younger players are more likely to miss a penalty than older players.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>age</i>	ordinal	categorical	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 9: Variable overview - "age" and "penalty outcome"

Earlier research indicates that both age and experience influence how athletes cope with performance pressure. While experience initially strengthens resilience and self-regulation, age-related cognitive decline may reduce these benefits over time (Bäckman & Molander, 1986; Fried & Tauer, 2011). Accordingly, performance under pressure improves with age and experience, but only up to a certain point. It is therefore assumed that younger players lack task-specific experience and are more likely to miss a penalty.

Effect of region of origin on penalty outcome

Hypothesis 9: The shooter's region of origin influences penalty missing rate.

Variables	Level of measurement	Characteristic	Statistical Method
Independent: <i>Region of Origin</i>	nominal	categorical	binary logistic regression
Dependent: <i>penalty outcome</i>	nominal	binary	

Table 10: Variable overview - "region of origin" and "penalty outcome"

The hypothesis is based on the idea that regional or cultural contexts influence how athletes experience and manage pressure. The stereotype threat, for instance, suggests that belonging to a certain social or cultural group can influence performance when being evaluated (Stone et al., 1999; Hill et al., 2010). Additionally, cultural norms regarding success and failure can have an influence on how strongly individuals perceive the fear of failure (Yoon et al., 2021). While no direction is specified, the hypothesis assumes that the regional background has an impact on performance.

4 Results

Before testing the hypotheses, the following section gives an overview of the descriptive statistics of the tested variables.

Variable	N	%	Goal	Miss	Miss%
Shooting Order	886	100%	652	234	26.41%
Early	276	31,15%	212	64	23,19%
Mid	275	31,04%	209	66	24,00%
Late	335	37,81%	231	104	31,04%
Score Situation	886	100%	652	234	26.41%
Disadvantage	346	39,05%	251	95	27,46%
Neutral	437	49,32%	317	120	27,46%
Advantage	103	11,63%	84	19	18,45%
Tournament Stage	886	100%	652	234	26.41%
Round of 16	143	16,14%	97	46	32,17%
Quarter-finals	450	50,79%	325	125	27,78%
Semi-finals	178	20,09%	140	38	21,35%
Third-place	37	4,18%	33	4	10,81%
Final	78	8,80%	57	21	26,92%
Audience Size	886	100%	652	234	26.41%
Low	119	13,43%	93	26	21,85%
Medium	598	67,49%	439	159	26,59%
High	169	19,07%	120	49	28,99%
Club Rank	353	100%	245	109	30,88%
Low	115	32,58%	78	37	32,17%
Medium	115	32,58%	74	41	35,65%
High	123	34,84%	92	31	25,20%
Historical Period	886	100%	652	234	26.41%
Early	165	18,62%	137	28	16,97%
Mid	529	59,71%	384	145	27,41%
Recent	192	21,67%	131	61	31,77%
Upcoming Transfer	886	100%	652	234	26.41%
No	644	72,69%	470	174	27,02%
Yes	242	27,31%	182	60	24,79%
Age	886	100%	652	234	26.41%
Young	164	18,51%	125	39	23,78%
Medium	586	66,14%	418	168	28,67%
Old	136	15,35%	109	27	19,85%
Region of Origin	886	100%	652	234	26.41%
East Asia & Pacific	13	1,47%	9	4	30,77%
Europe & Central Asia	460	51,92%	337	123	26,74%
Latin America & Caribbean	394	44,47%	294	100	25,38%
Middle East & North Africa	4	0,45%	3	1	25,00%
North America	11	1,24%	7	4	36,36%
Sub-Saharan Africa	4	0,45%	2	2	50,00%

Table 11: Descriptive statistics for penalty outcome by variable

For each variable, Table 11 above shows the absolute number of observations, their distribution across the categories, the absolute number of scored and missed penalties, and finally the relative number of missed penalties. Following the descriptive part, the results of the data analysis will be discussed. For each hypothesis, the statistical findings from the binary logistic regression are reported. The interpretation of the results will take place in the Discussion (Chapter 5). The results from the analysis are structured according to the three categories situational, contextual, and individual moderators. For all hypotheses, binary logistic regression was applied.

4.1 Hypotheses Including Situational Moderators

As outlined in Chapter 2.3, the situational moderators describe the immediate conditions that shape performance pressure in a particular moment. The following section presents the results for the hypotheses addressing these situational factors (shooting order, score situation, tournament stage).

4.1.1 H1: Effect of Shooting Order on Penalty Performance

Hypothesis 1 examines the role of the shooting order in penalty shootouts. The assumption is that the psychological pressure increases towards the end of a shootout because the outcome becomes more decisive. Therefore, later shooting positions are expected to show higher missing rates. The *Early* category was used as the reference category.

The distribution of penalty kicks across the shooting phases was balanced with 31.2% of all attempts occurring *Early* (shots 1-3), 31.0% in the *Mid* phase (shots 4-6) and 37.8% in the *Late* phase of the shootout (shots 7 and later). The miss rate increased slightly from the *Early* phase (23.2%) to the *Mid* phase (24.0%). It increased even further to 31.0% in the *End* phase. These descriptive observations suggest that players may face increased psychological pressure in later stages of the shootout.

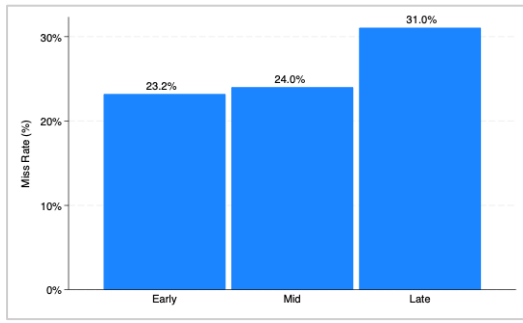


Figure 4: Miss rate by shooting order

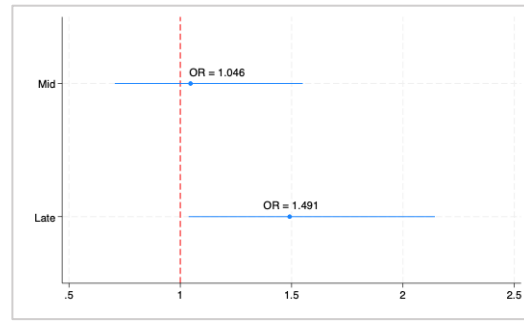


Figure 5: Odds ratios for penalty success by shooting order

The overall model approached statistical significance at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test ($LR \chi^2(2) = 5.93$, $p = 0.0515$). The model's explanatory power was not significant (Pseudo $R^2 = 0.0058$).

Compared to shooters from *Early*, players from *Mid* were slightly more likely to miss ($OR = 1.046$, $p = 0.822$). This effect was not statistically significant. Players from *End* showed moderately higher odds of missing ($OR = 1.491$, $p = 0.031$).

Therefore, Hypothesis 1 is partially supported. While the *Middle* phase was not significantly different than the *Early* phase, players in the *End* phase showed significantly higher odds of missing. This is consistent with the assumption that pressure increases in the decisive stage of a penalty shootout.

4.1.2 H2: Effect of Score Situation on Penalty Performance

Hypothesis 2 examines whether the score situation influences penalty performance, assuming that the pressure is highest when a team is disadvantaged (trailing) and lowest when they are leading. The *Neutral* score situation was used as the reference category.

Almost half of all penalties were taken under *Neutral* conditions (49.3%), followed by *Disadvantage* (39.1%) and *Advantage* (11.6%). The miss rate under *Disadvantage* (27.5%) and *Neutral* (27.5%) conditions was similar. It was clearly lower for *Advantage* (18.5%). This observation provides descriptive evidence that players perform better, when their team is leading, but it does not make a difference whether the team is trailing or the score is equal.

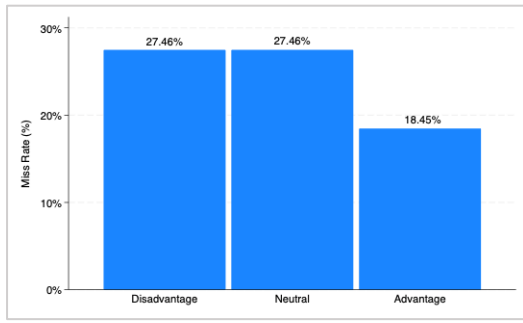


Figure 6: Miss rate by score situation

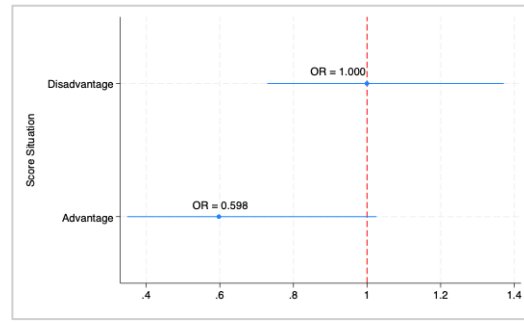


Figure 7: Odds ratios for penalty outcome by score situation

The overall model was not statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test ($LR \chi^2(2) = 4.06, p = 0.1311$). The explanatory power of the model was very limited (Pseudo $R^2 = 0.0040$). The results suggests that the score situation categories do not predict the penalty outcome significantly.

Looking at the odds ratios, players facing a *Disadvantage* were just as likely to miss a penalty compared to *Neutral* situations ($OR = 1.000, p = 0.999$). Players in *Advantage* situations show lower odds of missing ($OR = 0.598, p = 0.067$). The effects, however, were not statistically significant. Therefore, Hypothesis 2 is not supported. Although the descriptive trend suggests a better performance when leading, neither *Disadvantage* nor *Advantage* conditions had significant effects compared to the *Neutral* situation.

4.1.3 H3: Effect of Tournament Stage on Penalty Performance

Hypothesis 3 assumes that later tournament stages increase the likelihood of missing a penalty due to heightened pressure and higher stakes. The *Final* was used as the reference category.

Most penalties were taken in the *Quarter-finals* (50,8%), followed by the *Semi-finals* (20.1%), the *Round of 16* (16.1%) and the *Finals* (8.8%). The *Third-place* match had the smallest share (4.2%). The highest miss rate was observed in the *Round of 16* (32.2%), while the miss rate generally decreased until the *Semi-finals* (21.4%). The miss rate in the *Quarter-finals* was 27.8%. The lowest miss rate by far was found in the *Third-place* match (10.8%). The miss rate in the *Final* (26.9%) was lower than in the *Round of 16* but higher than in the *Semi-finals*. The descriptive pattern suggests that there is no linear relationship between the tournament stage and the perceived pressure.

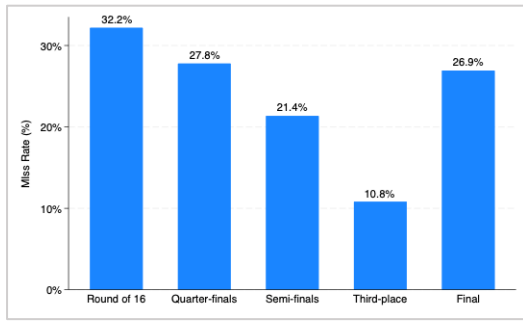


Figure 8: Miss rate by tournament stage

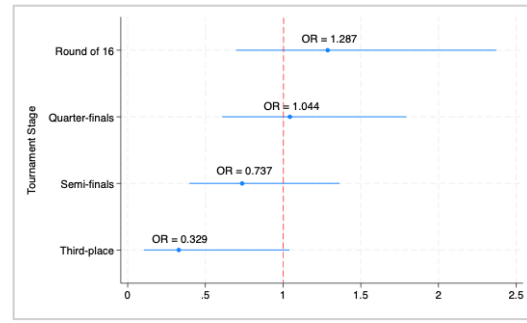


Figure 9: Odds ratios for penalty outcome by tournament stage

The overall model was statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test ($LR \chi^2(4) = 10.78, p = 0.0292$). The explanatory power of the model was modest (Pseudo $R^2 = 0.0105$).

Using the *Final* as the reference category, none of the earlier stages showed a significant effect on penalty performance. The odds of missing a penalty were 1.29 times higher in the *Round of 16* ($OR = 1.287, p = 0.418$) and 1.04 times higher in the *Quarter-finals* ($OR = 1.044, p = 0.876$). The *Semi-finals* ($OR = 0.737, p = 0.331$) and *Third-place* matches ($OR = 0.329, p = 0.059$), however, were associated with lower probabilities to miss.

Therefore, Hypothesis 3 is not supported. Although the overall model was significant, the results did not show a systematic increase in miss rates across later tournament stages.

4.2 Hypotheses Including Situational Moderators

As described earlier, contextual moderators are environmental influences that define how pressure is perceived and managed over time. The following section reports the results for the hypotheses related to the contextual dimension (audience size, club rank, historical period and upcoming transfer).

4.2.1 H4: Effect of Audience Size on Penalty Performance

Hypothesis 4 proposes that a larger audience size increases the likelihood of missing a penalty due to heightened evaluative pressure.

The audience size in the stadiums varied across the observed penalty shootouts. Most penalties were taken under *Medium* sized audience conditions (67.5%), followed by *High* (19.1%) and *Low* audience sizes (13.4%). The miss rate increased moderately with audience size. 21.9% of penalties were

missed under *Low* attendance, compared to 26.6% under *Medium* and 29.0% under *High* attendance. This suggests that larger crowds may put additional psychological pressure on players.

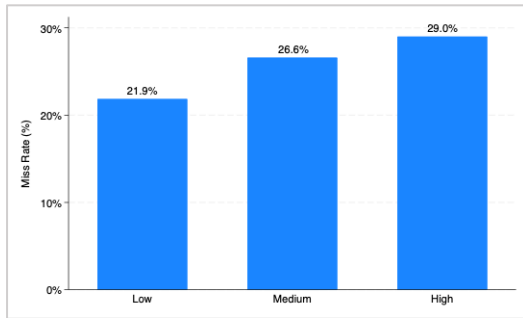


Figure 10: Miss rate by audience size

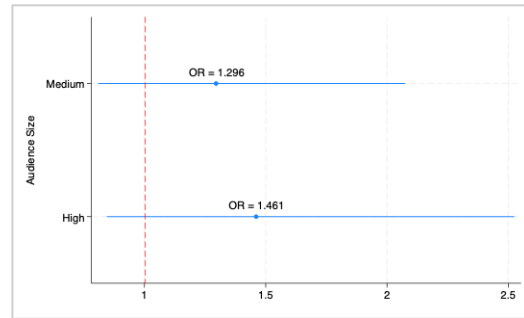


Figure 11: Odds ratios for penalty outcome by audience size

The overall model was not statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test (LR $\chi^2(2) = 1.91$, $p = 0.3857$). The model's explanatory power was very limited (Pseudo $R^2 = 0.0019$).

The odds ratios show a descriptive trend that is in line with the hypothesis. Compared to the *Low* reference category, the odds of missing a penalty increased by 29.6% for *Medium* attendance (OR = 1.296; $p = 0.281$) and by 46.1% for *High* attendance (OR = 1.461; $p = 0.175$). However, all observations were statistically not significant.

Therefore, Hypothesis 4 is not supported. While the descriptive trend was in line with the hypothesis, no differences across audience size categories were statistically significant.

4.2.2 H5: Effect of Club Rank on Penalty Performance

Hypothesis 5 examines whether the club rank influences penalty performance. The assumption is that players from higher-ranked clubs experience higher expectations and therefore show a higher probability of choking.

The subsample for which the club rank (UEFA club coefficient) data was available included 353 penalty observations. 123 penalties were taken by players from *High* ranked clubs (34.8%), 115 from *Medium* ranked clubs (32.6%) and 115 from *Low* ranked clubs (32.6%). The miss rate was the highest for players from *Medium* ranked clubs (35.7%), followed by players from *Low* ranked clubs (32.2%). *High* ranked clubs showed the lowest miss-rate with 25.2%. This suggests that players from

higher clubs perform more reliably under pressure, while medium-ranked clubs seem to be most vulnerable to choking.

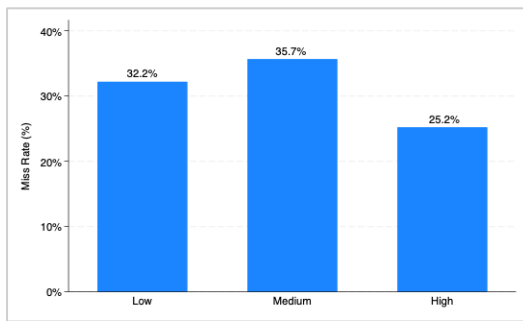


Figure 12: Miss rate by club rank

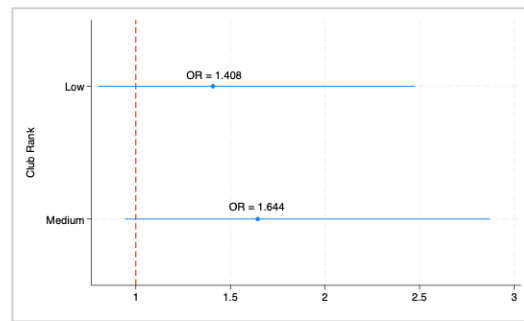


Figure 13: Odds ratios for penalty outcome by club rank

The overall model was not statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test ($LR \chi^2(2) = 3.21, p = 0.2005$). The explanatory power of the model was very limited (Pseudo $R^2 = 0.0074$). This suggests that the club rank does not significantly predict the penalty outcome.

Players from *Medium* ranked clubs had higher odds of missing a penalty ($OR = 1.644, p = 0.081$) than the reference group of players from *High* ranked clubs. The effect was not statistically significant. Players from *Low* ranked clubs also showed higher odds of missing ($OR = 1.408, p = 0.235$) compared to the reference category. Also, this effect was not statistically significant.

Consequently, Hypothesis 5 is not supported. In contrast to the assumption, players from high-ranked were least likely to miss a penalty. Players from medium-ranked clubs performed the worst of all three categories. However, none of the differences were statistically significant.

4.2.3 H6: Effect of Historical Period on Penalty Performance

Hypothesis 6 examines whether penalty performance has changed over time, assuming that players in more recent tournaments experience greater external pressure and expectations.

Penalties from the *Early* period make up 18.6%, *Mid* period 59.7%, and *Recent* period 21.7% of all observations. The descriptive analysis shows an increase in penalty miss rates over time. In the *Early* period, 17.0% of penalties were missed, compared to 27.4% in the *Mid* period and 31.8% in *Recent* tournaments. This trend indicates that players in recent tournaments are more likely to miss penalties, potentially due to higher public visibility and media attention in modern football.

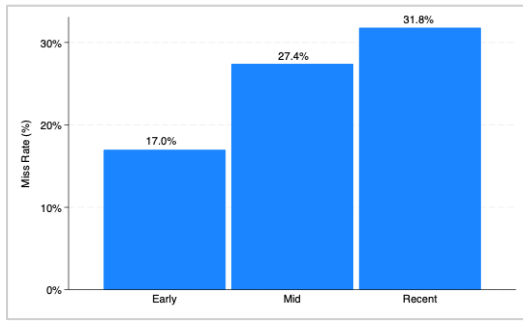


Figure 14: Miss rate by historical period

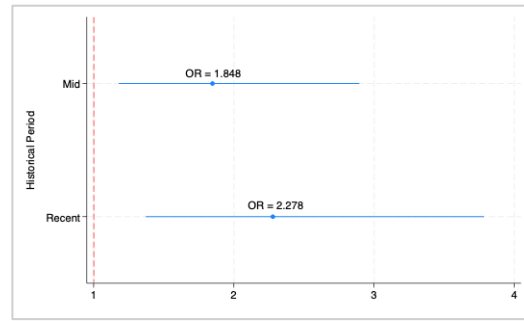


Figure 15: Odds ratios for penalty outcome by historical period

The overall model was statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test ($LR \chi^2(2) = 11.30, p = .0035$). The model explained a small but notable amount of variance (Pseudo $R^2 = 0.0110$).

Compared to the *Early* period reference category, the odds of missing were 1.85 times higher in the *Mid* period ($OR = 1.848; p = 0.007$) and 2.28 times higher in the *Recent* period ($OR = 2.278; p = 0.001$). Both effects were statistically significant, indicating an upward trend in penalty miss rates over time.

Therefore, Hypothesis 6 is supported. The analysis showed a significant increase in the odds of missing penalties over time, which indicates that players in more recent tournaments are more likely to miss than those in earlier tournaments.

4.2.4 H7: Effect of an Upcoming Transfer on Penalty Performance

Hypothesis 7 examines whether an upcoming transfer influences the penalty performance. It is assumed that an upcoming transfer leads to increased media attention, a higher public visibility, and ultimately to higher pressure.

Most of the penalties were taken by players without an *Upcoming Transfer* (72.7%). 27.3% of the attempts were taken by players with a transfer pending in the current transfer period. The miss rate was slightly lower for players with an *Upcoming Transfer* (24.8%) compared to those without (27.0%). This suggests that an upcoming transfer does not lead to a higher likelihood of missing a penalty and may even lead to a slightly better performance.

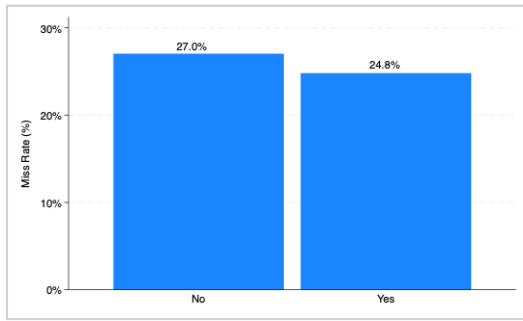


Figure 16: Miss rate by upcoming transfer

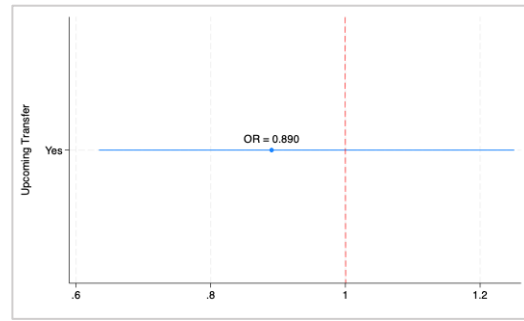


Figure 17: Odds ratios for penalty outcome by upcoming transfer

The overall model was not statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test (LR $\chi^2(1) = 0.45$, $p = 0.5014$). The explanatory power of the model was very limited (Pseudo $R^2 = 0.0004$). This suggests that the transfer status does not significantly predict the penalty outcome.

Using the group with *No* upcoming transfer as the reference category, the odds of missing a penalty were slightly lower for players with an upcoming transfer (OR = 0.890, $p = 0.503$). However, this effect was not statistically significant.

Therefore, Hypothesis 7 is not supported. The transfer status had no significant effect on penalty performance. Descriptively, players with an upcoming transfer even showed slightly lower miss rates, which points into the opposite direction of the hypothesis.

4.3 Hypotheses Including Individual Moderators

Finally, the individual moderators are personal and experience-based characteristics that determine how pressure is managed internally. The following section reports the results for the hypotheses that are focused on those individual factors (age and region of origin)

4.3.1 H8: Effect of age on penalty performance

Hypothesis 8 suggests that younger players are more likely to miss a penalty than older players.

Most penalties were taken by players in the *Medium* age group, making up 66.1% of all observations. The *Young* age group accounts for 18.5% of all observations, followed by the *Old* age group with 15.4%. The highest miss rate was among *Medium* aged players (28.7%), followed by *Young* players (23.8%) and *Old* players (19.9%).

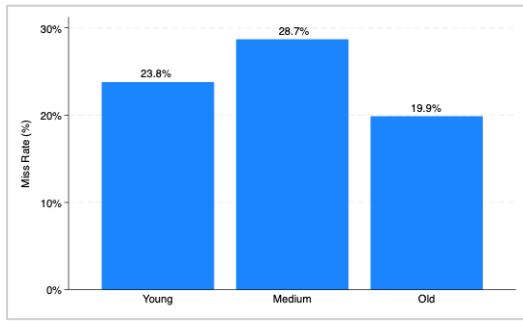


Figure 18: Miss rate by age

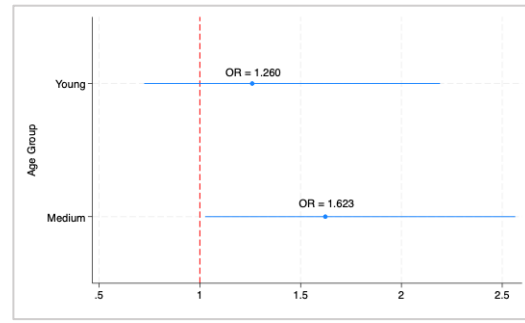


Figure 19: Odds ratios for penalty miss by age

The overall model was not statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test (LR $\chi^2(2) = 5.30$, $p = 0.0705$). The model's explanatory power was very limited (Pseudo $R = 0.0052$).

Although the overall model was not statistically significant, the analysis showed a significant difference between the *Medium* and *Old* age categories. Players in the *Medium* age group had 62.3% higher odds of missing a penalty (OR = 1.623, $p = 0.038$) compared to the *Old* reference group. Players in the *Young* age group had 26% higher odds of missing (OR = 1.260, $p = 0.414$). However, this result was not significant.

Therefore, Hypothesis 8 is not supported. No higher miss rates among *Young* players were observed. Instead, actually the *Medium* aged players showed significantly higher odds of missing compared to older players.

4.3.2 H9: Effect of Region of Origin on Penalty Performance

Hypothesis 9 examines whether the shooter's region of origin influences penalty performance. Most penalties were taken by players from *Europe & Central Asia* ($N = 460$; 51.9%) and *Latin America & Caribbean* ($N = 394$; 44.5%). This reflects the nature of the observed tournaments (European Championship and Copa América). The other regions *East Asia & Pacific* ($N = 13$; 1.5%), *North America* ($N = 11$; 1.2%), *Middle East & North Africa* ($N = 4$; 0.5%) and *Sub-Saharan Africa* ($N = 4$; 0.5%) only accounted for a small proportion of the sample.

The highest miss rate was observed in the small sample among players from *Sub-Saharan Africa* (50%), followed by *North America* (36.4%) and *East Asia & Pacific* (30.8%). Players from *Europe & Central Asia* (26.7%) and *Latin America & Caribbean* (25.4%) show similar missing rates, while players

from *Middle East & North Africa* (25.0%) show slightly lower rates. Even though the descriptive data suggests that there are regional differences in penalty performance, the sample size for all regions but *Europe & Central Asia* and *Latin America & Caribbean* were very small. This limits the interpretability of the results.

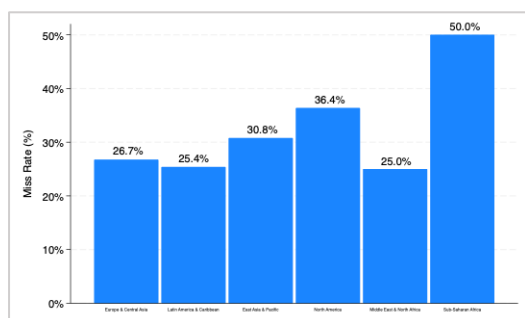


Figure 20: Miss rate by region of origin

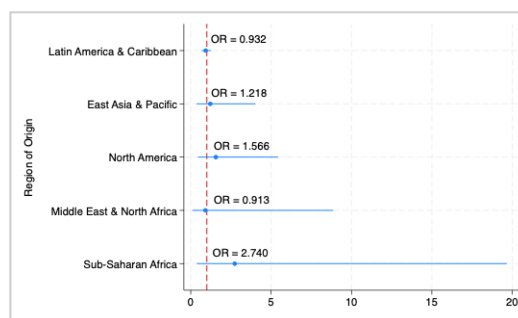


Figure 21: Odds ratios for penalty outcome by region of origin

The model examining was not statistically significant at the $\alpha = 0.05$ level, as indicated by the Likelihood ratio chi-square test ($LR \chi^2(5) = 1.90, p = 0.863$). This indicates that the region of origin does not explain meaningful variance in penalty outcome. The explanatory power of the model was very limited (Pseudo $R^2 = 0.002$).

No statistically significant differences were found. Although players from *Sub-Saharan Africa* ($OR = 2.740, p = 0.316$), *North America* ($OR = 1.566, p = 0.481$) and *Middle East & North Africa* ($OR = 0.913, p = 0.938$) showed higher odds of missing a penalty, these effects were not robust because of the small number of observations. There was also no significant differences in the odds of missing a penalty for players from *Latin America & Caribbean* ($OR = 0.932, p = 0.652$) or *East Asia & Pacific* ($OR = 1.218, p = 0.747$) when compared to the *European & Central Asia* reference group.

Therefore, also Hypothesis 9 is not supported. No statistically significant regional differences were found in the analysis.

5 Discussion

This chapter discusses and interprets the results from the empirical analysis and compares them with existing research. First, a comparison of the empirical results with the theoretical foundations and their interpretation is made. Then, the practical implications are discussed. In this chapter, the findings from

empirical analysis will be transferred to concrete implications for organizational settings. With this, the second part of the research question will be answered.

5.1 Comparison With Theoretical Foundations

The theoretical foundations introduced in Chapter 2 discussed several moderators that have an influence on performance decline under pressure. This section compares those empirical findings from the previous chapter with these foundations. It will be examined whether the empirical results are in line with the theoretical assumptions or show contradictions. The results are then interpreted. Building on the categorization introduced in Chapter 2, which also guided the structure of the hypotheses, the following comparison and interpretation is also structured along the three moderator dimensions situational, contextual, and individual.

Regarding the analyzed situational moderators, the results for score situation (H2), shooting order (H1), and tournament stage (H3), the hypotheses partially align with the theoretical foundations on temporal and situational pressure. In line with prior research (Apesteguia & Palacios-Huerta, 2010; Vandebroek et al., 2018), the empirical analysis indicates that performance generally declines when the sequence advances, showing a rise in misses toward the end of the shootout. This supports the hypothesized mechanism that perceived irreversibility leads to higher psychological pressure. However, there was no linear effect throughout all shooting phases (*Early, Mid & Late*) and the model had restricted explanatory power, which implies that the effect is not as systematic as theory suggests.

The results for *score situation* do not align with the theoretical predictions. The data does not confirm that a disadvantageous score increases choking due to higher outcome relevance as suggested by earlier research (Worthy et al., 2009; Cao et al., 2011; Toma, 2017). Performance under disadvantageous and neutral conditions were nearly identical, while the improvement under advantageous conditions is just descriptive and not statistically significant. A possible explanation is that players in a disadvantageous position may perceive a nothing-to-lose effect.

The results on tournament stage (H3) contradict the assumption that pressure increases linearly with the stakes of the match. Miss rates peak in early knockout-games and even decline in later stages. A likely explanation is the selection bias. Players who are better at performing under pressure are more likely to reach the later stages of a tournament. Additionally, the difference between quarter- and semi-

finals may be negligible, because the outcome is irreversible in both cases. The low miss rate in third-place games indicates that once the target of winning the tournament is missed, the pressure relief may restore performance stability. Also here, a nothing-to-lose effect could play a role.

The results from the empirical analysis on contextual moderators also provide a mixed picture. As outlined in Chapter 2, the theoretical literature provides mixed evidence for the influence of audience size on performance. Some research shows small but significant negative effects (Cao et al., 2011; Böheim et al., 2019). The existing findings suggest that larger crowds increase the evaluative pressure and therefore the likelihood of choking. Other research finds no significant relationship between the two variables (Dohmen, 2008). The empirical findings from this thesis are generally consistent with this ambiguity. While the descriptive trend indicated a higher miss rate with an increase in audience, the analysis found no statistically significant effect. The non-significant effect may be explained by the relatively small variance in audience size at professional tournaments, where players are simply used to performing under large crowds. This suggests that the audience size increases the perceived importance of the outcome less than other factors. The results for the club rank (H5) also contrast with the theoretical expectation that are based on research of an individual's public status. It is suggested that players from higher-ranked clubs experience stronger public scrutiny and therefore higher performance pressure. In contrast to the findings of Jordet (2009a) and Baumeister et al. (1985), the data in this research does not indicate that players from top clubs are more prone to choking than players with a medium and low club rank. In fact, players with a high club rank performed most reliably. A possible explanation for medium ranked players performing the worst is that these players may be skilled enough to compete in major tournaments but lack the experience of top professionals in dealing with the highest expectations. At the same time, they also do not benefit from the lower external expectations that players from less prominent clubs experience. In other words, the superstar of the team has more to lose than the player who is not well-known.

The results on the historical period (H6) align with the theoretical foundation of high public visibility. The significant rise in miss rates across the historical periods supports the assumption that the evaluative pressure in modern football has risen. A possible explanation for this could be the increased media attention and visibility in social media. Through the decades, visibility expanded through

television and later social media. This leads to athletes becoming increasingly exposed to public scrutiny from fans and the press, which may enhance self-awareness and fear of failure. This is consistent with the mechanisms proposed by Jordet (2009a), Jordet (2009b) and Baumeister et al. (1985). In contrast to this result, however, the findings for upcoming transfer (H7) do not align with the theoretical assumption that individual career-related visibility increases performance pressure. No significant differences were found. Descriptively, players with pending transfers even performed better than those that will transfer to a new club. A possible explanation is that those who face an upcoming transfer may transform the pressure into motivation. Another explanation is that transfer-related attention simply does not create additional stress in high-pressure situations.

The contextual moderators present a differentiated picture. Some factors, such as audience size or upcoming transfer, show mixed results and little impact on performance pressure. Others reveal a clear and significant effect. The results for historical period support the idea that increasing media exposure has increased the performance pressure over time. However, there could also be other factors, that lead to the increased probability of missing a penalty in recent times. This finding represents the most significant result from the analysis and deserves more attention in future research.

The results for individual moderators account for performance differences only to a limited degree. Regarding age, the analysis does not support the assumption that younger players are more likely to miss a penalty. This finding is partially consistent with prior research. Although theory proposes that performance may decline with age due to cognitive deterioration (Bäckman & Molander, 1986) or after experience surpasses the optimal impact (Fried & Tauer, 2011), empirical analysis results show that chronological age alone is not a key predictor of choking (McGarry & Franks, 2000; Jordet et al., 2007). A possible explanation is that the type of experience (e.g. task-specific vs. general), may play a critical role. The higher miss rate among medium-aged players suggests that this group may be at a very important stage of their career that increases the perceived pressure. They are no longer benefiting from the calmness of younger players and also do not yet have the accumulated experience of older players to manage pressure effectively. A similar explanation was made for the club rank (H5).

Similarly, no significant regional differences were found in the empirical analysis. This contradicts the theoretical foundations suggesting that cultural norms and stereotype-related

mechanisms shape how athletes perceive and cope with evaluative stress (Jordet, 2009; Hill et al., 2010; Yoon et al., 2021). The lack of significant effects may partly stem from methodological limitations (small sample sizes for most regions). It could also reflect that players at the highest levels operate in highly professional environments, that are standardized across regions and therefore reduce the impact of regional or cultural influences.

The results indicate that individual factors do not have a direct influence on choking (region of origin) or do not have the expected linear influence (age).

5.2 Organizational Implications

This section focuses on highlighting those results that were either statistically significant or revealed a strong trend and then translating these core empirical findings into key theoretical learnings. Finally, evidence-based conclusions for organizational settings will be derived from those learnings. This procedure that led to the final organizational implications is illustrated in Figure 22 below.

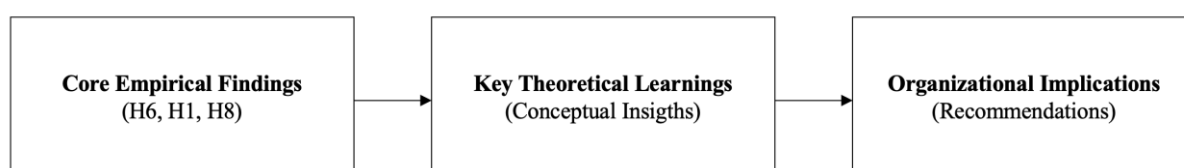


Figure 22: Framework for deriving organizational implications

1. As demonstrated by the results of Hypothesis 6, players in more recent tournaments were significantly more likely to miss penalties than those in earlier periods. Players from the recent period (2019 onwards) showed 2.28 times higher odds of missing compared to players from the early period (up to 1993). This finding points to a systemic rise in perceived performance pressure over recent decades.
2. The findings related to Hypothesis 1 show that the shooting order within a penalty shootout is a relevant situational factor. Players shooting in the final stage of the sequence showed significantly higher odds of missing (1.49 times higher) compared to shooters in the beginning of the shootout. This highlights how immediacy and decisiveness act as key triggers of performance anxiety.

3. The results of Hypothesis 8 showed that players in their physical prime (medium-aged: 23 to 30 years) show significantly higher odds of missing (1.62 times higher) compared to the older age group (31 years and above). The finding suggests that choking is most likely during an athlete's physical prime.

These findings provide evidence that performance pressure can be shaped by all three moderator categories: situational, contextual, and individual factors. The following section seeks to translate these empirical findings into conceptual insights. Within each of these insights, the implications for organizational settings are discussed.

Key Theoretical Learning about the contextual moderator historical period: *Individuals in high performance environments have to deal with increasingly higher performance pressure in modern environments.*

The significant increase in choking cases (players in recent tournaments were 2.28 times more likely to miss their penalty than players in early tournaments) suggests that external factors have intensified the psychological pressure on athletes in recent decades. These external factors may result from broader technological or societal developments, such as increasing media coverage (Faustin et al., 2022), the rise of social media (Rai et al., 2025) and real-time public scrutiny (Hapig et al., 2024). Together, these developments have increased visibility and performance expectations that are placed on athletes.

Translating this to organizational contexts, similar dynamics may be observed on two levels. At the organizational and team level, the rise of digital transparency, continuous performance tracking, and external stakeholder scrutiny has created work environments with high performance transparency and steady evaluations. This applies to regular professionals. While those factors foster accountability and efficiency on the one hand, they may increase collective pressure for good performance within teams and organizations on the other hand. From a theoretical perspective, this dynamic can lead to the occurrence of negative consequences that are also found by attentional theories (Baumeister, 1984; Beilock & Carr, 2001). In organizational and team contexts, the mentioned factors can lead to excessive

self-monitoring and an unhealthy striving for perfection (Flett & Hewitt, 2005). Often, however, minor imperfections little imperfections do not affect the overall performance outcome.

From a managerial perspective, the findings suggest that organizations should balance transparency and accountability with psychological safety and trust. Organizations can reduce the risk of unexpected performance declines by implementing evaluation systems that focus on learning and improvement rather than flawless execution. Also, an error culture, in which mistakes do not lead to punishments would be beneficial to avoid the mentioned negative consequences.

The finding may also have implications at the individual level. Especially for people that have highly exposed positions such as executives or public representatives. In contrast to regular professionals, they must manage high expectations from various stakeholders, which can be compared to athletes under media spotlight. Frequent public appearances, investor expectation, or social media exposure may lead to high perceived pressure and the fear of failure.

From a managerial standpoint, these insights underline the importance of preparation routines and psychological coping mechanisms, which were discussed in Chapter 2.4 (Mesagno et al., 2008). Organizations must develop well-designed leadership programs that do not only lead to strategic competences but also include components that strengthen psychological resilience and self-regulation under pressure. This can be achieved by simulating real-world situations through approaches like pressure simulation training or scenario-based decision-making exercises, as discussed in the sports context in Chapter 2.4. These formats expose leaders to controlled high-pressure situations in a safe environment. It gives them the opportunity to practice emotional regulation and keep focus in a stressful situation. Individuals who are or will be placed in such environments should have access to leadership programs or resources that makes them used to high-pressure situations and support the development of coping mechanisms.

Key Theoretical Learning about the individual moderator age: Psychological resilience often develops later than peak skill mastery.

In sports, the peak of the physical performance is normally reached between the early and late twenties, depending on the concrete discipline (Allen & Hopkins, 2015). However, performance is not only determined by the physical ability of a person but also by psychological resilience (Fletcher &

Sarkar, 2012). The result of the empirical analysis suggests that psychological resilience does not peak within the age group that that peaks in physical ability (see Hypothesis 8).

This gap between the peak physical abilities and psychological resilience can also be translated to organizational settings. Younger employees usually demonstrate a high technical skill-level and ambition. However, they are also less experienced and therefore more prone to fear of failure in high-stakes situations. This can be the case in situations such as client presentations. More experienced employees, on the other hand, may no longer master the newest technological skills but they can demonstrate greater psychological resilience when confronted with these stressors. This observation aligns with findings from occupational psychology that indicate that professional experience contributes to emotional stability and stress tolerance in work environments (Ng & Feldman, 2010).

It is important to note that this does not imply that younger professionals lack potential or capacity for resilience. It simply shows that psychological resilience develops by time through exposure to challenges. In other words, experience creates psychological resilience (Caza & Milton, 2012). The gap may therefore explain why high-performing individuals sometimes underperform in high-stakes situations despite proven competence.

For organizations, this described gap has implications regarding how talent in the organization is managed and developed. As resilience is primarily shaped through experience (Ng & Feldman, 2010), leadership should not expect younger professionals to perform at their highest level without any experience in such situations. Organizations must provide opportunities for high-potential employees to experience challenging and high-pressure situations in a controlled and safe environment. This allows them to practice coping mechanisms without the risk of consequential failure. In addition, organizations should offer structured resilience-building initiatives, such as mentoring or simulation-based trainings. Such measures can reduce the risk of performance breakdowns in high-pressure situations and additionally help to prevent burnout in young professionals (Scheuch, et al., 2021).

The gap also has implications for how to assemble teams. It suggests that both younger and more experienced employees bring complementary strengths and weaknesses to the workplace. Younger professionals often bring new perspectives and technological skill. More experienced employees can usually contribute emotional stability and psychological resilience. Successful teams are in need for a

combination of those skills and traits. When managed appropriately, teams with mixed experience levels may outperform homogeneous ones (Wang & Duan, 2025).

Key Theoretical Learning about the situational moderator shooting order: Performance is likely to decline when the moment is irreversible.

Research shows that the moment, where a decision becomes irreversible, is a clear psychological threshold (Baumeister, 1984). At this point, the risk of choking increases significantly. The theory on choking suggests that attention is then no longer directed toward the act itself but toward the possible consequences of failure. The awareness of irreversibility triggers avoidance motivation. This is often expressed by escape behaviors like rushing the action, which ultimately leads to impaired performance (Jordet & Hartman, 2008). The results from Hypothesis 1 support this interpretation. As the shootout progressed and the outcome became more decisive, the likelihood of missing a penalty increased significantly.

This mechanism is not exclusive to sport. High-stakes environments in organizations may create comparable pressure. When a decision carries irreversible consequences, leaders often respond with decision avoidance (Shortland, et al., 2023). This can be observed in delayed or suspended strategic decisions because individuals avoid accountability for potentially unfavorable outcomes. Examples, where this becomes visible in practice may be postponed market entries, or investment decisions that remain on hold. This indecisive behavior due to irreversibility of an action is relevant for organizations, as it can lead to weakened competitiveness.

To avoid this behavior, organizations can implement multiple intervention measures. These include the design of clear and transparent strategic decision-making processes or establishing a culture, where decision makers do not have to fear negative consequences when making a wrong decision that was still an informed and well-founded decision. Strategic decisions with significant consequences should be made along a clear and transparent decision-making approach. Organizations should adopt a standardized and evidence-based approach to strategic decision-making, which has already been shown to positively influence organizational performance (Coali et al., 2024). Such a standardized decision-making process would enhance transparency and could reduce the fear of irreversible decisions. This approach should primarily be applied to strategic or high-impact decisions.

The second organizational implication that was derived from this theoretical learning referred to the culture of an organizations. The learning suggests that organizations must establish a culture that encourages accountable and goal-oriented decision-making while reducing fear of blame or failure. It should be mentioned, however, that embracing accountability is not always beneficial, as it can also trigger unwanted behaviors (Lerner & Tetlock, 1999).

Revisiting the organizational implications and suggested measures, the insights from the analysis demonstrate the need for well-designed approaches that address situational, contextual, and individual drivers of performance pressure. A summary of the organizational implications will be made in the conclusion (Chapter 6).

While this translation of the empirical findings into organizational implications might offer valuable theoretical and practical insights, several limitations must be acknowledged. The findings from the sports context come from acute pressure situations that typically have different dynamics than high-pressure situations in organizations. In organizational settings results usually develop over time and corrections are possible. Therefore, the comparison between athletes under acute pressure and professionals in organizational settings comes with limitations. Moreover, the empirical analysis focuses on factors such as tournament stage or age, which can be observed or measured. Further relevant variables such as motivation, likely has an impact on the performance but is unobservable. The presented findings should therefore be understood as conceptual frameworks, not as direct causal models.

6 Conclusion

This last chapter revisits the research question of this thesis, consolidates the results of the analysis and addresses potential fields for future research. As described in Chapter 1, the research question of the thesis was twofold: (1) What factors moderate choking under pressure? and (2) How can these insights be applied to organizational settings?

Across the analyzed moderators, three key learnings were derived. First, performance pressure has intensified over time. Players in recent tournaments were significantly more likely to miss a penalty. It is hypothesized that increased visibility through media accounts for this observation. Second, choking does not peak among the youngest players but among those in their physical prime. Medium-aged players show higher miss rates than older ones. This suggests that psychological resilience develops

later through experience and not linearly with physical development. And third, performance declines most when outcomes become irreversible. Over the course of writing this thesis, it became a learning that any factor that influences performance pressure can potentially act as a moderator. This means that moderators are subjective. A factor that raises the perceived pressure beyond the choking threshold for one individual might not have the same effect on someone else. Nevertheless, the empirical analysis in this thesis suggests that the following factors are likely moderators of choking: increased public visibility, irreversibility of the situation, and task-specific experience. This addresses the first part of the research question, which aimed at the identification of potential moderators. It must be noted, however, that increased public visibility is the hypothesized reason for the finding that performance declines have significantly increased over time.

The second part of the research question addresses the transferability of those findings to organizational settings. The measures that I have proposed for organizations are not aimed at eliminating performance pressure, but at enabling individuals to cope with the pressure in a way so that it does not lead to stress. In summary, this should be achieved through targeted training for individuals in high-pressure situations, the right compositions of teams, and creating a corporate culture that fosters a goal-oriented approach to the issue of performance pressure.

Some of the limitations of this research have already been mentioned throughout this thesis. However, a summary of the most significant limitations will be provided here. The analysis generally provides robust and realistic insights into performance under pressure. I used a correlational, cross-sectional design. Therefore, it was not possible to establish causal relationships. This means that no proof of cause and effect could be provided. Also, as the analysis relied on secondary and observable data, the players' internal psychological states (e.g. motivation) could not be measured. The findings therefore offer only a partial picture of the choking concept. The overall sample size (886 penalty observations) was relatively large. However, certain categories only had limited observations. In particular, the variable region of origin had certain subgroups with only a few observations. The variable club rank was restricted to European players due to data availability. This limits the robustness and generalizability of the results.

Future research should address the methodological limitations of this study by trying to include primary data, for instance from player interviews. This would include psychological factors that cannot be observed through secondary data. Using longitudinal or experimental designs could help to test causal relationships and validate the identified moderators (e.g. observing the penalties of one specific player throughout his career). Beyond those methodological improvements, there were some questions that emerged from the analysis and could be examined in further research. It would be of great interest to identify the factors that led to increased choking in more recent times. I hypothesized that increased public visibility through more media attention and visibility on the internet is the reason. However, this is a hypothesis that needs to be tested. Finally, future work should not only focus on what increases pressure but rather on understanding why certain individuals seem to perform better in high-pressure environments.

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