NEW PERSPECTIVES ON CHOKING AT THE FREE-THROW LINE

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ABSTRACT

The aim was to produce three quality publications including; a review of literature publication and two original studies designed to examine the effects of pressure on free-throw performance, particulary the phenomenon of choking, in the sport of basketball. Pressure when FT shooting is generally experienced by basketball players, irrespective of the level of participation, and resultant choking can affect game outcome and diminish personal enjoyment (Gómez, Lorenzo, Jiménez, Navarro, & Sampaio, 2015; Worthy, Markman, & Maddox, 2009).

The theoretical framework for the current study was a triangulated approach by examining choking from multiple perspectives with the common focus on choking in the task of basketball free throw shooting. The combination of a traditional quantitative approach (Study 1) and a less traditional qualitative approach (Study 2) were used to potentially provide perspectives on choking to illuminate possible consistencies and inconsistencies in how choking is experienced. Study 1 was designed to capitalize on the depth of athletes' knowledge using a small number of elite athletes and reflected a predominantly inductive logic. The findings of this study informed a deeper understanding of how basketball players typically deal with choking and potentially present new knowledge and strategies relevant to alleviate choking within and beyond the sport of basketball. The elements of knowledge, transfer and exchange, the process of acquiring, developing, sharing and applying knowledge was used to question how the results can inform practice in the 'real world'. In keeping with triangulation, the insider perspective used in Study 1 was equivalent to a 'bottom up' explanation of choking. Conversely, Study 2 was designed to more actively control variables in a quasi-experimental manner and was linked in design to the results from Study 1. Study 2 was designed to examine the effects of physical exertion on choking in conjunction with

psychological using a larger population of competitive recreational student-athletes and reflected a predominantly deductive logic.

More specifically, the aim of the first study was to investigate 'insider' perspectives of elite basketball players regarding perceptions of pressure and the associated phenomenon of choking in basketball free-throw shooting. Seven elite basketball players (1 female and 6 males; M_{age} = 33.3, SD = 5.4) were recruited through snowball sampling. In-depth semi-structured interviews were conducted to enable participants to reflect on experiences of pressure and explanations of how to avoid choking. The data were thematically analysed, with six themes identified; choking definitions, antecedents, personality, automaticity, mental skills, and management strategies. The findings are discussed, especially in the context of mental skills, to reduce choking-susceptibility, and to recommended strategies for players, coaches and sport psychologists to consider when managing chronic choking.

More specifically, the aim of the second study was to examine the influence of physical exertion and pressure as potential antecedents of choking in basketball free-throw shooting. A within-subjects design was implemented with 50 student-basketball players who completed 40 basketball free-throws in four manipulated conditions: higher pressure-running, higher pressure-no running, lower pressure-running, and lower pressure-no running. A repeated measure analysis of variance revealed that participants scored significantly lower in the higher-pressure conditions than the lower-pressure conditions. Furthermore, participants scored significantly higher in the no-running conditions compared to the running conditions. The current study was the first to examine the effects of physical exertion on performance in pressure situations. The applied implications of these results are discussed and tentative conclusions drawn for the relevance to players, coaches and sport psychologists.

The participants in Study 1 provided unique insights based on their extensive experience performing under pressure at the highest levels of basketball. Participants were

aware of the importance of mental skills but were not necessarily sufficiently informed or able to rectify choking without further assistance. The results of Study 2 contributed useful new information and insights into the link between physical exertion and choking. These results provide a new avenue for researchers interested in further examining physical exertion and fatigue as contributing to under-performance under pressure. Overall, the two studies broaden the knowledge regarding the triggers and underlying mechanisms of choking, and also enrich the strategies that athletes can use to optimise their performances. I expect that the current findings will be able to build capacity in assisting those players who experience difficulties in converting critical free-throws. Finally, the results of the current study assist athletes, coaches, and applied sport psychologists to better understand the deleterious effects of pressure in sport and suggest possible solutions to manage them.

STUDENT DECLARATION

I, Rouhollah Maher, declare that the PhD thesis entitled “New Perspectives on Choking at the Free-throw Line” is no more than 100,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this thesis is my work.

Signature: *Rouhi Maher* Date: 22-06-2018

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This thesis is dedicated to my solicitous parents, my unique siblings and my lovely wife, Fatemeh. They are highly significant people in my life, and I am eternally grateful for their unconditional love, encouragement and support. To my parents who have always been there for me, and their faith in my ability to realise the goals I set myself in life has been, and continues to be, a source of inspiration and strength to me. To my dear wife - for her patience, her belief in me and for always being there to share the intense, and the lighter moments during this journey, and for her continual encouragement and reassurance which I would always be grateful for. I also treasure all the other family members to whom I have been close over the years, and whose influence has been so positive. You have contributed in no small part to help me work towards achieving my academic and professional goals.
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I particularly want to say thank you to my supervisors – Associate Professor Daryl Marchant and Professor Tony Morris. Your ongoing professional advice, constructive feedback and encouragement, accessibility, excellent communication and profound expertise have immeasurably deepened my knowledge and understanding of my area of research. It was a privilege to be guided by you both in undertaking this thesis. I also want to express my immense gratitude to all participants in my research. Your involvement was critical in this study and I sincerely thank you for your willingness, cooperation and enthusiasm.

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CHAPTER 1

BACKGROUND

Thesis by Publication (TBP)

The TBP option was introduced in 2011-2012 at Victoria University (VU) as an alternative to the traditional thesis format for the Doctor of Philosophy degree. Based on the VU guidelines for TBP, the thesis comprises high-quality papers together with framing and linking material. The term paper refers to research presented in the format of a journal article, book chapter, published conference paper or another form of written scholarly work prepared for publication and demonstrated to have been subject to academic peer review. In this section, I explain the backstory to my decision to take the TBP route. My confirmation of candidature was approved in 2013. At this point, I intended to follow the traditional thesis route by conducting and presenting a two-study thesis. I attended a workshop at VU introducing and explaining the process to change from the traditional thesis format to TBP. I believe TBP is a productive learning method since publishing the findings of the research is a primary goal for PhD students. In addition, I accepted an invitation prior to converting to TBP to co-author a book chapter on choking in sport for an international sport psychology text. This book chapter represented an ideal lead into the TBP as an extended review of literature. After careful consideration and discussions with my principal supervisor, the PhD was converted to TBP. Similarly, I have included explanations and justifications for how each paper was framed, linked and contributed to my development as a preamble to each chapter.

Publications and Conference Presentations

Journal Manuscripts:

1. **Maher, R.,** Marchant, D., Morris, T., & Fazel, F. (2017, in review). Managing Pressure at the Free-throw Line. Manuscript re-submitted to '*International Journal of Sport and Exercise Psychology*', Q2 Scimago Journal.
2. **Maher, R.,** Marchant, D., Morris, T., & Fazel, F. (2017, accepted). Examining Physical Exertion as a Potential Cause of Choking. Manuscript submitted to '*International Journal of Sport Psychology*', Q2 Scimago Journal.

Book Chapter:

3. Marchant, D., **Maher, R.,** & Wang, J. (2014). Perspectives on choking in sport. In A. G. Papaioannou & D. Hackfort (Eds.), *Routledge Companion to Sport and Exercise Psychology: Global Perspectives and Fundamental Concepts* (pp. 446-459). London and New York: Routledge. Routledge is considered by the VU Office for Research as a prestegious publisher (equivalent to a Q1 or Q2 article).

Conference Papers and Presentations:

4. **Maher, R.,** Marchant, D., & Morris, T. (2017, July). *Choking at the Free-throw Line: Elite Players Have Their Say.* Paper presented at 22nd Annual Congress of the European College of Sport Science (ECSS), MetropolisRuhr, Germany. Abstract retrieved from http://www.ecss.de/asp/2012_Bruges/Abstract_Display.asp?MyAbstractID=1725
5. **Maher, R.,** Marchant, D., & Fazel, F. (2016, September). *Physical Exertion and Fatigue: A Breakthrough in the Choking Sphere.* Paper accepted at 18th International

Conference on Sport Science, Medicine and Fitness (ICSSMF), London, UK. Abstract retrieved from https://waset.org/abstracts/55461

6. **Maher, R.,** Marchant, D., & Fazel, F. (2016, September). *Developing a Multi-Modal Choking Intervention.* Paper presented at 18th International Conference on Sport and Exercise Science (ICSES), Chicago, USA. Abstract retrieved from https://waset.org/abstracts/55409
7. **Maher, R.,** Fazel, F., & Marchant, D. (2015, April). *Choking and Media in Sport.* Paper presented at 12th International Scientific Conference on Transformation Processes in Sport, Podgorica, Montenegro.

Organisation

The thesis is organised in chapters that reflect the sequence of how the PhD was planned and conducted. First, I have presented (see above) the abstract to provide an overview of the two central research studies including the key findings and conclusions. Furthermore, the abstract includes the intellectual framework and rationale for how the studies are tied together and contribute new knowledge. Second, I have presented the background (see Chapter 1) including the context of choosing the TBP option, the resultant outputs and the organisation of the thesis (e.g., current section). The introduction section is consistent with a traditional thesis format. The aims are presented to reflect both pragmatic and intellectual objectives. Third, I have presented the review of literature (see Chapter 2) in a distinct, but I believe necessary style that combines four elements: a) a co-authored review of choking book chapter publication (2014), b) an update of the most recent choking related literature of recent developments in choking research since the book chapter was published (2013-2017) and relevant research that was beyond the scope of the published book chapter, c) the review of literature contained within the first study (see Chapter 3), and d) the review of literature contained within the second study (see Chapter 4). Fourth, I have included the two research papers that we (i.e., I am the principal author) submitted for publication Study 1 and Study 2, as self-contained Chapters 3 and 4. Fifth, the general discussion section (see Chapter 5) includes; the conclusions and recommendations sections to review the key findings and suggestions for further research. Sixth, I have included all references cited in the published book review, updated review of literature, research manuscripts and conclusions in the references section. Finally, I have included relevant appendix material as cited throughout the thesis.

Introduction

We normally expect elite athletes to produce outstanding performances irrespective of the circumstances, for instance, successfully shooting free-throws (FT) during the final minutes of a deciding game in a National Basketball Association (NBA) playoff series. At the 2016 Copa América final, megastar football player Lionel Messi inexplicably missed a crucial penalty shot that precipitated his retirement from the Argentinian national team. There are numerous examples of champion athletes, such as Messi, failing under pressure. Drama and unpredictability are central to the enduring fascination of sport with the term choking frequently applied to dramatic performance failures. The ability and inability of athletes to perform under pressure and the associated area of choking have been a popular field of research for sport psychologists since the early 1980s. Researchers have investigated the underlying mechanisms of performance decrements, developed explanatory theories and recommended approaches to alleviate performance impairments under pressure (Hill, Hanton, Matthews, & Fleming, 2010b; Maxwell, Masters, & Poolton, 2006; Otten, 2009; Wang, Marchant, Morris, & Gibbs, 2004).

Definitions of choking have been updated as more evidence has become available through published research (Mesagno & Hill, 2013b). Choking was initially defined as "performance decrements under pressure situations" (Baumeister, 1984) and "the occurrence of inferior performance despite striving and incentives for superior performance" (Baumeister & Showers, 1986). Thus, a sub-optimal performance is a choke providing the athlete is well-motivated to attain their goal, is capable of executing a better performance, and the situation is critical (Hill et al., 2010b). Hence, choking is a specific negative response to perceived pressure, rather than a random fluctuation in skill level (Beilock & Gray, 2007). Stated simply, choking is an acute performance failure in a stressful situation (Hill, Hanton, Fleming, & Matthews, 2009).

The body of research into choking in sport has followed a traditional accumulation path. That is, initial research consisted of quasi-experimental designs with the purpose of better understanding the key mechanisms that contribute to choking in sport. For example, a common approach has been to manipulate one or more independent variables as potentially affecting performance under pseudo-competitive conditions (Beilock & Carr, 2001; Gray, 2004; Mesagno, Marchant, & Morris, 2008; 2009; Wang, Marchant, Morris, et al., 2004). These approaches have been successful in gradually building an understanding of choking as a complex phenomenon with numerous predictors and contextual variables. The emergence of explanatory theories appears to have helped to guide the research. The two dominant theories; the self-focus theory (Baumeister, 1984; Beilock & Carr, 2001, 2004; Masters, 1992) and the distraction theory (Carver & Scheier, 1981; Eysenck & Calvo, 1992; Wine, 1971) are both well supported in the published literature. Interestingly, some derivative or satellite theories have recently emerged that are now being used to contextualize or 'fine tune' the broad understanding of choking in sport.

To date, choking interventions have typically been designed to test the self-focus and distraction related theories. Although a large body of research has accumulated related to choking, most of the research has been theoretically driven rather than practically driven. A relatively small number of researchers have designed evidence-based intervention studies (e.g., Hill, Hanton, Matthews, & Fleming, 2011; Hill & Hemmings, 2015; Hill & Shaw, 2013; Mesagno et al., 2008, 2009). Consequently, an imbalance has developed, whereby few researchers have attempted to translate theoretical findings into efficacious and practical solutions for athletes affected by choking. As a result, in recent years there has been an increased focus on linking the findings of experimental choking research with applied interventions. Also, researchers interested in choking have continued to be creative in conceptualising research designs and research questions. For example, while a

quantitative research paradigm dominated the early research, in recent years, a balance between quantitative and qualitative designs has occurred. I summarise these trends because they have all informed my research and the aims.

Aims

Study 1 was an exploratory qualitative design, in which I conducted semi-structured interviews with the purpose of gaining an insight into the specific details of techniques utilised by elite basketball players to self-manage performance pressure while shooting free-throw (FT). The interview guide was designed to first gain an understanding of their basketball career followed by specific questions relating to FT shooting, mental skills, managing performance pressure, including experiences and observations of choking. Hence, the aim of study 1 was to investigate 'insider' perspectives of elite basketball players regarding perceptions of pressure and the associated phenomenon of choking in basketball FT shooting. Based on a key finding from Study 1, Study 2 was to designed to examine the potential role of physical exertion in contributing to choking in basketball FT shooting using a quantitative design. The critical role of physical exertion and fatigue in the occurrence of choking has been widely speculated but not experimentally investigated within a choking context. To date, the focus of majority of choking studies have been focused exclusively on the psychological and emotional aspects of performance with little regard for the physiological aspects. Hence, the general aim of study 2 was to design and implement a choking intervention to examine the potential role of physical exertion in the occurrence of choking while also measuring and considering psychological variables. The first study has been reviewed and recently resubmitted, and the second study has been accepted for publication.

CHAPTER 2

REVIEW OF LITERATURE

Preamble to Review of Literature

Around the time of converting to TBP, a timely invitation to co-author a chapter for a proposed international sport psychology text book was presented by editors Dieter Hackfort and Athanasios Papaioannou via my principal supervisor. The editors were keen to include authors from all parts of the globe to contribute to a high-quality text produced by Routledge. I had the responsibility of drafting large sections of the book chapter, especially the sections on summarising choking research, dissecting explanatory choking theories and presenting the literature of choking moderators. I was the second of three authors and I believe my supervisor would agree that I contributed significantly to the book chapter, which I understand has been adopted as a text of choice for many applied sport psychology graduate programs. This book chapter represents the type of extended review of literature that is required in the traditional PhD thesis mode. The skills and effort I invested in helping to produce a quality book chapter was an essential part of the TBP portfolio and my development.

Framing, Linking and Skill Development

The published Routledge book chapter was written during a six-month period in 2013. This was ideal timing because I had recently completed my candidature and was familiar with the many new studies that were being published on the choking in sport. Because the Routledge book chapter is an extended literature review, my contribution helped me to; a) learn to frame research by starting with a broad frame initially and then delimiting to specific research questions, b) better appreciate the need to continually link theory with practice, c) synthesise research to tell a story, and d) invest the time to understand the research theme and later link and place new research into a specific part of

the topic ‘puzzle’. I did not anticipate being asked to contribute to an international sport psychology text and I worked hard to prove myself as a worthy contributor. I was able to:

1. Consolidate my knowledge of the classic/influential studies in sport choking.
2. Adapt my writing style to what was required for a book chapter intended for by postgraduate students.
3. Reflect on the feedback and constructive criticism that is essential to produce a finished piece of research.

Supplementary Review of Literature

The review of literature for the two journal manuscripts currently being reviewed also provides additional relevant material but is probably best read after the previous book chapter and the supplementary material. I compiled a supplementary review of literature (presented below) to specifically update the most recent and relevant developments in choking research not included in the three manuscripts (i.e., book chapter and two journal articles). To ensure consistency and parallel construction, I have followed the same format and section headings as the book chapter headings except the introduction and personal reflections that were particular to the book chapter. Furthermore, in some instances, I have included additional material that predates the book chapter for topics and themes that were not covered in sufficient detail because of word limit restrictions in the published book chapter.

- Update: From Baumeister to Present (2013 - 2018)
- Update: Explanatory Theories of Choking
- Update: Moderators Associated with Choking
- Update: Interventions and Knowledge Transfer in Choking

Perspectives on Choking in Sport

(See Appendix F for this paper in published format)

Summary

Thirty years of systematic choking research beginning with Baumeister (1984) through to Land and Tenenbaum (2012) have examined numerous aspects of choking. Apart from Roy Baumeister, researchers including; Rich Masters, Sian Beilock, Geir Jordet, Chris Mesagno and Denise Hill have been key contributors in conducting and publishing evidence-based research in the choking domain. The degree of interest in choking within the sport psychology community is also reflected in the media and the general public with choking remaining as a conversational chestnut every time a champion athlete fails under pressure or 'defeat is snatched from the jaws of victory' in a major event. While instances of choking provide additional drama, colour and unpredictability to major sporting events, sport psychologists are focused on more fully understanding the choking phenomenon and providing strategies to reduce the likelihood of choking or beneficial solutions for athletes that experience choking repeatedly. Given that from a research resource perspective the topic of choking in sport rarely attracts funding, we believe sport psychology researchers have collectively made substantial steps in understanding what causes choking and are now substantiating useful evidence-based interventions.

Introduction

When elite athletes choke, it represents a classic psychological conundrum. How can the performance of highly trained professional athletes deteriorate so rapidly, often just when victory seems almost assured? There seems little reason to doubt that high profile athletes who are touted as chokers in the media represent a minute proportion of athletes across the full spectrum of sports that have choked in their careers. Aside from sport, other performance domains where choking occurs include; music, dance, public speaking, and

acting. As discussed previously (see Marchant, 2010), rapper Eminem released the song Lose Yourself (2002) with the lyrics cleverly describing choking from a stage performer perspective and represents the occurrence of choking in performance domains Although, choking is not a serious threat to physical health and is sometimes treated as trivial or inconsequential, for some performers, such as professional athletes, the consequences can be more serious. Anxiety, distraction, missed opportunities, and frustration seem to prevail when choking is evident. Paradoxically, choking occurs despite high motivation and maximal effort from the performer.

Objectives

After reading this chapter you should be able to:

1. Understand how choking in sport can be a serious occupational risk for professional athletes.
2. Define choking in sport and understand the key explanatory theories.
3. Appreciate the diverse range of mechanisms and underlying causes that have been linked with choking.
4. Better understand your own performances and observations in sport of poor performances under pressure.
5. Cite evidence-based treatments that have been shown to decrease susceptibility and/or increase resistance to choking.

Personal Reflection

I (first author) vividly recall as a teenager my first (of numerous) experiences with choking in sport. In summary, our sports obsessed gang decided on a ‘social’ game of doubles tennis. Social sport was an anathema in our group with everything being highly competitive irrespective of the circumstances. On this occasion, I partnered Tony who was the only member of the group with a decent level of tennis expertise. This should have been

an easy win, with Tony on my side how could we lose? What followed was an out of body experience (not in a flow kind of way)! I somehow managed to block or undercut a series of routine shots fully into the distant fence. I'm not talking about near misses but wild shots a few of which escaped over the high perimeter fence. The first few miss hit shots produced considerable mirth and astonishment in the group – what is he doing? I certainly felt weird, like some evil genie was gripping the racquet and hitting the ball. My initial bemusement was followed by embarrassment. During the game, I responded by conducting an ongoing causal search for an explanation, including an interrogation of Tony who after offering perfectly reasonable suggestions declared emphatically that "you are beyond help." I was then banished to the net and placed in charge of a one-metre square piece of court space not technically out of court but practically rendering the game a one vs two affair. This first choking experience evoked a personal and sustained fascination that likely fuelled my professional interest in choking. Furthermore, it contained many of the hallmarks that have subsequently been shown to correlate with choking in sport, such as fear of negative evaluation, self- consciousness, anxiety and ineffective coping.

For professional and semi-professional performers, however, choking may be viewed as a serious career risk that can be accompanied by embarrassment, humiliation and derision depending on the level of media scrutiny (e.g., "Choking: The Case of Jana Novotna: One of the most famous collapses in sport", "Novotna famed for a great sporting choke", "Wimbledon '93: Too much choke ruins the Novotna engine"). Although there is widespread anecdotal evidence of elite athletes choking for obvious reasons, it is difficult to substantiate the extent of choking in high-level sport using traditional research methods. One of the few attempts to actually measure the extent of performance failure under pressure was recently conducted by Wells and Skowronski (2012) who, in using archival data convincingly, demonstrated that the performances of professional PGA golfers

typically deteriorate in the magnitude of approximately 50 shots between the third and final rounds in PGA tournaments. Based on 2007 data, this type of third to final round score decrement equated to the difference between the 19th placed player and the 57th placed player in the tour average score. While Wells and Skowronski provided average data for all PGA tour players in calculating the average performance decrement, clearly the performance decrement for particular players (e.g., the 80-100 percentile of players on final round decrement) would likely fit the definition of choking as being a substantial decrement in performance and, although not reported, would be much greater than .50 shots. Recently, Mesagno and Hill (2013b) have questioned how researchers have operationally defined choking and contend that researchers have often reported and possibly confused what is actually under performance as choking. Mesagno and Hill (2013b) are concerned that the current definitions of choking are not explicit regarding the level of performance decrement that is required before using the term choking is justified. Mesagno and Hill (2013a) and Jackson (2013), therefore, argue for more distinct and multi-level considerations of the magnitude of choking. Apart from the direct and indirect financial losses that result from habitually scoring poorly in the final rounds of tournaments there are knock-on effects in terms of psychological well-being, diminished enjoyment and goal achievement, reduced capacity for automatic entry into subsequent events and loss of prestige in being regarded as a player that does not perform well in pressure circumstances. (For additional evidence of how elite soccer players can struggle to perform under the pressure of executing penalty kicks see Jordet, 2009a, 2009b; Jordet & Hartman, 2008; Jordet, Hartman, & Sigmundstad, 2009).

From Baumeister to the Present

An overview of choking research. To describe over 35 years of choking research the analogy of constructing a wall seems apt (sorry in advance if you find the analogy

annoying). This analogy is also sometimes used in generic research methods. A sturdy or reliable wall is built on solid foundations (i.e., good theory). Each subsequent brick (e.g., study) builds on the previous brick and contributes to the overall size, strength and aesthetic of the wall. From a multi-dimensional perspective rather than a wall of knowledge, the image of the construct of choking as surrounded by interconnected walls of under- standing perhaps works best. In what ways have researchers constructed the bricks in the walls of understanding choking in sport? There are now well over 100 published peer-reviewed articles (i.e., bricks) in which choking features in the title. Are the foundations of the walls sound? To what points do the perpendicular walls meet? To what extent is the mortise able to bind the bricks into a unified edifice? Where are the strong points in the walls and where are the weak points or gaps currently? Interestingly, Mesagno and Hill (2013a) have recently and independently used a brickyard analogy where they question whether choking researchers are adequately distinguishing the metaphorical edifice of knowledge (theory) from piles of bricks. Stated bluntly, after 35 years what do we know about choking? What solutions can we provide for athletes experiencing choking or for coaches working with these athletes? In what ways does current theory or current best practice require tweaking, alteration or a major make-over? This chapter is largely about answering these questions including a conclusion that looks at where we are at now.

Nearly 30 years ago Baumeister (1984), a social psychologist, published what is widely regarded as the first investigation of choking in sport. This seminal paper reported on the results of six related studies and sparked what has remained a hot topic of research, initially by social psychologists and subsequently by sport psychologists. Baumeister defined choking, developed a model of choking and successfully manipulated choking experimentally. The initial definition and findings were sufficiently interesting and equivocal to draw other researchers into choking research. The methods Baumeister and

colleagues (e.g., Baumeister & Showers, 1986) used including; pressure manipulations, manipulation checks and measuring independent variables with self-report questionnaires are still widely used in choking research.

Baumeister (1984) simply defined choking as “performance decrements under pressure circumstances” (p. 610). In the ensuing years, researchers have argued for a more expansive definition primarily for the purposes of precision and uniformity of understanding in research. For example, Masters (1992) defined choking as “the failure of normally expert skill under pressure” (p. 344). Although, discussions on the adequacy of definitions are ongoing, two recent definitions are being regularly used in the related literature. Mesagno et al. (2008) defined choking as “a critical deterioration in the execution of habitual processes as a result of an elevation in anxiety under perceived pressure, leading to substandard performance” (p. 439). The Mesagno et al. definition was essentially a refinement on an earlier definition proposed by Wang (2002) was the first to point out that perception of pressure, the level of performance decrement and habitual processes were necessary components of a choking definition. Wang defined choking as “deterioration in the execution of habitual processes of performance under pressure” (p. 140). Wang further explained that deterioration refers to a clear disruption in the quality of performance characterized by the performer trying too hard. Similar to other definitions, choking only occurs under pressure circumstances. According to this definition, choking reflects the combined problems of both perceptual control and skill execution. Pressure may cause these problems, resulting in an alteration of an athlete’s habitual processes of performance. This process is repeated in a cyclical pattern, resulting in choking. Habitual processes of performance refer to performance patterns that performers typically execute. A second definition regularly used in the related literature proposed by Hill et al. (2009) offers an alternative definition of choking “as a process whereby the individual perceives that their

resources are insufficient to meet the demands of the situation and concludes with a significant drop in performance" (p. 206).

Whichever definition is more representative of choking is semantics, however, the critical elements of perceived pressure, anxiety and inappropriate attention result in a performance substantially below the normal level occurs and constitutes a choke. We intentionally use the term choke as is used in common sporting vernacular and strongly recommend that researchers discontinue using the term choking under pressure because pressure is a necessary condition for choking to occur, and hence the addendum under pressure is a tautology. Stated simply, if there is no perceived pressure, there will be no choke.

Update: From Baumeister to Present (2013 - 2018)

Performance under pressure in sport has received considerable attention within the fields of sport psychology and social psychology in the past three decades. The traditional key topics of interest for researchers have been; explanatory theories, definition, mechanisms, influencing variables, antecedents, moderators, and interventions to ameliorate choking. Researchers are still expanding and updating these topics, while canvassing new trends, for instance, the efficacy of specific interventions, proposing more comprehensive definitions of choking, postulating new theories, and examining previously unexplored but potentially relevant variables, moderators and antecedents. In this section, the controversy about how choking has been defined is presented, and the relationship between anxiety and under-performances is elaborated on.

In recent years, researchers have continued to debate what specifically is (and is not) choking by offering numerous definitions. Despite this debate, researchers clearly agree that the presence of perceived pressure is central to the experienced of choking. As noted in the above pressure is included in every definition of choking proposed to date.

Simply stated and based on the universal understanding of what constitutes choking pressure is a central component of the definitions. Consequently, experimental research designs have repeatedly used pressure as an independent variable (Gucciardi & Dimmock, 2008; Kinrade, Jackson, & Ashford, 2015; Masaki, Maruo, Meyer, & Hajcak, 2017; Mesagno et al., 2008, 2009). Researchers have manipulated pressure through a range of methods including; video recording performances, audiences, monetary and other performance contingent incentives, evaluation by experts, distraction techniques (e.g., Belletier et al., 2015; Beseler, Mesagno, Young, & Harvey, 2016; Mesagno et al., 2008, 2009; Mesagno & Marchant, 2013; Otten, 2009). There is no universally agreed definition of choking, with multiple variations still being presented in the published research.

Nowadays, researchers often cite Mesagno and Hill (2013b), who argued that the term “choking” should only be applied to acute and chronic under-performances, not simply any decline in performance. In response, Jackson (2013) argued that the crux is differentiating between acute and moderate performance declines, and how to demarcate between choking and under-performance. Buszard, Farrow and Masters (2013) also proposed that to apply the term choking, the performance level of the athlete needs to be assessed independently from the performance of the opponent. For example, an athlete may perform adequately, but be overwhelmed by a superior performance from an opponent. Mesagno and Hill (2013b) stated that determining the precise magnitude of a performance failure as distinct from simply under-performance is virtually impossible because of the complex array of factors that may underpin choking behaviours. Mesagno, Geukes and Larkin (2015) have also raised the prospect that other relevant considerations, including skill level, anxiety level, and task difficulty, coalesce in determining the magnitude of a choke. Buszard et al. (2013) emphasised the necessity of taking precautions to avoid creating a boundary and separating choking from under-performance. Jackson (2013)

suggested a need for further research, for example, on the role of cognition to more clearly differentiate the dichotomy between what is choking and what is simply under-performance. Mesagno, Geukes, et al. (2015) agreed that clarity around this dichotomy is critical to informing sport psychologists and coaches how to assist athletes in managing choking and under-performance.

The reliability and validity of the techniques employed to assess choking is also relevant. Apart from observational methods, researchers have devised a variety of self-report measures through quantitative designs, such as psychological questionnaires (Self-Consciousness Scale; Fenigstein, Scheier, & Buss, 1975; Sport Anxiety Scale; Smith, Smoll, & Schutz, 1990; Coping Style Inventory for Athletes; Anshel & Kaissidis, 1997), and qualitative designs, such as phenomenological methodology (Hill & Shaw, 2013) and grounded theory methodology (Gucciardi, Longbottom, Jackson, & Dimmock ., 2010). Furthermore, researchers (e.g., Cao, Price, & Stone, 2011; Gómez et al., 2015; Lorenzo, Gómez, Ortega, Ibáñez, & Sampaio, 2010; Toma, 2017) have also used retrospective data mining and statistics from high-level sports competitions to investigate performance trends under pressure, such as FT shooting in the closing minutes of basketball games, or conversion of penalty shots in football games. The primary advantage of using the data from real competitions is the consistency of the task (e.g., FT shooting) and the real-world pressure inherent to high stake situations (Linder, 2017). Despite ongoing commentary on choking definitions, many researchers have concluded that further research is required before an agreed definition of choking is attained. Due to the productive and continuous cycle of research, a conclusive and widely agreed definition of choking seems unlikely but this is arguably not critical. Most of the traditional and recently proposed definitions of choking contain the elements of perceived pressure linked to anxiety, and inappropriate attention leading to substantial decrements in performance.

Each element of the conventional choking definitions requires further consideration and deconstruction, especially regarding how the components interlink. Athletes typically experience increased levels of perceived pressure in high stakes situations, where there are implications for future opportunities and success depending on the performance outcome (Gómez, Avugos, Oñoro, Lorenzo, & Bar-Eli, 2018). When the expectations (self and others) are high, perceived pressure is experienced and manifested through high levels of anxiety and produce cognitive and behavioral disruptions (Nieuwenhuys & Oudejans, 2017). Studies with basketball players (Cao et al., 2011), soccer players (Dohmen, 2008) and golfers (Hickman & Metz, 2015) have established that dramatic performance decrements occur due to anxiety and inappropriate attention during high-stakes contests. Regarding the effect of anxiety on performance in pressure circumstances, both trait anxiety (A-trait) and state anxiety (A-state) have been examined from the choking perspective (Englert & Bertrams, 2012). Trait anxiety is a stable personality characteristic with individuals perceiving their circumstances as life-threatening (i.e., chronic manifestation of anxiety). State anxiety is described as a temporary condition that individuals experience and perceive as difficult or threatening (i.e., acute manifested of anxiety) (Spielberger, 1966). From a choking perspective, trait anxiety is relevant because people who chronically perceive situations and challenges as anxiety evoking will likely be hyper-sensitive to experiencing anxiety in sports competitions. State anxiety is relevant because people who report high levels of A-state will be susceptible to intense episodes of anxiety for particular situations (e.g., FT shooting). Notably, researchers have reported a relatively strong correlation between A-trait and A-state in sport. That is, people who report high levels of trait anxiety are considerably more likely to also report high levels of state anxiety (Martens, Vealey, & Burton, 1990).

There is a substantial body of literature documenting the relationship between anxiety and performance, with numerous anxiety-performance theories postulated and examined (e.g., Inverted U Theory; Yerkes & Dodson, 1908; Cusp Catastrophe Model; Hardy, 1996). Critically, these anxiety-performance theories have been used to examine variables (e.g., task, level of competition, expertise) that affect the production of an optimal level of anxiety for individuals in specific circumstances. That is, irrespective of the influencing of variables there will be an ideal level of anxiety for each athlete (i.e., optimal zone of performance; Hanin, 1980, 1986). When athletes' experience sub-optimal anxiety performance will suffer (Causer, Holmes, Smith, & Williams, 2011; Englert & Bertrams, 2012; Horikawa & Yagi, 2012).

Certain levels of anxiety, preceding or during the execution of a task, may lead to negative repercussions, such as choking (Baumeister, 1984) and can be exacerbated by situational and contextual factors. For instance, evaluative contexts may increase perceived and deteriorate individuals' performances (Beilock & Carr, 2001; DeCaro, Thomas, Albert, & Beilock, 2011). Although much of the anxiety-performance research is relatively dated, recent studies have been published where more contemporary themes, such as neuro-responses may also link to performance under pressure. Masaki et al. (2017) investigated the effect of errors on neural responses under evaluation conditions, with three groups of athletes (high-level sports anxiety, low-level sports anxiety, and control). They executed a spatial Stroop task, with significant correlation reported between the neural responses (error-related negativity) and high levels of sports anxiety. In other words, not only was being evaluated inducing the levels of anxiety and causing under-performances, but athletes high in sports anxiety performed worse. To explore the relationship between anxiety and FT shooting, recently, Thomas (2017) investigated whether A-trait affected A-state and FT shooting of female collegiate basketball players. Thomas used the NEO Personality

Inventory (NEO-PI-R) to assess A-trait, and the state sub-scale of the State-Trait Anxiety Inventory (STAI) to measure the conditions (pressure vs. no-pressure). Thomas (2017) reported a positive correlation and significant effect of trait anxiety on state anxiety, however, no significant effect of trait anxiety on performance was reported, whereas state anxiety affected the performance negatively. Furthermore, a significant difference between pressure/no-pressure conditions was reported by Thomas (2017) in which participants performed better under pressure.

There have been several recent developments in anxiety management techniques that have potential implications for how choking could be managed. One such technique is termed adaptive working memory training has been investigated (Ducrocq, Wilson, Smith, & Derakshan, 2017), whereby, optimal levels of attentional control are needed under pressure, in order to ameliorate the adverse effects of anxiety. Ducrocq et al. explored whether the processing efficiency of the main executive functions of working memory (WM) could produce transferrable effects to sports performance outcomes, when training attentional control, using an adaptive dual n-back paradigm was implemented. A group of 30 tennis players were allocated to either WM training or the control group. They participated in 10 days of high pressure or low-pressure post training conditions, in which WM capacity, performance, and objective gaze indices of attentional control during a tennis volley task were assessed. Significant benefits of WM training on tennis performance were reported in the high-pressure condition.

Nonetheless, based on the findings of most recent studies regarding the effect of anxiety on various aspects of perceptual-motor behavior, it has been identified that anxiety not only affects attentional focus, but also triggers a chain of neurobiological and psychological responses (Hermans, Henckens, Joëls, & Fernández, 2014). The negative effects of anxiety can be extended to different levels of operational control and throughout

task execution phases. Therefore, anxiety could be influential in environmental perception, decision-making and task execution (Nieuwenhuys & Oudejans, 2017). Discovering the mechanisms with respect to causative influences of anxiety on performance has been a challenge for psychologists for many years. The concurrence in connection with perceptual-motor behavior in high-pressure contexts (e.g., shooting a decisive FT) is that heightened levels of anxiety provoke attentional changes, whereby individuals face difficulty to attend task-relevant information, thereby often resulting in under-performance (Eysenck & Wilson, 2016; Nieuwenhuys & Oudejans, 2012).

Explanatory Theories of Choking

Although, theories to explain choking have now been evolved considerably, in this first section, we provide an overview of the two predominant generic models, namely self-focus and distraction explanations. In proposing the self-focus model (also referred to as explicit monitoring, automatic execution and execution focus in the related literature) to explain choking, Baumeister (1984) drew on a number of researchers. For example, Martens and Landers (1972) who suggested that focusing evaluative attention on the process of performance may impair the performance more than focusing attention on the performance outcome. In the context of coaching practices where an outcome focus is eschewed in favour of a process focus, the Martens and Landers finding runs counter to conventional wisdom, and hence provides a potential alter- native or caveat for particular types of high-pressure situations. Numerous examples can be found in the early sport psychology literature where theorists subscribe to the importance of focusing on the performance process. Nideffer and Sagal (1998) recommended that athletes use the ‘process focus’ while performing to reduce the distraction of an ‘outcome focus’. For example, Nideffer and Sagal provided an example of avoiding an outcome focus by suggesting that in competitions swimmers should attend to some technical aspect of their stroke during

performance. The subsequent years of research in choking has resulted in sports psychologists being more reticent to subscribe to a unilateral process focus, particularly for choking-susceptible (CS) athletes in pressure circumstances. Baumeister described his understanding of the self- focus model; under pressure, a person realizes consciously that it is important to execute the behaviour correctly. Consciousness attempts to ensure the correctness of this execution by monitoring the process of performance (e.g., the coordination and precision of muscle movements); but consciousness does not contain the knowledge of these skills, so that it ironically reduces the reliability and success of the performance when it attempts to control it (p. 610).

In further explaining self-focus, Lewis and Linder (1997) emphasized the centrality of self- awareness (S-A) and the potential for competition, audiences, ego-relevance, reward and punishment contingencies to heighten S-A. Beilock and Carr (2001) described Self-focus theories as pressure raising self-conscious-ness and anxiety about performing correctly, that in turn increases the attention to skill processes and their step-by-step control. Attention to execution at this step-by-step level is thought to disrupt well-learned or proceduralised performances. Put another way, Masters (1992) stated that in pressure situations, individuals begin thinking about how they are executing the skill, and attempt to control it with their explicit knowledge of movement mechanics.

Supporters of self-focus theories have explained that increased levels of self-awareness (S-A) result in athletes inwardly focusing attention. Self-focus theories are contingent on stages of learning (Fitts & Posner, 1967). A novice during performance for example, attends to the explicit rule-based aspects of the skill rather than executing the task automatically. According to self-focus theorists, the process of well-learned and automated tasks is implicitly outside working memory and breakdowns in performance result from

reinvestment in well-learned skills and conscious processing through working memory (Hill et al., 2010b; Masters & Maxwell, 2008).

Explicit Monitoring Hypothesis (EMH; Beilock & Carr, 2001), and in particular, the Consciousness Processing Hypothesis (CPH; Masters, 1992) are the most renowned and cited self-focus theories. The key distinction is that Beilock and Carr in describing EMH state that step-by-step monitoring of performance causes the disruption in the execution of skills, whereas when Masters describes CPH he states that conscious controlling of the performance is detrimental. The available evidence shows that disrupting conscious control supersedes explicit monitoring as a detrimental performance explanation (Hill et al., 2010b; Jackson, Ashford, & Norsworthy, 2006). Attentional Threshold Hypothesis (ATH; Hardy, Mullen, & Martin, 2001; Mullen, Hardy, & Tattersall, 2005) has been proposed as an alternative hypothesis for CPH to explain performance decrements owing to the combination of anxiety-related cognitions and explicit instructions that exceed the attentional capacity threshold. Correspondingly, anxiety occupies a part of attentional resources normally required for performance. Hence, diminution of attentional resources has a detrimental effect on performance, when both components, anxiety-related cognitions and explicit instructions, are added collectively and individually (Gucciardi & Dimmock, 2008; Mesagno et al., 2009; Mullen et al., 2005).

When skilled performers are required to focus on skill execution, it can be challenging because they are not accustomed to thinking about specific cognitive processes while performing. This raises the interesting and seemingly counter-intuitive possibility that as sports people become more increasing skilled and their level of explicit skill execution knowledge increases commensurately, they become increasingly vulnerable to performance degradation under stress (Liao & Masters, 2002). Consequently, Beilock and Carr (2001) have pointed out that despite acquiring increased explicit knowledge experts

develop a type “expertise-induced amnesia” (p. 703) or what might be considered expertise-induced inattention because experts generally do not attend to explicit procedural knowledge when performing skills.

The primary alternative to self-focus models are generically termed distraction models and are founded on the belief that decrements in performance under pressure occur because of interference with task concentration that creates a type of dual task where the performer is switching between task relevant and task-irrelevant cues (Lewis & Linder, 1997). Distraction, by definition, is any stimulus or response requirement irrelevant to the individual’s primary task whether it is an external or an internal stimulus (Sanders, Baron, & Moore, 1978). In pressure situations individuals may accept too much information during performance, thus reducing their ability to focus on the task at hand. As a consequence, increased arousal leads to narrowing attention, resulting in a conflict between attending to the task at and attending to distracting stimuli (Sanders & Baron, 1975). Furthermore, Sanders et al. proposed that the increased arousal is likely to impair performance on complex tasks, because such tasks require more attention resources. Researchers have tested and reported positively on the relevance of Processing Efficiency Theory (PET; Eysenck & Calvo, 1992), a revised version of distraction theory, whereby athletes some- times overcome inefficient processing under pressure by applying increased effort (Murray & Janelle, 2003; Wilson, 2008; Wilson, Smith, & Holmes, 2007). Employing effort, however, may not be sufficient or advisable in pressure circumstances, because attentional capacities may be overwhelmed by virtue of high levels of anxiety (Hill et al., 2010b; Williams, Vickers, & Rodrigues, 2001). Recently, PET has been developed and represented as Attentional Control Theory (ACT; Eysenck, Derakshan, Santos, & Calvo, 2007). The interaction of two attentional systems including a stimulus-driven system and a goal-driven system determines attentional selection. It is presumed that anxiety

damages the efficiency of the goal-driven system and decreases attentional control through focusing attention on the stimulus-driven system. Applying compensatory strategies, such as increased effort, however, may avoid decrements in performance effectiveness (Moser, Becker, & Moran, 2012; Wilson, 2008). Beilock and Carr (2001) pointed out that self-focus models and distraction models are based on different mechanisms causing choking and can be viewed as opposite explanations. Comparing and contrasting explanatory models is important, because a therapeutic intervention might emphasize reducing the athlete's distractions and refocusing on task-relevant features while performing. If a self-focus model is used, however, to drive practice, interventions to reduce choking might emphasize attention away from the specific aspects of skills during performance. Despite these differences in underlying mechanisms, Beilock and Carr have demonstrated different instances where both self-focus and distraction explanations are applicable. For example, distraction theory is most applicable when skill execution is reliant on working memory for storage of decision and action-relevant information. Whereas, distraction models may be more applicable for strength and endurance dominant tasks and for novice and medium ability performers who have not fully automated their skills (Wang, 2002). In using a well-designed sequence of interrelated studies Beilock and Carr found that self-focus theories were the primary cause of choking but also cautioned that the most applicable theory is possibly dependent on (a) task complexity, (b) the degree that tasks become proceduralised with practice, and (c) the degree of motor activity and cognitive activity required in tasks. Beilock, Kulp, Holt and Carr (2004) have shown that for non-sensorimotor tasks, such as challenging mental arithmetic problems, distraction theories provide a better explanation of poor performance under pressure. From a sports perspective Jackson et al. (2006) discuss the possibility that process goals relating to strategic features of a task may engage attentional processes that serve metacognitive roles and thereby prevent a step-by step

focus on the processes governing skill execution. It is also widely recognised that distraction theories offer a better explanation for poor performance under pressure for novice performers (e.g., Beilock, Kulp et al., 2004).

In the last ten years, researchers have consistently shown that when experts are performing complex motor tasks they regularly perform better in dual task conditions. That is, because experts can complete tasks at the procedural or autonomous level they actually perform better under pressure when they are mentally loaded with an additional secondary task while performing the primary task (e.g., counting backwards from 100 while putting in golf). It is widely believed that the additional secondary task enables non-attention to the mechanics of the primary task that can break under pressure (Beilock & Carr, 2001, 2004; Beilock, Wierenga, & Carr, 2002; Gray, 2004). Conversely, when novices are required to carry out dual tasks under pressure they normally perform worse than in a single task condition because they require their working memory to assist with step-by- step task execution.

Update: Explanatory Theories of Choking

My intention in this section was to extend and update recently published research relevant to the theoretical models of choking. Researchers have developed and regularly revised explanatory theories of choking. A brief revision is necessary here. Disruptions to attentional processing was initially postulated as central in the two predominant theories; self-focus related theories (e.g. Baumeister, 1984; Beilock & Carr, 2001; Masters, 1992) and distraction related theories (e.g., Eysenck & Calvo, 1992; Eysenck et al., 2007; Wine, 1971) to explain the underlying mechanisms of choking (Beilock & Gray, 2007; Hill & Hemmings, 2015). According to self-focus theorists, consciously monitoring the explicit components of automated tasks under pressure can lead to breakdowns in well-learned skills (Beilock & Carr, 2001; Englert & Oudejans, 2014). The colloquial phrase “paralysis

by analysis" is representative of this theory, with the implication that a performance breakdown stems from over-analysing and disrupting the automatic execution of an instinctive action (Hussey, 2015; Wang, Marchant, & Morris, 2004). In contrast, distraction theorists have shown that choking can result from inefficient processing (Eysenck & Calvo, 1992) when athletes attend to task-irrelevant thoughts and stimuli instead of paying attention to executing the primary task (Beilock & Gray, 2007).

Researchers are, however, somewhat conflicted regarding which theory holds the greater validity in different circumstances (Christensen, Sutton, & McIlwain, 2015). Researchers have employed diverse research designs such as qualitative (e.g., Eysenck & Calvo, 1992; Gucciardi et al., 2010; Hill et al., 2010b) and quantitative studies (e.g., Beilock & Carr, 2001, 2004; DeCaro et al., 2011) or combinations of both (Mesagno et al., 2008, 2009) to examine and support two main choking theories. Based on the existing literature, self-focus theories are supported more strongly by the results of quantitative research (e.g., Beilock & Carr, 2001; Gucciardi & Dimmock, 2008; Mesagno et al., 2009), whereas distraction theories are supported more strongly by the results of qualitative research (e.g., Gucciardi et al., 2010; Hill et al., 2010; Hill & Shaw, 2013). A variety of interventions (e.g., task-irrelevant cues, analogy or implicit learning, dual task, quiet eye (QE) training, process goal, left-hand contractions, fluency cues, pre-performance routine (PPR) and neurofeedback training) have been designed and tested mostly to examine aspects of self-focus theories. Similarly, examples of quantitative studies used to examine self-focus theories are representative of experimental designs (e.g., Ashford & Jackson, 2010; Beckmann, Gröpel, & Ehrlenspiel, 2013; Bobrownicki, MacPherson, Coleman, Collins, & Sproule, 2015), quasi-experimental designs (e.g., Gröpel & Beckmann, 2017), and single-case designs (e.g., Mesagno et al., 2009) studies.

Methods of learning have also been used extensively in choking research. For example, implicit learning as a choking intervention has been used to decrease the likelihood of task reinvestment by reducing explicit knowledge while learning sport skills (Masters, 1992). The effectiveness of implicit learning techniques to support self-focus theories have subsequently been used in many studies (Liao & Masters, 2001; Masters, 1992, 2000; Vine, Moore, Cooke, Ring, & Wilson, 2013), whereas other researchers have reported no significant effects of implicit learning among high jumpers and golfers (Bobrownicki et al., 2015; Schücker, Ebbing, & Hagemann, 2010; Schücker, Hagemann, & Strauss, 2013). Zhu, Poolton, Wilson, Maxwell, and Masters (2011) have demonstrated that implicit learning is useful, but not under pressure circumstances for skilled performers. Irrespective of pressure, golfers putted more accurately if they used implicit learning that is relying on incidental, ingrained, and largely automatic processes rather than explicit technical instructions. To summarise, the findings of research implementing implicit-explicit learning are largely in favour of using explicit approaches at the early stages of learning complex motor tasks and gradually switching to implicit approaches once the skills are well learned.

Quiet Eye (QE) training has been considered and examined from the performance pressure perspective. QE is defined as the final visual fixation toward a relevant target prior to the execution of a movement (Vickers, 2007). Wood and Wilson (2011) found a significant difference between QE and control group in football penalty shootout task, however, these results have not been replicated under pressure. QE interventions have been supported by researchers examining applicability to both novice athletes (e.g., Moore, Vine, Cooke, Ring, & Wilson, 2012; Vine et al., 2013; Vine & Wilson, 2010: 2011) and experts (e.g., Vine, Moore, & Wilson, 2011; Wood & Wilson, 2012) whereby the QE group performed better than control group.

Dual task is another type of intervention that has been successfully used by researchers to demonstrate the potential benefits for athletes that habitually obtain explicit knowledge while acquiring the skill with counter-productive results. Different dual tasks have been presented by researchers such as counting numbers backwards (Lewis & Linder, 1997; Nibbeling, Oudejans, & Daanen, 2012), generating random letters in response to sounds (Jackson et al., 2006, Study 1; Land & Tenenbaum, 2012), verbalising a word at a specific moment during performance (Land & Tenenbaum, 2012), or concentrating on the lyrics of a song during FT shooting (Mesagno et al., 2009). With the exception of Nibbeling et al. (2012) the findings from these studies support the effectiveness of using dual task during high pressure performances. Similarly, implementing task-irrelevant cues has also been found to be beneficial when performing under pressure (Balk, Adriaanse, De Ridder, & Evers, 2013; Gucciardi & Dimmock, 2008). Recently, researchers have also found significant benefits of having athletes carry out brief contralateral (left-hand contractions for a right-handed athlete) such as squeezing a softball while performing under pressure (Beckmann et al., 2013; Cross-Villasana, Gröpel, Doppelmayr, & Beckmann, 2016; Gröpel & Beckmann, 2017). Moreover, researchers who examined goal setting (Jackson et al., 2006, Mullen, Faull, Jones, & Kingston, 2015) and neurofeedback training (Ring, Cooke, Kavussanu, McIntyre, & Masters, 2015) have reported no significantly positive effects of these interventions to improve performance.

Cappuccio (2017) has concluded that the research findings have been more supportive of self-focus theories and the performance decrements in elite level athletes are due to conscious over processing. Cappuccio (2017) summarised the self-focus arguments with four points. First, some researchers (e.g., Beilock and Carr, 2001) highlighted the inconsistency of distraction theories because choking often results from situations of focused attention, such as concentrating solely on one task, whereas choking is less

prevalent when attention is divided between multiple tasks (e.g., dual tasks). Second, some researchers (e.g., Beilock, Bertenthal, McCoy, & Carr, 2004) have outlined that cognitive overload theories are unable to explain why choking does not normally influence elite athletes' executing skills in fast-paced conditions, whereas the choking increases substantially under self-paced conditions. Third, the predominant theories are believed to predict choking depending on the skill level of athletes. Beilock and Gray (2007) have drawn on the extensive literature to conclude that choking at the experienced level is predominately explained by self-focus theories, whereas choking at the novice level is predominately explained by distraction theories. Fourth, distraction theorists are unable to explain how the application of multiple tasks and distractors in therapeutic interventions can enhance the performance of CS athletes (Cappuccio, 2017). Distractors that prevent overthinking about the main task could improve performance despite occupying that part of the working memory that is required for task execution (Cappuccio, 2017). Despite the arguments above that support self-focus theories, and also the assumption that anxiety occupies athletes' focus during performance, some authors (e.g., Montero, 2015) are still uncertain about the link between anxiety, self-focus and consequent choking. Moreover, the conclusions reached regarding self-focus theories are primarily supported by quasi-experimental research, rather than actual competition, so their ecological validity is questionable. Finally, the indispensable role of explicit monitoring is recognised in complex sporting tasks, particularly during execution of open skills, where multiple interactions and decision-making are required (Cappuccio, 2017). In conclusion, self-focus theories are more applicable to expert performance contexts that include automaticity and fluidity of a well-practised task in familiar circumstances. Conversely, distraction theories are more applicable to expert performance contexts that demand complex decision-making and problem solving (Cappuccio, 2015, 2017; Carr, 2015).

In view of the support for both predominant choking theories, depending on the context, researchers have recently posited that a combination of self-focus and distraction theories can be considered as a more efficient explanation of choking (DeCaro et al., 2011; Mesagno & Beckmann, 2017; Nieuwenhuys & Oudejans, 2012). Some researchers (e.g., Mesagno, Geukes, et al., 2015) have emphasised the important point that both theories may contribute to explain the occurrence of choking, but not simultaneously. Despite the applicability of each mechanism in certain contexts, researchers are still trying to recognise at what point each theory specifically can explain the performance failure.

Integrated anxiety and perceptual-motor performance model. Anxiety has been identified by researchers as one of the most influential factors in performance deterioration under pressure. Nieuwenhuys and Oudejans (2012) rationalised that attentional theories have limited capacity to explain how anxiety influences the disruption of task execution. Hence, Nieuwenhuys and Oudejans (2012) introduced an integrated model of anxiety and perceptual-motor performance to clarify how anxiety may differentially influence performance by focusing on positive and negative anxiety-related influences. Nieuwenhuys and Oudejans (2017) also identified three levels of control (i.e., attentional, interpretational, and physical response), in which the neurobiological changes related to high pressure and anxiety are operationalised. This integrated model is used to explain how psychological and neurobiological responses functionally link responses to various aspects of perceptual-motor behaviour, such as anxiety, in pressure circumstances. Nieuwenhuys and Oudejans (2017) proposed perceptual-motor behaviour as an active process with three stages, including perception, selection, and action. In the first stage, individuals detect task-relevant information. In the second stage, individuals make decisions and select a suitable action according to the stimuli. In the third stage, individuals execute suitable movements to achieve the selected plans and goals coordinated in the first two stages. Regardless of the

situation, individuals need to efficiently control their movement and consider their specific circumstances when planning decisions and actions. The integrated model was derived from Attentional Control Theory (ACT; Eysenck et al., 2007), in which it is argued that anxiety, aside from disrupting the regulation of goal-directed control processes, tends to produce compensatory efforts. Accordingly, CS individuals are expected to apply additional mental effort and resources to reduce their levels of anxiety, control stimulus-driven impulses, and facilitate goal-directed control (see Nieuwenhuys & Oudejans, 2017).

The self-presentation model (Schlenker & Leary, 1982) is another model that has been applied to choking (Mesagno et al., 2011). According to proponents of the self-presentation model, athletes possessing particular personality traits are more prone to experience heightened cognitive state anxiety and choking. Recently, Mesagno and Beckmann (2017) posited combining the original models of choking (i.e., self-focus and distraction) with the self-presentation model (Mesagno et al., 2011) and introducing them as one comprehensive model, whereby the attention-related and anxiety-related features are explained by the original theories and self-presentation models, respectively. Mesagno and Beckmann (2017) have also suggested aggregating self-presentation model (Mesagno et al., 2011) with the integrated model of anxiety and perceptual-motor performance (Nieuwenhuys & Oudejans, 2012) to produce a more comprehensive model to explain the underlying mechanisms of choking.

Moderators Associated with Choking

Self-focus models and distraction models have been used to explain the broad relationship between attention and performance under pressure. There is also considerable accumulated knowledge now available about the specifics of numerous factors that precipitate choking. Self-consciousness as measured through self-report has been shown to predict choking although, contrary to the early work of Baumeister (1984) where low self-

conscious individuals were at risk to choking, the prevailing body of sport research has shown that high self-conscious individuals are more susceptible to choking (Dandy, Brewer, & Trotman, 2001; Wang, Marchant, Morris et al., 2004; Wang, Marchant, & Morris, 2004). Similarly, high reinvesters (i.e., high propensity for reinvestment in controlled processing) have been shown to be more susceptible to choking (Masters, Polman, & Hammond; 1993; Poolton, Maxwell, & Masters, 2004). It should be noted that the similarity in choking susceptibility with both high self-conscious individuals and high reinvesters is hardly surprising given that over half of the reinvestment scale items (Masters et al., 1993) typically used to measure reinvestment, are drawn directly from the self-consciousness scale (Fenigstein et al., 1975) and thus, share considerable variance. In drilling down into why some athletes self-monitor under pressure, Mesagno, Harvey and Janelle (2012) argue that efforts to generate a positive self-image to others helps to minimise social anxiety. Conversely, in situations where people doubt they will be successful, self-presentation concerns increase anxiety because of the possible ramifications for how the unsuccessful self may be viewed by others. For example, Wilson and Eklund (1998) have discussed a number of self- presentation concerns that athletes experience including concerning the inability to handle pressure or incompetency. Drawing on Leary (1992), Mesagno, Harvey, and Janelle (2011) state that people experience more social anxiety particularly if those impressions lead others to devalue, avoid, or reject them. They also argue that being portrayed as unsuccessful under pressure (e.g., choking) can lead to self- and relational devaluation. Also based on a self-presentation model, Mesagno, et al. (2012) demonstrated how a related concept, fear of negative evaluation (FNE), can precipitate choking. Watson and Friend (1969) defined fear of negative evaluation as "apprehension about others' evaluations, distress over their negative evaluations, avoidance of evaluative situations, and the expectations that others would evaluate oneself negatively"

(p. 449). Mesagno et al. (2012) used dichotomous groups (i.e., high and low in FNE) to demonstrate that high FNE basketball players performed poorly under pressure (i.e., inference of choking). Self-presentation and FNE as underlying contributors to choking are especially relevant because self-presentation and FNE have been consistently linked with both anxiety and attention (i.e., via self-focus), the two key domains that constitute choking.

Other potential moderators associated with choking include; trait anxiety (Baumeister & Showers, 1986), self-confidence (Baumeister, Hamilton, & Tice, 1985), skill level (Beilock & Carr, 2001), task properties (Beilock & Carr, 2001), stereotypical threat (Chalabaev, Sarrazin, Stone, & Cury, 2008), public status (Jordet, 2009a), dispositional reinvestment (Masters et al., 1993), fear of negative evaluation (Mesagno et al., 2012), audience effects (Wallace, Baumeister, & Vohs, 2005), and coping style (Nicholls & Polman, 2007, 2008; Wang, Marchant, & Morris, 2004).

For those that subscribe to the view that sport psychologists should focus on transferring their knowledge and expertise to solve practical problems then choking is a worthy topic. To date, the majority of choking interventions have been designed to test distraction theories and self-focus theories. Yet, most of the research has been theoretically-driven rather than practically-driven. Possibly researchers, for some years, were reluctant to test evidence-based interventions because, as Baumeister and Showers (1986) suggested, “the development of therapeutic techniques for ameliorating choking must wait until this debate is resolved” (p. 377). The ‘debate’ referred to here is whether the self-focus model or the distraction model provides the best explanation of choking. As discussed earlier in the chapter, recently there has been considerable research deciphering in which circumstances the self-focus models and distractions models are most applicable and, although theories will continue to be examined, researchers are beginning to focus more

intentionally on testing choking interventions and practical solutions (e.g., Gucciardi & Dimmock, 2008; Hill et al., 2011; Mesagno et al., 2008, 2009). Consequently, the previous imbalance between the high proportion of theoretically-driven studies and low proportion of intervention- driven studies is being re-balanced.

Update: Moderators Associated with Choking

Researchers have recently strived to elucidate additional factors that may relate to the choking phenomenon. Accordingly, various aspects of the related theories have been developed to more clearly explain the underlying mechanisms and to recognise the influential variables of choking. The accumulated research into the influential variables of choking has resulted in a number of potential antecedents and moderators being associated with choking. In the previous literature (e.g., Hill et al., 2010b; Marchant, Maher, & Wang, 2014), these influential variables have been labelled as moderators; however, in other literature (e.g., Hill & Shaw, 2013), they were separated as either antecedents or moderators. There have not been precise definitions of antecedents and moderators to differentiate them in choking literature; hence, the following definitions have been extracted from other sources. Antecedent is defined in the English Oxford dictionary as “a thing that existed before or logically precedes another” (2017). Lee, Chan, and Berven (2007) defined an antecedent related to depression as any event that increases the probability of the future occurrence of depression, including macro-stressors, micro-stressors, and chronic difficulties. Baron and Kenny (1986) defined a moderator as “a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable” (p. 1174). Accordingly, the following is an update, in which the influential variables are split into two categories. The antecedents that exist and influence before (and sometimes during) the performance include: the presence of an

audience (Baumeister & Steinhilber, 1984; Wallace et al., 2005), public status (Jordet, 2009a), fear of negative evaluation (Mesagno et al., 2012), self-confidence (Baumeister et al., 1985; Wine, 1971), trait anxiety (Baumeister & Showers, 1986; Wang, Marchant, Morris, et al., 2004), dispositional reinvestment (Masters et al., 1993), self-consciousness (Baumeister, 1984; Geukes, Mesagno, Hanrahan, & Kellmann, 2013b; Wang, Marchant, Morris et al., 2004), narcissism (Geukes, Mesagno, Hanrahan, & Kellmann, 2012, 2013a; Wallace & Baumeister, 2002; Wallace et al., 2005), coping style (Wang, Marchant, Morris et al., 2004), important games/moments (Gómez et al., 2015; Hill & Shaw, 2013), expectations (Gucciardi et al., 2010; Hodge & Smith, 2014), individual responsibility (Barić, 2011, Hill & Shaw, 2013), fear of failure (Gucciardi et al., 2010), physical/mental errors (Hill & Shaw, 2013), poor preparation (Hill et al., 2010a; Wallace et al., 2005), and physiological fatigue (Murayama & Sekiya, 2007, 2015; Murayama, Tanaka, & Sekiya, 2009). The moderators that have been linked to choking include: skill level and task properties (Beilock & Carr, 2001), stereotype threat (Beilock & McConnell, 2004; Chalabaev et al., 2008), opponents (Hill & Shaw, 2013), perfectionism (Hall, Kerr, & Matthews, 1998), team cohesion (Adegbesan, 2007; Baker, Côté, & Hawes, 2000), motivational climate (Barić, 2011), mental skills, action orientation (Gröpel, 2016; Heckhausen & Strang, 1988), and passion (Hill & Shaw, 2013).

The link between the aforementioned factors and choking has been examined and shown by various studies, however, uncertainty still exists involving recent findings that have not been examined sufficiently. The main reason for the scarcity of research is that multiple factors can influence performance simultaneously (Buekers et al., 2017), hence it is challenging to identify one particular element as the choking trigger. In this section, firstly, I review the most recent qualitative studies in connection with antecedents and moderators of choking, and relevant research not discussed in the book chapter. Secondly,

since the quantitative and intervention-based studies are presented under the sub-heading of "Interventions and Knowledge Transfer in Choking", I just briefly include the more relevant quantitative studies in order to complement the discussion regarding the antecedents and moderators of choking. In recent years, researchers examining choking have adopted qualitative methodologies to understand the choking experience from athletes' perspectives (e.g., Gucciardi et al., 2010; Hill et al., 2010a, 2011, 2013; Stoker, Lindsay, Butt, Bawden, & Maynard, 2016). To examine golfers' choking experiences, Gucciardi et al. (2010) conducted a focus group (12 males), and also individual interviews (seven females and three males). The findings were categorised in five primary themes: antecedents, personal investment, choking event, consequences, and learning experiences. The five primary themes were representative of numerous sub-themes. The antecedents theme was representative of six sub-themes: loss of attentional control, perfectionistic tendencies, loss of emotional control, fear of failure, directional interpretation of anxiety and perceived pressure (internal and external). The personal investment theme consisted of personal meaning and personal improvement sub-themes. The choking event theme included loss of attentional control, loss of emotional control, departure from normal routine and physiological symptoms sub-themes. The consequences theme assimilated the sub-themes of loss of confidence/trust in ability, emotional distress, suboptimal performance and loss of enjoyment. Finally, the learning experiences theme embraced the sub-themes of maintaining a consistent pre-shot routine (including behavioural and cognitive strategies), trust in the game plan and physical ability, drawing confidence from previous experiences, maintaining perspective (e.g., why you enjoy golf), and investing in the process not the outcome. Gucciardi et al. (2010) asserted that a lack of emotional control due to mounting perceived pressure critically impaired performance thereby heightening negative emotions and reducing positive emotions. Participants also indicated

that a certain level of anxiety could play a facilitative role, whereas excessive anxiety is debilitating and associated with the occurrence of choking. Moreover, Gucciardi et al. (2010) concluded that fear of failure and perfectionism were potential moderators of choking, and also highlighted the substantial role of pre-shot routine, whereby departure from the routine increased the likelihood of choking.

Despite the development of experimental studies and more recently creative approaches to designing choking studies, simulating real world situations and inducing pressure commensurate with competitive settings has remained an issue for choking researchers. Recently, the approach of analysing large data sets of how athletes perform under pressure in actual competitions represents a new trend to address the ecological validity confound. For instance, Harb-Wu and Krumer (2017) analysed the shooting performances of elite biathletes during 16 years of top-level competitions and reported that the athletes missing significantly more shots while performing in front of a supportive audience. The findings often parallel previous studies gleaned from traditional experimental and quasi-experimental designs examining for instance home audiences can induce more pressure and cause choking (Butler & Baumeister, 1998) and was termed “the trouble with friendly faces”. Wallace et al. (2005), however, further qualified these results by finding that supportive audiences only negatively affect skill-based tasks that demand automatic processes, whereas supportive audiences enhance performance for effort-based tasks.

Team sports. The debate about choking in team sports has recently engaged the interest of investigators using qualitative designs. Researchers found that it is not feasible to simply apply and generalise the findings of individual sports or coactive tasks to team sports or collective tasks (Wolf, Eys, & Kleinert, 2015). Iwatsuki and Wright (2016) posited that there might be differences between individual and team sports athletes on the subject of choking. They examined collegiate athletes (84 males), including squash, tennis,

volleyball, soccer, and basketball players and highlighted movement self-consciousness as a predictor of athletes' perception while choking under pressure. Moreover, higher incidence rates of choking were reported in individual sport athletes compared to team sport athletes. The reason might be the athletes in individual sports have to deal with the pressure of competitions individually whereas the pressure of a contest in team sports would be spread among the team members. Teammates can also help each other to deal with pressure as outperformances by some players compensate others' underperformances.

One of the most notable issues in studying choking in team sports is that athletes' performance can be influenced by teammates or opponents. Researchers (Englert & Oudejans, 2014; Fryer, Tenenbaum, & Chow, 2018; Gómez et al., 2015; Jordet & Elferink-Gemser, 2012; Toma, 2017) have investigated individual, self-paced tasks in team sports particularly the moments leading up to critical performance situations. In an attempt to isolate the influence of others, Jordet, Elferink-Gemser, Lemmink, and Visscher (2006) examined the penalty shot in soccer. Ten highly-ranked soccer players were interviewed after watching themselves taking penalty shots at an international tournament. The aim was to extract the players' perceptions of the outcome (luck or skill), competence (perceived ability at penalty taking) and control (perceived ability to cope with anxiety). Those with higher perceived competence, who believed the outcome was due to luck rather than skill, experienced higher levels of anxiety (Jordet et al., 2006). Jordet and Elferink-Gemser (2012) interviewed eight elite soccer players, who had participated in European Championship penalty shoot-outs, about their experience through four mini-stages or critical moments: (a) the break before the shoot-out began, (b) waiting for their turn to shoot, (c) walking to the penalty mark, and (d) executing the shot. Noticeable variations in the experience of stress, coping, and emotions during the performance stages were evident. Participants found the first stage to be particularly stressful. In addition, feelings of solitude

and disrupted concentration for some participants during the third stage were reported. Less stress occurred at the penalty mark compared to the previous stages. Fear of failure combined with worrying about the goalkeeper's potential behaviour was identified as an outcome threat. Various coping strategies, including problem-focused coping, emotion-focused coping and avoidance coping were employed (Jordet & Elferink-Gemser, 2012). Hill and Shaw (2013) examined the perceived choking experiences of eight team sport (rugby union, soccer, hockey, volleyball, and cricket) athletes. Some of the identified antecedents of choking, such as the importance of the games and moments, high expectations, self-confidence, the presence of an audience, and poor preparation were similar to the findings from previous studies (see Gucciardi et al., 2010; Hill et al., 2010a; Mesagno et al., 2011). Moreover, Hill and Shaw (2013) outlined antecedents that precede choking, including physical and mental mistakes, maladaptive coping, and actions of opponents, physical fatigue and expectation that athletes would assume responsibility under pressure. Passion was also cited as an antecedent, whereby obsessive passion can generate negative cognitions and behaviours such as disrupted attention. Participants in the Hill and Shaw's study (2013) emphasised the role of distraction in causing choking and reinforced the importance of implementing strategies, such as performance routines, process goals, and cognitive restructuring, to improve perceived control for CS athletes to maintain or improve their performance under pressure. The participants also linked choking to negative evaluations from others, lending support to the self-presentation model of choking (see Mesagno et al., 2011). Participants also highlighted the influential role of team dynamics and motivational climate on choking. Hill and Shaw (2013) advocated that coaches encourage an approach-mastery training and performance climate to reduce the likelihood of choking for CS athletes (Hill & Shaw, 2013). After the New Zealand All Blacks won the 2011 Rugby World Cup, Hodge and Smith (2014) investigated specific aspects of choking

such as stereotype threat and coping experiences of players and coaches through in-depth interviews and also included previous media, such as interviews and autobiographies. Hodge and Smith (2014) reported five key themes, including public expectation and pressure, learning from the previous world cup, coping with world cup pressure, decision-making under pressure, and avoiding the choke. As a result, the All Blacks improved their choking-resistance, and deliberately replaced negative stereotypes of managing pressure with positive stereotypes of managing pressure.

Self-confidence has been frequently investigated and identified as a potential antecedent of choking (Baumeister & Showers, 1986; Baumeister et al., 1985; Otten, 2009). Fransen, Vanbeselaere, De Cuyper, Vande Broek, and Boen (2015) explored confidence in team sports and how athlete's confidence can be strengthened. Two sources of confidence; process-oriented team confidence (i.e., collective efficacy) and outcome-oriented team confidence (i.e., team outcome confidence) were investigated using a mixed method research. Forty-three soccer coaches and 30 basketball coaches were initially interviewed, and 72 sources of team confidence were identified. Then, using a quantitative method, 1028 soccer coaches and players and 867 basketball coaches and players completed questionnaires measuring the perceived the sources of team outcome confidence perceived sources of the collective efficacy. Based on the findings of Fransen et al. (2015), high-quality performance was recognised by players as the foremost element of the team outcome confidence, whereas team enthusiasm was the paramount factor for collective efficacy. Positive coaching was perceived as second determinant factor for both sources of team confidence. Also, the main causative factors of low levels of team confidence were negative communication and negative expression by players or coaches. The results indicated the central role of the athlete leaders and the coach is to manage either upward or downward spirals of team confidence that affect all team members (Fransen et al., 2015).

The importance of the game and the magnitude of the competition have also been identified as a possible antecedent of choking (Baumeister, 1984; Gómez et al., 2015; Hill & Shaw, 2013; Morgulev & Galily, 2018). For example, by analysing 360,000 FT shots during clutch moments of NBA games, Goldman and Rao (2012) reported a significant FT shooting decrements at home games compared to away games. This effect was largely attributed to the pressure induced by the home supportive audience or other confounding factors. The occurrence of choking is frequently discussed during NBA playoffs. Not only the importance of the games is critically heightened, but also extrinsic rewards such as monetary incentives are contingent on performance, particularly when teams are threatening by possible season elimination circumstances. Morgulev and Galily (2018) who collected data from 33 NBA seasons and analysing 1,930 playoffs games reported that when faced with elimination players objectively produced higher levels of effort related statistics but produced lower skills related statistics. Based on the results of Morgulev and Galily (2018) the practice of providing more incentives to motivate the players may ironically cause additional pressure on them and lead to performance declines under pressure for skill related tasks such as FT shooting. These findings accord with Dohmen (2008) who has stated that “high rewards or the threat of severe punishment might sometimes be perceived as pressuring and lead to poor performance” (p. 636).

Another type of choking episode in the context of team sports is collective collapse, when a number of teammates abruptly and inexplicably start under-performing in a period of the game. This type of contagion effect was investigated in a study using nine elite male handball players, who encountered the collapse previously and agreed to participate in semi-structured interviews (Apitzsch, 2009). According to the drawn conclusions, the collective collapse can emanate from inappropriate behaviour, inefficient functioning of the role system, negative communication between teammates, changing in the opponent

strategies, and scoring by the other team. The participants recommended that negative thinking, negative emotions, and negative emotional contagion should be dealt with to circumvent the failure (Apitzsch, 2009). In a mixed method qualitative and quantitative study, collective collapse in basketball was investigated (Granér, 2010). Based on the results, a performance anomaly initiates whereby players can negatively affect each other's performance, and consequently produce a downward spiral. Hence, the collective collapse can be considered as a group dynamic context where the crew function ineffectively and cause performance deterioration. The dysfunctional behaviour, which is due to simultaneity of various factors, can be observed not only from individuals within the team but the team collectively. Within the social structure of the team are ruptured, which in turn weakens the performance of the individual, accentuating for both individual and team. One explanation does not exclude the other, since a combination of factors appears to operate simultaneously (Granér, 2010).

Choking-susceptible vs choking-resistant. The extremity approach to investigating performance under pressure has focused on choking as a performance failure and clutch, as performance success. Nomenclature introduced by Wang, Marchant, and Morris (2004) and later by Mesagno (2006) has been choking-susceptible (CS) and choking-resistant (CR) to differentiate between athletes that habitually perform either poorly or well under pressure. Hill et al. (2010a) examined the experiences of six CS and five CR elite golfers and included the perspectives and observations of their coaches. They reported that CS golfers employed avoidance coping strategies compared to CR golfers, who successfully applied approach coping strategies. Moreover, Hill et al. outlined self-confidence, preparation, and perfectionism as paramount choking variables. The participants also suggested preventive strategies, such as imagery, practice simulations, pre-shot and post-shot routines, cognitive restructuring and process goals. Hill et al. (2011)

applied these findings in an action research approach with two CS professional golfers over a 10-month, multi-method intervention. Avoidance coping behaviours (rushing and disengagement) increased the likelihood of choking, whereas the intervention consisting of approach coping strategies (cognitive restructuring, holistic process goals, and pre-post shot routines) decreased choking occurrence. Mesagno and Marchant (2013) studied CS and CR athletes using a mixed-method design. The selection criteria for identifying CS and CR players were a combination of several psychological variables, including trait anxiety, self-consciousness, and coping style. CR participants were low trait anxious, low in self-consciousness, and used avoidance coping styles. CS participants were high trait anxious, high in self-consciousness, and typically used approach coping styles. As expected, CS players under-performed when exposed to pressure, whereas the CR players maintained or improved their performance (Mesagno & Marchant, 2013). Recently, Hill and Hemmings (2015) interviewed six elite golfers, who had experienced both choking and clutch performances under pressure. These golfers had applied approach coping strategies, such as simulated practice, pre- and post-shot routines, and cognitive restructuring that facilitated clutch performances under pressure. Conversely, avoidance coping strategies such as rushing and denial were linked to an increased likelihood of choking.

Interventions and Knowledge Transfer in Choking

Based on choking theories, researchers have employed various interventions to test the efficiency of proposed choking alleviation solutions. For example, Gucciardi and Dimmock (2008) compared the CPH and the ATH theories and found that a focus on explicit technical instruction for novice golfers caused choking, whereas experienced golfers were able to maintain their performance by concentrating on an abstract ‘swing thought’ (e.g., smooth, tempo) or irrelevant thought (i.e., a color) while executing a putting task under pressure circumstances. Oudejans and Pijpers (2009) investigated the

effectiveness of anxiety training on choking with elite basketball and darts players. They found that intentionally practising the task in pressurised environments is beneficial in reducing performance decrements. Traditional approaches such as using mental skills strategies are still beneficial in improving the athletes' performances. For instance, Neumann and Hohnke (2018) examined whether setting a performance goal is beneficial for elite basketball players while shooting FT under pressure circumstances. Based on the findings, the FT accuracy of elite players, especially those showing a FT skill deficit, in game situations can be enhanced through implementing the practice by performance goals. A novel approach to reducing choking susceptibility was recently tested by Beckmann et al. (2013) who had participants squeeze a soft ball in either their left or right hand for 30 seconds prior to executing soccer penalty kicks, Taekwondo kicks and badminton serves in three interlinked studies. The rationale underlying squeezing the ball is linked to evidence that under pressure right hemisphere activity is increased via increased activity of the Broca's region of the brain which is involved in language production. Hemisphere-specific priming (e.g., ball squeezing) can apparently be activated by contralateral movements. That is, squeezing the ball with the left hand will increase activity in the right hemisphere and vice versa. Beckmann et al., state; "It can be argued that this disadvantageous hemispheric asymmetry reflects a regression to the cognitive phase of motor learning, which occurs under pressure and, in turn, produces choking" (p. 3). With all three sport tasks left-hand ball squeezing was associated with superior performance when comparing pre-pressure and post-pressure skill execution. The Beckmann et al., study opens a further line of inquiry for sport choking researchers apart from traditional intervention methods (i.e., imagery, routines, and arousal control). We expect researchers will follow-up with further studies to examine other potential hemisphere priming actions. The ball-squeezing task is appealing from a practical perspective because it can easily be built into established routines in many

sports (Beckmann et al., 2013). Whether we see golfers walking up the final fairway of a major or tennis players during a break in games squeezing a soft ball in their left-hand remains to be seen. Nevertheless, hemisphere activation provides an example of the diverse range of interventions that are being tested to ameliorate or dampen choking effects.

There have been calls for a move away from the predominant experimental approaches toward more qualitative and ecologically valid designs (Gucciardi & Dimmock, 2008; Mesagno et al., 2009). Hence, changing the research paradigm may be necessary to produce a greater weight of evidence especially regarding choking interventions. To date, only a few researchers (Mesagno et al., 2008, 2009; Hill, Hanton, Matthews, & Fleming, 2010a, 2011) have attempted to combine qualitative and quantitative methods to examine the effectiveness of interventions on CS athletes. Mesagno et al., (2008, 2009) applied defined selection criteria to sample participants based on three variables consisting of high self-consciousness, high trait anxiety and approach coping style. To examine the efficacy of a PPR for choking alleviation, Mesagno et al. (2008) intervened with elite tenpin bowlers utilising a single subject design and in-depth interviews. The rationale for employing interviews was that participants who evidently choked should be interviewed to provide the textual depth of narrative relating to their choking experience. Mesagno et al. (2008) concluded that PPR intervention had a preventative influence on choking. In the second study, Mesagno et al. (2009) had experienced basketball players listening to specifically selected music that contained lyrics to challenge anxious thinking before the task and subsequently the players were to focus on these lyrics while performing free-throw shots. This second intervention, again with a small number of purposively selected participants was also effective. Interviews were conducted after completion of the experimental manipulation to examine perceptions of choking and cognitions relating to the effects of the interventions. The data derived from these interviews provided detailed knowledge about

participants' choking experience not normally achievable through quantitative studies. These studies represented initial attempts to transfer knowledge into practical contexts and a practical technique for alleviating choking through the combination of qualitative and quantitative methods. Hill et al. (2010a) explored the experiences of six elite CS and five CR golfers qualitatively. Moreover, the perceptions of their coaches were also taken into account and thus provided a degree of triangulation. Hill et al. (2010a) found that self-confidence, focus, anxiety management and perceived control were enhanced by applying mental skills in the pre and post-shot routines. These mental skills included cognitive restructuring, imagery, simulated practice and holistic swing thoughts with the result being a reduction in performance decrements under pressure. Hill et al. (2011) also further examined the effectiveness of an evidence-based intervention on choking incorporating a multi-model strategy including process goals, cognitive restructuring, imagery and simulated training with two professional golfers who have frequently been negatively affected by choking. Qualitative evaluations indicated that the interventions were again beneficial.

Update: Interventions and Knowledge Transfer in Choking

Although the relevant published literature in the choking realm represents a substantial body of work, most of the intervention-based studies have been designed reliant on the traditional choking theories. Hence, a gap exists regarding the inclusion of narrative accounts from athletes about their experiences of choking and also examining currently presented theories. Similarly, endeavours to apply research findings to practical settings and from practical settings to research are not common. Knowledge, transfer, and exchange (KTE) is the process of acquiring, developing, sharing and applying knowledge (Verburg & Andriessen, 2011). Exchange models place a heavy emphasis on close interaction between researchers and practitioners for the successful dissemination of knowledge to occur

(Russell, Greenhalgh, Boynton, & Rigby, 2004). Mesagno and Beckmann (2017) pointed out that possessing knowledge regarding the choking models is not sufficient to prevent the occurrence of choking.

One of the main issues with research is ecological validity because the majority of experimental research on performance under pressure (choking and clutch) has been conducted under laboratory-based pressure conditions (e.g., Beilock & Carr, 2001; Mesagno et al., 2008, 2009). Mesagno et al. (2011) differentiated the conditions based on the pressure-inducing situational factors as motivational (e.g., monetary incentives) and self-presentational factors (e.g., audiences). Accordingly, Geukes et al. (2013a) presented three categories: (1) private high-pressure conditions, which are laboratory-based, high-pressure conditions mainly relying on the manipulation of motivational cues (e.g., Geukes et al., 2013a; Gucciardi & Dimmock, 2008; Wallace & Baumeister, 2002); (2) mixed high-pressure conditions, which combine the manipulation of motivational and self-presentational cues (e.g., Mesagno et al., 2012; Otten, 2009; Wang, Marchant, Morris et al., 2004); and (3) public high-pressure conditions, which rely on self-presentational cues and occur in real-world contexts outside the laboratory (e.g., large audiences; Geukes et al., 2013b). To date, the majority of the experimental studies are from the mixed high-pressure conditions category, that is, closer to the private rather than public category. Geukes, Harvey, Trezise, and Mesagno (2017) argue that the results from those limited studies that have been conducted in real-world situations are more ecologically valid.

Choking and personality traits. According to some theorists' research, the labels choker or clutch performer are grounded in the athletes' personality. Hence, the occurrence of choking can potentially be predicted based on personality while also considering other situational variables (Otten, 2009). Researchers have attributed the antecedents and moderators of choking to various aspects of athletes' personality (Geukes et al., 2017;

Owens, Stewart, & Huebner, 2017). Researchers who investigate the personality-performance relationship have to deal with a dichotomy between two concepts: personality traits (stable over time) and performance under pressure (situational). Researchers have rationalised the link between stable personality and situational outcomes (Geukes et al., 2017). Geukes et al. (2013a) have advanced an interactionist perspective to rationalise the link between personality and performance in sport. The interactionist perspective initially engendered from the idea that behaviour is predictable across various circumstances within differential psychology. Integrating two adversarial positions of dispositionism and situationism, it is proposed that situational outcomes may be due to both person-related and situation-related variables. Tett and Guterman (2000) introduced the interactionist principle of trait activation, whereby the predictability of the trait is only in situations that are related to this specific trait, not all situations. Thus, the capability of predicting a behaviour in irrelevant situations to a trait has been questioned. The interactionist principle of trait activation thereby provides explanations for the relevant situations when a performance can be predicted by individuals' personality traits, and also rationalises the relationship between personality and performance (Geukes et al., 2017). Consequently, researchers have identified several relevant personality traits on the basis of the trait activation principle that are activated, and potentially possess the capability of predicting performance in High-Pressure (HP), but not in Low-Pressure (LP) situations, such as self-consciousness (e.g., Baumeister, 1984; Geukes et al., 2013b; Wang, Marchant, Morris et al., 2004), self-confidence (Baumeister et al., 1985; Wine, 1971), narcissism (Geukes et al., 2012, 2013a; Wallace & Baumeister, 2002; Wallace et al., 2005), approach and avoidance coping (Wang, Marchant, & Morris, 2004), and action orientation (Gröpel, 2016; Heckhausen & Strang, 1988). Geukes et al. (2013b) applied the interactionist principle of trait activation to find the link of self-focus and self-presentation traits with performance in a private HP setting.

Fifty-nine university students completed personality questionnaires (including the German version of the Self-consciousness Scale [Fenigstein et al., 1975], the German personality style and disorder inventory, and the German Competition Anxiety Inventory) and then executed eight throws at a target under HP (a monetary incentive and a cover story) and LP conditions. The self-focus trait, but not self-presentation traits, was identified as a predictor of performance only in the HP condition. Hence, the negative relationship of the self-focus trait and HP performance was supportive of the trait activation principle in this study and accentuates the activation of self-focus personality traits by the situational demands of private HP circumstances. Geukes et al. (2013a) further compared the situational demands of private (monetary incentive, cover story), mixed (monetary incentive, small audience), and public (large audience, videotaping) HP situations to find whether situational demands of private and mixed HP conditions can activate self-focus traits, and also whether the situational demands of a public HP condition can activate self-presentation traits. After completing personality questionnaires (including the German version of the Self-consciousness Scale [Fenigstein et al., 1975], the German personality style and disorder inventory labeled “Ambitious Style and Narcissistic Personality Disorder”, and the German Competition Anxiety Inventory), the throwing skill of 120 female handball players was examined under LP and one of three HP conditions. Geukes et al. (2013a) indicated a self-focus trait negatively predicted performance in private and mixed HP conditions, while self-presentation traits positively predicted performance in the public HP condition. Hence, the pressure situations varied in their trait-activating situational demands. To extend the findings from the laboratory to actual competition circumstances and increase the ecological validity, Geukes et al. (2017) examined the predictability of three personality traits, including fear of negative evaluation, dispositional reinvestment, and athletic identity in a real-world situation based on the trait activation principle. Fifty-three basketball

players, who were recruited by Geukes et al. initially completed trait questionnaires (including the Brief Fear of Negative Evaluation-II questionnaire [Brief FNE-II; Carleton, McCreary, Norton, & Asmundson, 2006], the Movement Specific Reinvestment Scale [MSRS; Masters, Eves, & Maxwell, 2005], the Athletic Identity Measurement Scale [AIMS; Brewer & Cornelius, 2001], and the Mental Readiness Form [MRF-3; Krane, 1994]) and then reported on perceived importance, confidence, their somatic and cognitive state anxiety. Finally, their FT performance was examined in two experimental conditions, 30 FT attempts in LP and HP, and also in real basketball games (percentage of 12 FT attempts). Geukes et al. (2017) reported that the traits were unable to predict performance under LP. However, fear of negative evaluation and state anxiety predicted performance under HP (negative correlation). In a study conducted by Byrne, Silasi-Mansat, and Worthy (2015), 127 (76 female and 51 male) undergraduate students completed the Big Five Personality Inventory (BFI), and two experiments under either LP or HP conditions during decision-making. Based on the results of the first study, Byrne et al. reported a negative relationship between neuroticism and performance under high social pressure, but neuroticism did not predict performance under LP. Neuroticism also predicted performance in a combination of social and time HP condition in the second study. Agreeableness was also identified as another predictor of performance in both studies. The findings of Byrne et al. (2015) support distraction theory, where under-performances occur due to pressure occupying highly neurotic individuals' cognitive resources.

Choking and gender. Researchers have frequently investigated gender differences in various aspects of the sport; however, very limited evidence exists with regard to gender differences while performing under pressure and particularly with reference to choking. Cohen-Zada, Krumer, Rosenboim, and Shapir (2017) used the data from elite tennis players during all four 2010 Grand Slam tournaments to compare gender differences under

competitive pressure. Based on analysing first sets of 4,127 matches involving women and 4,153 matches involving men, and making a comparison of the performances in low-stakes versus high-stakes situations, Cohen-Zada et al. (2017) reported a consistent occurrence of choking in men, whereas the results for women were mixed. Interestingly, in case of a drop-in performance, the percentage of failure in women was 50% less than males. Similarly, De Paola and Scoppa (2017) collected data from 35,000 professional tennis matches between 2007-2014, to examine gender differences in response to the outcomes of sequential stages throughout a competition. De Paola and Scoppa (2017) indicated that compared to men, the likelihood of poor performance in the second set increased for those women who lost the first set. What De Paola and Scoppa suggested indicates that women are more prone to under-performance when approaching the pressure of lagging behind. De Paola and Scoppa also reported stronger gender differences in high-stakes matches. No gender differences were reported when the score was tied in the third set which is an indicator of the equal potential of women and men to deal with pressure if they do not fall behind. Sampling more than 100,000 professional tennis matches, Jetter and Walker (2015) found that male and female tennis players performed similarly in high-stakes situations. Jetter and Walker examined the hot-hand effect and clutch-player effect. They found no gender differences in the hot-hand effect, in which an additional win in the most recent ten matches, increases the likelihood of winning by 3.2-3.4 percentage points. Minor differences were observed in the clutch-player effect, in which top players excel in Grand Slam tournaments. In summary, although the results of these studies are interesting they are mostly based on non-experimental data. Further research with larger samples in a broader range of sports tasks and skills will no doubt clarify whether the occurrence rates of choking is genuinely different based on gender.

Although the relevant literature represents a substantial and diverse body of work, a gap exists regarding narrative accounts from athletes about their experiences of choking. That is, accounts from professional and elite athletes, who frequently perform under high pressure, are uncommon in the published literature. Similarly, endeavours to adapt research findings to inform practical settings and, conversely, from practical settings experiences to inform research are not common in the literature.

Conclusion

Choking in sport and other performance domains continues to be a topic of considerable discussion both in the popular press and sport psychology related literature. Sport psychologists have defined choking, examined multiple causal factors and developed plausible explanatory theories. Self-focus and distraction models have remained the dominant theoretical explanations, however, the application of these theories is nowadays more sophisticated and nuanced. Choking remains a relatively difficult area to explore experimentally. Even choking- susceptible athletes do not choke on cue and will not necessarily choke under pressure. Furthermore, there are obvious practical and ethical limitations to the degree of pressure that can be induced experimentally. Some researchers have wisely chosen to examine choking- resistant athletes, those that have a high-performance pressure threshold. Closely examining the differentiating factors, including both trait and state factors, that characterise the approach of CR athletes is potentially useful. For example, a better understanding of the key differentiating factors between CR and CS athletes should provide avenues for determining which aspects of successfully dealing with performance pressure are trainable.

In recent years there has been a significant change in research direction with greater attention on knowledge transfer with numerous choking interventions being tested in pseudo or actual competition settings. A new research direction into brain hemisphere

priming has recently opened up another direction for researchers seeking to bridge the gap between theory and practice or, in colloquial terms, improve the ‘push through’ to athletes and coaches. Furthermore, the recent trend toward examining choking qualitatively opens up the possibility for genuine knowledge exchange. That is, rather than the sport psychologist expertly prescribing evidence-based solutions to ‘treat’ choking in a didactic manner, a more collaborative exchange takes place, where sport psychologists, researchers or practitioners seek to understand the full range of approaches that athletes take to better deal with performance pressure. Although sport psychology researchers have produced a range of potentially beneficial choking interventions, we believe there is scope to more fully embrace the hard-fought knowledge borne from athletes and artists from years of performing in sport and other high-pressure environments.

Learning Aids

1. Explain how the application of self-focus models of choking and distraction models of choking have been used to explain poor performance under pressure for both experts and novices? Researchers applying self-focus models have consistently shown that, under pressure, CS athletes consciously attempt to monitor the execution of performance. As a consequence, the smooth and automatic execution of performance is disrupted. Researchers have also demonstrated that, under pressure, novices can be susceptible to choking when they are distracted either externally (by opponents) or internally (by non-task relevant thoughts) whereas, novices perform better when attending to performance step-by-step.
2. Explain why researchers have found that elite athletes can sometimes perform better under pressure when they are required to carry out dual tasks (i.e., skill execution and counting backwards from 100 simultaneously).

The additional requirements of executing dual tasks take up ‘attentional load’ and consequently insufficient available memory is free to become self-focused.

Review Questions

1. Discuss the difference intervention options that have been shown to reduce choking susceptibility.
2. Which of these options appeals to you and why?
3. Discuss how sport psychologists have defined choking. Which definition do you prefer?
4. Based on your own experiences and reading, discuss the causes of choking.
5. Discuss the potential benefits of studying the specifics of how CR athletes respond to pressure

Exercises

1. Outline a group of exercises and drills that could be used in everyday training to assist athletes in better managing performance pressure.
2. Design your own experiment to examine choking in sport using the hemisphere priming method. Include a research question, recruitment of participants, ethical issues, measures, methods to collect data and hypothesis.

CHAPTER 3

Preamble

This first study took a long time to complete because of the challenges in recruiting elite basketball players and the time intensive nature of qualitative research. This paper has recently been submitted to the IJSEP journal for review.

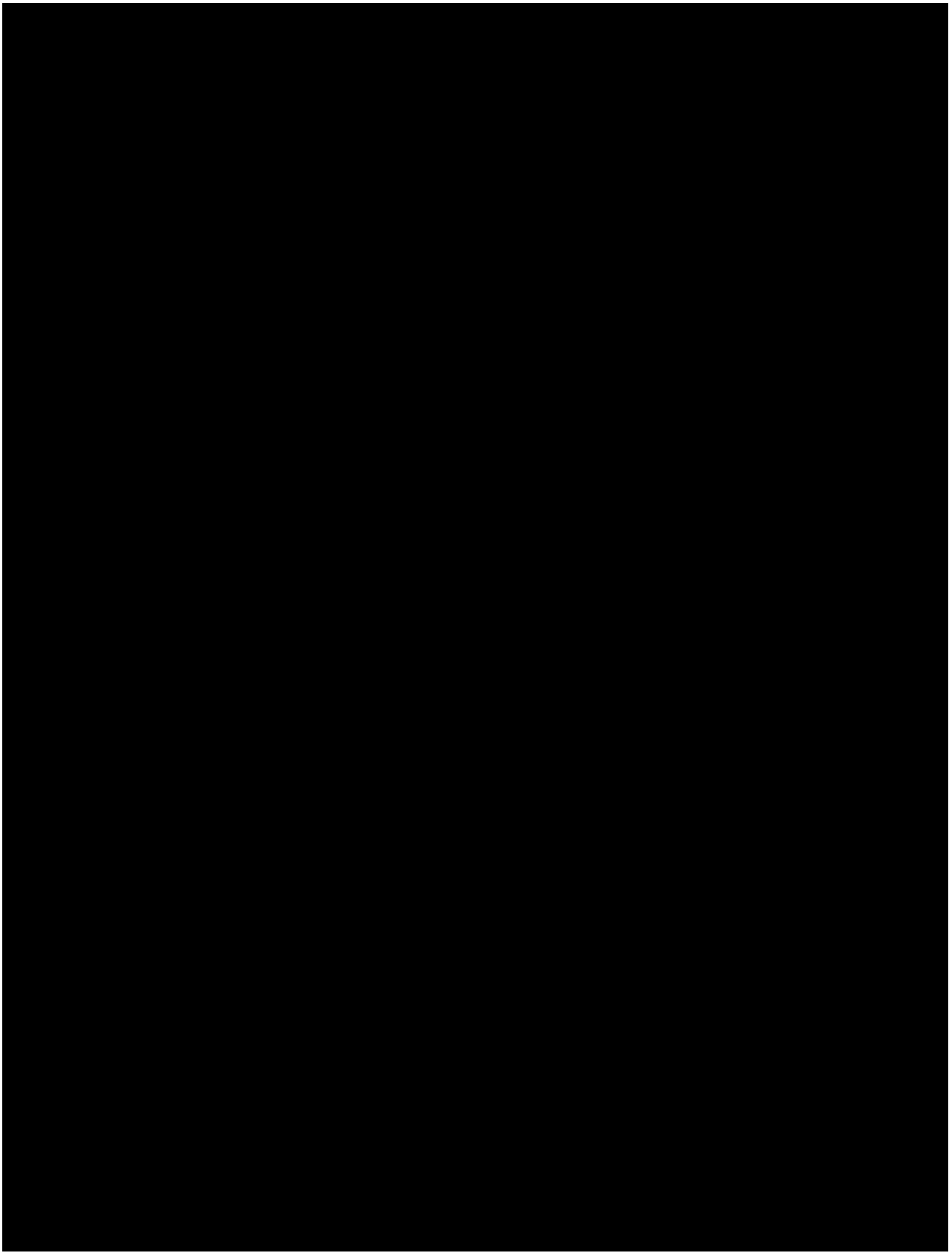
Framing, Linking and Skill Development

Study 1 was pivotal for a number of reasons; a) developing my understanding of the psychology of choking from an athlete's perspective, b) better appreciating the full range of psychological and contextual factors that explain the choking phenomena, c) As a means of contextualising choking in sport, and d) as a catalyst for Study 2. This was also my first attempt to conduct qualitative research. I have absorbed deep understandings of the qualitative research genre including:

1. My understanding of the myriad of qualitative methodologies has improved substantially.
2. My recruitment and interviewing skills have improved with guidance and support from my supervisor.
3. My technical and practical ability to judiciously selected qualitative techniques (e.g., thematic analysis and critical realism) and justify these from an epistemological stance has improved greatly.
4. The route of TBP has been difficult because English is my second language and the standards for peer review journals are high. I have needed additional assistance at times and I have read many qualitative articles to better understand the style and techniques required.
5. Although the TBP option has been challenging, I am more work ready and have improved my professional capital for a career in the field of sport psychology.

STUDY 1:

MANAGING PRESSURE AT THE FREE-THROW LINE



Rouhollah Maher, Daryl Marchant, Tony Morris & Fatemeh Fazel (2020) Managing pressure at the free-throw line: Perceptions of elite basketball players, International Journal of Sport and Exercise Psychology, 18:4, 420-436, DOI: 10.1080/1612197X.2018.1536159

CHAPTER 4

Preamble

The aim and execution of this study was a variation from the choking intervention study I originally conceptualised. I experienced great difficulty and frustration recruiting participants and eventually had to abandon the original aim (see Appendix B, design and study aims). I also became aware that other researchers had recently published studies reporting on multi-modal choking interventions that reduced the originality of how I had first planned study 2. Fortunately, interviews from the first study alerted me to a choking issue (fatigue) that has not been researched in relation to choking. After further discussions with my supervisors, I redesigned study 2 to focus on fatigue through the inclusion of physical exertion, while still maintaining the key elements of the design (basketball FT shooting and a quantitative-quasi experimental design). This study was commenced and concluded in approximately 12 months, and was submitted as a co-authored manuscript for peer review in November, 2016. The editor advised that reviews for IJSP can take up to three months to complete. In June 2017, we finally received the blind reviews from the editor and the feedback was positive and constructive. We re-submitted the paper with associated responses to reviewers, and finally, it has been accepted for publication most recently.

Framing, Linking and Skill Development

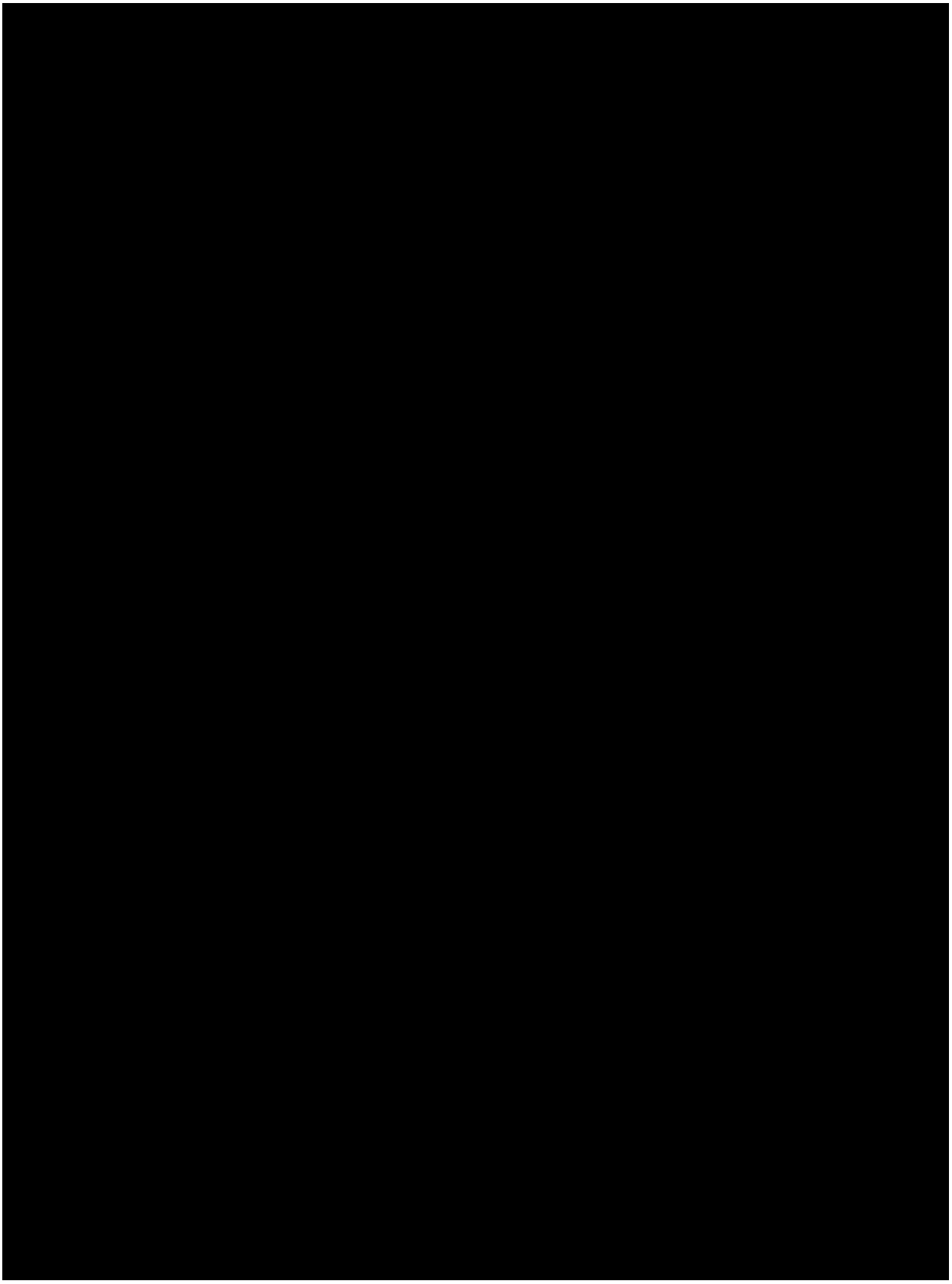
This second study emanated from the data collected in the first study and was also designed around the common theme of choking at the FT line in the sport of basketball. This study represented: a) an opportunity to detect and test a gap in the research literature, b) gain experience in conducting a quantitative study, c) develop and test a-priori hypotheses, and d) make an original contribution to knowledge.

This was my first attempt to conduct a rigorous quantitative research study. I have absorbed deep understandings of the quantitative research genre including:

1. With the benefit of experience, I now appreciate the level of planning, organisation and attention to detail that is needed to successfully conduct field research.
2. I experienced the satisfaction of a research project coming together from the initial research question, conducting the literature search, planning the study and successfully predicting the results a-priori and conducing the statistical analysis.
3. I have learned to critically analyse research and succinctly present the body of literature in the introduction section.
4. My confidence to independently identify a research gap and plan the approach (study) to fill this gap has increased. I enjoyed conducting the research and critically reflecting on the process.

STUDY 2:

EXAMINING PHYSICAL EXERTION AS A POTENTIAL CAUSE OF CHOKING



Maher, Rouhollah, Marchant, Daryl, Morris, Tony & Fazel, Fatemeh (2019) Examining physical exertion as a potential cause of choking, International Journal of Sport Psychology, 50:6. 548-564, ISSN 0047-0767

CHAPTER 5

GENERAL DISCUSSION

Introduction

This chapter consists of three sections. First, I summarise how each of the completed studies contributed to potentially developing new perspectives on choking and explain choking at the free-throw line? Second, I also provide suggestions and perspectives relating to applied implications, future research and limitations based on the findings of the current research and reflections on the research process. Third, I have included brief concluding comments that reflect the key learnings from the current research. Each section is also interlaced with comments that reflect on the learning process from my perspective.

By developing my understanding of choking research trends, methods, and results, I gradually felt more informed and confident in building toward conducting my first study. I commenced by building a comprehensive understanding of choking with extensive reading of research reports and book chapters. This reading extends back to Baumeister (1984) who published the classic study “Choking under pressure: self-consciousness and paradoxical effects of incentives on skilful performance”. Because there is now a large body of published literature focussed on choking in sport, an initial challenge for me as a neophyte researcher was in reading, reflecting and grasping over 30 years of continuous research. The result has been a compilation comprised of a published book chapter “Perspectives on choking in sport” representing an extended review of the literature. Furthermore, two additional reviews of literature are contained within manuscripts that are currently under review; “Managing Pressure at the Free-throw Line” and “Examining Physical Exertion as a Potential Cause of Choking”. I also developed a supplementary review to update the literature over the last four years since the book chapter was written. I reached the

following conclusions through reviewing and reading the extensive body of literature on choking in sport.

In the next section, I discuss how the two planned studies were designed in response to current research trends and the overarching research question. A common thread between the studies was to broadly examine performance under pressure and specifically choking in the sport of basketball. I have a deep interest in basketball having played and refereed for many years. A specific theme between the two studies was how basketball players manage pressure and choking in relation to the task of FT shooting, a crucial skill in basketball. I adopted a multi-method approach that was in keeping with the central research question and also my goal to develop well-rounded research skills during the PhD.

The first study was an intentional effort to take a qualitative approach to understand how pressure affects performance with an elite sample of retired basketball players. One goal for my development was to gain experience in conducting both qualitative (Study 1) and quantitative (Study 2) research. At the study design stage, there had not been any published research drawing on the collective knowledge and experience of elite performers in basketball. I designed Study 1 to tap into the extensive experience of elite players and thus increase ecological validity and external validity. My expectation was that they would provide valuable insider perspectives (which they did) of choking from their many years of training and playing. My general aim for Study 1 was to investigate the strategies that elite basketball players use to self-manage performance pressure relating to basketball FT shooting. On reflection, the design, interviewing and analysis entailed within the study was a steep learning curve for me. I did, however, gradually develop my skills and confidence in conducting thematic qualitative research.

As discussed in Study 1, the themes that emerged fit closely with the themes identified by other researchers from recent qualitative research conducted over the same

period with other populations (e.g., golfers). I believe a number of noteworthy findings emerged from Study 1. Three primary themes have been derived from knowledge and experiences of high-level basketball players: (a) influencing variables, (b) mental skills, and (c) management strategies. Although some of the themes identified in Study 1 are in accordance with the relevant published literature, additional new themes were identified. For example, the sub-theme of fatigue and how some participants reported that fatigue could cause or exacerbate poor performance under pressure. In cross-referencing the relevant research, I found that, although there was evidence of fatigue contributing to performance decrements, in previous research no direct link had been made between pressure and fatigue in the choking context. Participants also highlighted warm-up form and game form as influencing factors that have not previously been cited within the choking literature. Interestingly, the majority of participants, particularly those who experienced performance decrements in their career, indicated the importance of warm-up form and game form. Whereby a poor shooting form in these early stages may negatively influence shooting throughout the entire game. Thus, coaches may need to be attuned to warm-up form and the early game form of players. Also, sport psychologists may be required to help those athletes who experience the pressure of under-performing during the warm-up or early phases of the game. Moreover, researchers might consider examine potential differences with the strategies and behaviours of CS and CR athletes during the warm-up and early game form that inform how successful shooters self-manage during these stages. Moreover, there might be differences between the influence of poor warm-up form and game form on the athletes in individual sports and team sports, because teammates might be able to positively cover the initial poor performance of an athlete and help them to recover quickly during the game or may negatively cause more pressure by criticising or their expectations. The other influencing variables, such as overthinking or

overcontrolling, poor technique/altering technique, uncertainty/inconsistency, and perceived pressure (coach related pressure, crowd, fear) have been introduced in previous choking studies. The shooter's mindset was another newly identified theme. Although some influential factors related to a positive shooter's mindset were mentioned by the study participants more focus and research is possibly required.

Participants of the current study extensively discussed their experiences of both choking and clutch performances under pressure. I have found support for elements of both self-focus and distraction theories. For example, Beilock and Gray (2007) have identified skill level as a key factor and indicated that choking for experienced athletes is predominately explained by self-focus theories, whereas choking at the novice level is predominately explained by distraction theories. Furthermore, self-focus theories are more applicable to expert performance contexts that include automaticity and fluidity of a well-practised task in familiar circumstances. Conversely, distraction theories are more applicable to expert performance contexts that demand complex decision-making and problem-solving (Cappuccio, 2015; Carr, 2015). Based on the findings of the current study, both self-focus and distraction theories contribute to explain the occurrence of choking, but not simultaneously. Researchers have posited that a combination of self-focus and distraction theories can be considered as a more efficient explanation of choking (DeCaro et al., 2011; Mesagno & Beckmann, 2017; Nieuwenhuys & Oudejans, 2012).

Participants' highlighted valuable implications regarding the influence of mental skills on FT shooting, Participants presented a detailed account of simultaneously using a range of mental skills while FT shooting. Although this is not a revelation, it shows a demand for providing a holistic, integrated approach to mental skills training with athletes by coaches and sport psychologists. Furthermore, various aspects of performance routines were cited by participants who reported that their routine were extremely beneficial. For

sport psychologists working with elite athletes that are CS, consideration needs to be given to the individual needs of the athlete in conjunction with incorporating routines and other relevant mental skills.

The effective use of management strategies was a prevalent theme from the findings of the current study and are likely applicable to numerous sports. The sub-themes of technique (maintaining technique, releasing the shot, and not rushing), integrating mental skills, seeking assistance, and training strategies (simulating game and pressure situations, individual training and individual differences) were identified by the participants. Sport psychologists and coaches would likely benefit from consideration and application of these strategies.

The summarised implications from Study 1 are: (a) the psychological-technique dilemma in assessing under-performance, (b) the limitations of incorrectly applied mental techniques, and (c) planning and executing training designed to better prepare players to better manage pressure were discussed extensively in Chapter 2 (Study 1). I also condensed the findings from Study 1 into a new schematic model that links mental skills and intervening variables with performance. Based on this schematic model choking far from being inevitable can be avoided with the proactive use of mental skills.

I believe the findings from this study, once published, will deepen the understanding of how high-level basketball players typically deal with pressure and will contribute new knowledge that is readily applicable to applied sport psychologists, coaches and basketball players. Study 1 has been reviewed with positive feedback provided by the editor and reviewers.

Regarding Study 2, as mentioned previously, my original intention had been to use the findings from Study 1 to generate a follow-up study focused on developing an evidence-based multi-modal choking intervention and testing it. I needed to change the

research direction slightly because of reservations about the viability of the planned design for Study 2. Fortunately, I was assured by my supervisors that the slight change of direction in the design of Study 2, based on the findings from Study 1 was not uncommon, particularly when the initial study is exploratory in design. I deliberately planned from the outset for Study 2 to have a quantitative design. I wanted to develop my skills as an all-round researcher by conducting a study with a larger sample, a specific focus and pre-determined hypotheses. As discussed earlier in this section, the potential role of physical fatigue in contributing to poor performance under pressure emerged from Study 1. Because fatigue is relatively difficult to operationalise and control, I eventually settled on the related variable of physical exertion that also had not been combined experimentally with pressure as potential predictors of choking. Thus, the aim of Study 2 was to compare the extent to which physical exertion may affect FT performance under manipulated pressure conditions. The two alternative hypotheses, (a) the HP manipulation will significantly reduce performance compared to a LP manipulation, and (b) intense pre-performance physical exertion will significantly reduce performance compared to a low level of pre-performance physical exertion, were both predictive of the results. As discussed in Manuscript 2, the results demonstrated uniform reductions in the manipulated pressure and physical exertion conditions. A limitation of Study 2 was the lack of significant differences in the reported state anxiety levels across conditions as measured using the MRF-3. I concluded that there were possible internal validity issues with the single item MRF-3 scales or administration limitations. Nevertheless, the results and limitations provide other researchers with new insights into the effects of perceived pressure when combined experimentally with physical exertion on performance and a cautionary note about potential measurement issues when adopting the MRF-3. The manuscript for Study 2 has been reviewed and accepted by the International Journal of Sport Psychology.

Applied Implications

Based on the findings presented here and my experiences carrying out the research, numerous applied implications require further discussion. Despite nearly 35 years of continuous research by sport psychologists, choking remains relatively common in elite sport. That is, proven and reliable applied strategies to assist athletes experiencing choking remain elusive despite considerable signs of positive results from applied studies (Bobrownicki et al., 2015; Gröpel & Mesagno, 2017; Mesagno et al., 2008, 2009; Oudejans & Pijpers, 2009; Ring et al., 2015). Implications for practice are especially important for athletes who experience chronic or acute choking. Research that can potentially illuminate the path to preventing, managing or treating choking is likely to be of interest to applied sport psychologists and sport coaches.

Virtually all the published research in choking has implications for practice (Doron & Bourbousson, 2017; Swann et al., 2017), either directly or indirectly, and applied implications are, to a degree, bound by and relate to the development of underlying theoretical and basic research. The maxim by renowned action researcher Kurt Lewin's (1943) "there is nothing as practical as a good theory" remains relevant. From my perspective as an inexperienced researcher, I have become increasingly aware of the two predominant choking theories, summarized earlier (see review of literature), that inform research design and implications for practice. Due to my inexperience, I initially understood how choking applied to practice largely from my personal experiences and observations of athletes. In this section, I discuss how conducting the current research has led to personal insights and explanations of choking from an applied perspective. Within the published literature it seems that interventions, programs and treatments to manage choking are broadly related to four overarching steps or processes. First, how the published literature informs the understanding of how to manage choking. Second, the awareness or

diagnosis of choking in sport. Third, choices and decisions about persevering with self-help approaches, or seeking assistance and support from informed others, such as coaches or applied sport psychologists. Fourth, the range of available management options and how these can be trialed or implemented.

I first discuss how 'circling' back to the published choking literature while reflecting on my results has assisted me in gaining a broader understanding of the applied implications of my research. As mentioned above the importance of how theories potentially apply to practice seems especially relevant for choking in sport. The two predominant theoretical groupings of choking (i.e., distraction theories and self-focus theories) were first established in the 1970s and 1980s, respectively (Baumeister, 1981; Wine, 1971). With each new decade these two theoretical explanations have been constantly revisited, revised and expanded (e.g., Christensen et al., 2015; Hill, Carvell, Matthews, Weston, & Thelwell, 2017; Hill et al., 2010b; Mesagno & Beckmann, 2017). As a necessary starting point for my research, I reviewed the theoretical literature to design the current studies and more recently better understand how the findings of my research could be applied.

Based on the published literature and the findings presented in this thesis, assessment or 'diagnosis' of choking susceptibility generally occurs at the athlete level. Based on the results of study 1, athletes struggling with their FT shooting typically use various methods to improve their FT shooting or would enlist the assistance of their coach. Moreover, athletes were normally aware if poor FT shooting was a mental issue (e.g., potentially choking). Awareness of what constitutes choking has always been at the forefront of research and remains a point of discussion. For example, in study one, highly experienced basketball players discussed how they had managed pressure circumstances throughout their career. I specifically asked participants about their understanding of and

their experiences of choking. These elite basketball players confessed to either choking regularly or periodically. They also understood choking in a manner that was relatively consistent with the published definitions, albeit using less sophisticated terms, or focussing on particular aspects (i.e., dramatic failure under pressure) or practical examples of choking (e.g., “missing the ring altogether” or “struggling to convert any shots”). Based on the study 1 results, there is a relatively high level of awareness, with athletes assessing themselves as choking regularly, choking periodically, or choking rarely.

In-situ self-assessment (e.g., study 1) can be compared to the type of processes, terminology and validity checks required when using quantitative methods to study choking (e.g., study 2). For example, researchers (e.g., Hill & Hemmings, 2015; Hussey, 2015; Mesagno & Marchant, 2013) have used terms such as CS and CR. Choking researchers frequently use questionnaires (e.g., Coping Style Inventory for Athletes; Anshel & Kaissidis, 1997; Self-Consciousness Scale; Fenigstein et al., 1975; Sport Anxiety Scale; Smith et al., 1990) to assess the level of choking-susceptibility of participants. Furthermore, researchers have discussed a participant recruitment dilemma, relating to not only recruiting choking susceptible participants, but also manipulating conditions to elicit likelihood of choking during experiments. For example, FT shooting is regularly used in experiments because of the high level of external validity (i.e., an identical experiment and actual game performance task). Nevertheless, despite the best efforts of researchers in manipulating variables to elicit choking, there is no guarantee that choking will occur under experimental conditions (Belletier et al., 2015; Beseler et al., 2016; Mesagno et al., 2008, 2009; Otten, 2009). In summary, I attempted to gain insights into my research question from both the athlete perspective (Study 1) and the traditional experimental design perspective (Study 2).

As discussed previously, elite athletes involved in study 1 specifically discussed seeking the assistance of their basketball coach when they experienced chronic and/or acute

choking. However, none of the athletes involved in study 1 had specifically consulted with an applied sport psychologist about choking. The athletes in study 1 talked about how coaches used a range of techniques to assist them in managing FT pressure, some of which parallel techniques suggested by researchers (e.g., simulated pressure training, shooting while fatigued, behavioural techniques such as rewards or punishments). Whether coaches rely on their coaching accreditation training, experience, or additional specific training to inform their approaches to assist athletes to perform under pressure is, however, unknown. Similarly, although there are published studies describing techniques for better managing performance pressure (e.g., Ducrocq et al., 2017; Neumann & Hohnke, 2018; Stoker et al., 2016) there is almost very little available information, such as case studies, describing specifically how applied sport psychologists provide psychotherapy to athletes who present with chronic and/or acute choking. Presumably, applied sport psychologists draw on the published choking studies to better understand the theoretical explanations, assessment techniques and evidence-based interventions suitable for choking susceptible athletes. For coaches and applied sport psychologists working with athletes who are performing poorly under pressure (e.g., choking at the FT line), there are numerous evidence-based solutions published in the extant literature. Whether sport coaches are aware of or have access to such information is unknown.

In this next section, I summarise relevant applied techniques and interventions applicable for assisting athletes manage pressure more effectively. The following includes, but not limited to; pressure training (PT), self-consciousness training, emotion regulation strategies, positive self-talk, self-confidence, pre-performance routines. PT was introduced by Bell et al. (2013) as an effective intervention to decrease the likelihood of choking and improve performance under pressure. Baumeister (1984, p. 610) defined pressure as “any factor or combination of factors that increases the importance of performing well on a

particular occasion". Athletes who experience certain levels or specific types of pressure can dramatically under-preform (Stoker et al., 2016). Based on the proposed PT approach, athletes are strategically trained to experience different stressors to strengthen their ability to cope with pressure circumstances (Bell, et al., 2013; Driskell et al., 2014; Oudejans & Pijpers, 2009). The majority of researchers who have intervened with both novice and elite level athletes have reported positive results using PT approaches. In one of the first studies with basketball players, Oudejans and Pijpers (2009) tested the effectiveness of PT on the FT shooting performance of elite players. The intervention group participants benefited from PT, whereas performance decrements under pressure were observed in control group. Mental toughness and resilience have been identified as critical factors while exposing pressure. Bell et al. (2013) used PT as a method of developing mental toughness with both objective and subjective scores of mental toughness being significantly increased in their study. Fletcher and Sarkar (2012) pointed out that the length of time athletes may be required to withstand pressure is important in developing resilience. Recently, Stoker et al. (2016) interviewed 11 elite coaches to explore how they manipulate stressors during PT. The coaches indicated that they created pressure through manipulating aspects, such as, the task, the environment, using rewards and judgments. Stoker et al. (2016) classified these stressors as demands or consequences of training, observing multiple stress responses by the athletes. Other researchers have also employed similar methods. For instance, Bell and colleagues' (2013) asked elite cricketers to re-perform a task in front of others (i.e., audience) with the threat missing the next training session if they failed. Oudejans and Pijpers (2009) created a PT training condition by informing participants that they would complete a task that was later watched by experts who would evaluate their performance. Mesagno, Geukes et al. (2015) used acclimatisation, whereby pressure was systematically induced gradually over repeated occasions.

Stoker et al. (2016) have highlighted the methods coaches used to replicate competition stressors. The focus of these studies has been on manipulating the demands (e.g., simulating a competition like situation such as being one point behind or ahead) rather than directly manipulating other ecological realities of competition (such as large crowds or large performance contingent prizes) that are obviously difficult to reproduce. Nonetheless, PT has proven to be beneficial to athletes by preparing them to make decisions and execute the specific task, while experiencing simulated pressure situations that could be transferred to real competitions. The proposed methods should be further examined, separately or combined, to establish their reliability and validity, and to help coaches to achieve a more inclusive PT approach.

Self-consciousness training is focusing on specific relevant cues or aspects of tasks (e.g., focusing on follow through when shooting). This type of technique was found to help soccer players overcome pressure by having them pay close attention to what part of the foot was used to kick the ball (Reeves, Tenenbaum, & Lidor, 2007). Mesagno and Mullane-Grant (2010) argued that while focusing on one or two performance cues the rest of the body can perform the task automatically. Emotion regulation strategies have also been applied to assist athletes who experience under-performances in pressure situations. Balk et al. (2013) compared a condition in which experienced golfers controlled their emotions in a positive way by reminding themselves that ‘it is just a game’ (also referred to as positive self-talk). Balk et al. (2013) used a control and distraction condition, whereby golfers were asked to think about something irrelevant to the task (e.g., singing a song in their head). In the distraction condition participants demonstrated performance improvements, whereas in the self-talk condition participants did not show either performance improvements or decrements under pressure.

Pre-performance routines are another strategy to manage stress in sports, defined as "Sequence of task relevant thoughts and actions which an athlete engages in systematically prior to his or her performance of a specific sport skill" (Moran, 1996, p. 177). For example, the great basketball player Kevin Durant, bounces the ball a couple of times, looks up to the rim, and loosens his shoulders before he takes each FT shots. This widely accepted technique could enhance attentional control by alleviating pressure during task performance (Mesagno & Mullane-Grant, 2010). More recently, Gröpel and Mesagno (2017) overviewed 47 empirical studies that have examined interventions applied to ameliorate choking. The findings of their study show that pre-performance routines, quiet eye training, left-hand contractions, and acclimatisation training were the most efficacious interventions. Dual task was reported as effective under pressure circumstances, but detrimental in training. Their report did not support implementing analogy learning, goal setting, neurofeedback training, or reappraisal cues, showing a demand for more research in these areas. Despite the existing evidence regarding the abovementioned interventions, sport psychologists, coaches, and athletes should consider various aspects, such as the requirements of a task and the environment, while selecting and implementing a strategy to optimise performance under pressure.

Further Research

Based on the results of the current studies a number of avenues for further research are recommended. The design and data gleaned from elite athletes in the first study is indicative of an emerging trend in the published literature to capitalise on the collective experiences and wisdom of athletes who have committed years to honing their skills. These elite players some of whom had performed well under pressure offered excellent insights and techniques in how to avoid choking. Whereas, other high-level participants despite their involvement at the highest-levels of basketball struggled to perform well under

pressure and openly and generously described their insights of experiences they might have preferred to forget or deny.

The FT shooting in basketball remains a frequently used performance task in studies of psychological processes such as choking because of the capacity to control extraneous variables. Numerous sports, however, have analogous skill tasks that lend themselves to further qualitative and quantitative inquiry. Based on the results of Study 1, another pool of informed participants are high-level coaches. For example, coaches are often the first line of support for athletes who are not performing to their potential in pressure circumstances. It would be useful to directly compare themes derived from athletes and coaches especially in determining which themes are convergent or divergent. As an extension of Study 1, I propose that coaches would benefit from the knowledge, transfer and exchange (KTE) from research findings that are highly applicable to their sport (e.g., basketball coaches) in the current context. Additional research to follow-up from the finding that athletes are often extremely reluctant to engage an applied sport psychologist, even after chronic and acute episodes of choking under pressure is also warranted. I was surprised by the entrenched resistance expressed, albeit from a small sample about reaching out for professional assistance in better managing pressure at the FT line beyond what their coach and personal resources could provide.

The range of strategies and approaches reviewed in the current thesis should enable researchers to assist athletes through improved awareness of intervention options and the rationale underpinning interventions. Although different strategies have been suggested to achieve an optimal performance, introducing a more comprehensive approach that can guide athletes, coaches and sport psychologists through a step-by-step approach with athletes in the ‘real world’. That is, KTE is highly relevant because the intervention possibilities have generally not progressed past the academic literature to mainstream

publications. Although many possibly interventions have been trialed in research practical KTE questions remain unanswered. For example, how are choking intervention options being disseminated to users? How could interventions be combined or used systematically? Assuming interventions are initially successful, how can the effects be maintained? What interventions are sufficiently sophisticated to be the most relevant for applied sport psychologists? Which interventions can be more readily transferred for directly use by coaches or athletes themselves? Hence, although the literature on choking developed over 35 years has provided improved understanding of choking mechanisms, theories and interventions there are further research and applied opportunities available.

Limitations

One limitation of Study 1 was that complete data saturation on all key themes was not necessarily achieved. A limiting factor was participant recruitment with a limited number of high-profile basketball players who fitted the participation criterion being available to take part (i.e., small interview sample size). For example, I intended to recruit sufficient CS and CR participants to facilitate a qualitative comparison of the experiences of success and failure in FT shooting under pressure. Consequently, the thematic analysis was conducted under the auspices of one combined group of participants. There is a possible cost-benefit trade off when recruiting high-level samples and balancing the valuable insights that professional athletes, for instance, provide and the difficulty in recruiting sufficient numbers of participants to satisfy methodological and sampling considerations.

A frequently discussed limitation when conducing choking studies is the challenge of reproducing levels of pressure commensurate with ‘real life’ situations without contravening ethical considerations. I was cognizant of this limitation at the outset and the choice of qualitative study (Study 1) with professional athletes was to circumvent the

limitation in of designing a live study with high levels of pressure and also to take a novel approach. The advantages of the qualitative study design have been stated previously, however, certain inherent limitations or reliability of delayed retrospective recall.

Since one of the limitations of Study 2 was controlling the level of physical exertion experienced by participants, researchers might consider, objectively measuring the level of task-specific fitness (e.g., Vo2 maximal aerobic output, anaerobic threshold or anaerobic power). This approach would entail the involvement of multidisciplinary research teams including, sport psychologists, physiologists, and biomechanists.

Concluding Remarks

Choking in sport remains an interesting and paradoxical phenomenon. I was fortunate for Study 1 to have access to a talented and experienced group of athletes who generously volunteered their valuable time and knowledge. Not only did these athletes provide unique insights into performing at the highest levels in basketball, but they also represent collaborators in this personal entrée into qualitative research and thematic analysis. I enjoyed the experience of taking the emergent theme of fatigue to design a follow-up study using a more traditional quantitative design. I also thank the student-athletes who volunteered to contribute their time and talents in Study 2. Again, the results were encouraging, and I humbly submit my research as a conduit to the continued endeavours of sport psychology researchers to better understand the deleterious effects of pressure in sport. Finally, the two experimental studies that I conducted despite their common elements represent the Yin and Yang of how athletes sometimes succumb to performance pressure (i.e., the dark side), but also sometimes perform remarkably well under pressure (i.e., the bright side). I anticipate that the findings that I have presented will continue to build capacity in helping athletes that struggle to convert vital FTs.

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APPENDICES

Appendix A

Interview guide

1) Tell me about your development as a high-level basketball player?

2) How do you rate your ability to convert free-throws under pressure?

3) Because this research is about shooting under pressure can you please describe situations where you feel you have handled performance pressure well or poorly?

4) What strategies for instance have you employed to assist you with performing well under pressure on the free-throw line?

5) Similarly, what situations in either competition or training have other players performed well or poorly under pressure?

6) What actions have your coaches taken to assist players to shoot well under pressure?

7) Have you used any forms of mental training to assist you in managing performance pressure?

8) What differentiates players who execute their free-throws well from those who execute them poorly under pressure?

9) What is your understanding of the term choking in relation to free-throw shooting?

10) Based on either your experience or knowledge of basketball – can you please describe strategies that can be employed to assist basketball players in their free-throw conversion rate under pressure?

11) Are there any other points you would like to make related to the theme of this interview about free-throw shooting under pressure?

Appendix B

Demographic Questionnaire

1. Name: _____

2. Age: _____

3. Gender: Male Female

4. Contact details

Phone Number: _____ Email: _____

5. What was your highest level of basketball participation?

Domestic State/BigV SEABL League

NBL National International

6. Are you still playing? If so, what level / competition

_____

7. Years of Basketball Experience: _____

8. How many hours per week are you training basketball? _____hours/week

9. Approximate free-throw percentage: _____

Appendix C

Consent Form

CONSENT FORM FOR PARTICIPANTS INVOLVED IN RESEARCH

We would like to invite you to be a part of a study into

Examining Physical Exertion as a Potential Cause of Choking

CERTIFICATION BY SUBJECT

I, ----------certify that I am at least 18 years old* and that I am voluntarily giving my consent to participate in the study: PhD project being conducted at Victoria University by: Associate Professor Daryl Marchant and Professor Tony Morris.

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by Rouhi Maher and that I freely consent to participation involving the below-mentioned procedures:

- Complete Mental Readiness Form - 3 (MRF-3)
- Complete a Shuttle-run Test
- Undertake the Free-throw (FT) Test

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from this study at any time and that this withdrawal will not jeopardize me in any way.

I have been informed that the information I provide will be kept confidential.

Signed: Date:

Any queries about your participation in this project may be directed to Associate Professor. Daryl Marchant (03 99194035) or Professor. Tony Morris (03 9919 5353).

If you have any queries or complaints about the way you have been treated, you may contact the Ethics & Biosafety Coordinator, Victoria University Human Research Ethics Committee, Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone (03) 9919 4148.

Appendix D

Free Throw Record Sheet

Participants Code:

Session: Date:

HP-R

0 1 2 3 4 5 6 7 8 9 10

HP-NR

0 1 2 3 4 5 6 7 8 9 10

LP-R

0 1 2 3 4 5 6 7 8 9 10

LP-NR

0 1 2 3 4 5 6 7 8 9 10

Appendix E

Mental Readiness Form - 3

Participant's Code: Date:

MRF-3

Instructions: Please answer the following statements regarding how you are feeling right now.

My thoughts are:

1	2	3	4	5	6	7	8	9	10	11

CALM WORRIED

My body feels:

1	2	3	4	5	6	7	8	9	10	11

RELAXED TENSE

I feel:

1	2	3	4	5	6	7	8	9	10	11

CONFIDENT SCARED