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The use of training aids for sport-specific skill development in racket and club sports: a scoping review protocol

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Abstract

Training aids have been used by sport coaches to help with the development of sport-specific skills. In racket and club sports, gripping the handle is an integral skill that requires specific expertise from instructors in the given sport to ensure that an athlete can execute strokes to either prevent injury or optimise performance. However, the effectiveness of training aids in the development of sport-specific motor skills is unknown. Therefore, the objective of this review is to provide an overview of the use of training aids for skill development in adolescent athletes in racket and club sports. The specific questions, regarding the published literature are; what types of training aids have been used to develop appropriate gripping technique in racket and club sports? How effective are these training aids for sport-specific skill development, and what protocols/methodologies are used when investigating the efficacy of training aids from a research perspective? This review will follow the Joanna Briggs Institute framework for scoping reviews to ensure a clear, rigorous systematic process is used for all available and relevant data. The search strategy will identify published peer-reviewed and grey literature. An initial search will identify suitable search terms, followed by a systematic search using keyword and index terms. Two reviewers will independently screen identified studies for final inclusion. This method may prove useful to provide information regarding sport-specific motor skill development for racket and club sports while using training aids.

Background

The ability to perform specific skills during sport competitions requires tactics and motor training. In racket and club sports such as tennis, badminton and golf, gripping the handle (or grip positions) is an essential technical component that can affect performance outcomes (Carson, Richards, & Mazuquin, 2019; Busuttil et al., 2020). Specific grip positions require deliberate hand and finger orientation to effectively execute a given technique (Tagliafico et al., 2009; Carson et al., 2019; Busuttil et al., 2020). Specific grip positions have continually evolved such that certain grip positions may be beneficial to either prevent injury, or to optimise performance during competitive match-play (Reid, Elliott, & Crespo, 2013; Stuelcken et al., 2017). Two key sports in which grip technique has been extensively examined are tennis and golf as they require specific motor patterns to execute given strokes effectively.

In tennis, the most commonly used strokes during competitive match-play are the forehand, backhand (either single or double-handed), and serve (Reid, Morgan, & Whiteside, 2016). These skills require different hand positioning to execute the stroke effectively (Elliott, Takahashi, & Noffal, 1997). The most common grip positions used by professional and recreational tennis players are the continental, eastern backhand, eastern forehand, and semi-western grips (Tagliafico et al., 2009; Eng, & Hagler, 2014). The grip positions that are adopted by these players are generally dependent on what their tennis instructor has informed them to use early in their development (Ioannis, 2020). Primarily, the eastern forehand, eastern backhand, and semi-western grip are used in groundstrokes (forehand and backhand, and in combination for the double-handed backhand), whereas the serve is performed with the continental grip (Tagliafico et al., 2009). In golf, to perform the action of the drive, athletes can use three types of grip positions (strong, neutral, weak, which corresponds with dominant knuckle visibility) to execute the skill effectively, each grip position results in different shot accuracy and club velocity (Carson, Richards, & Mazuquin, 2019). Additional golf strokes including the putt and chip, which are essential in the modern game, are performed with similar hand grip positions as in the drive, however

require different motor patterns and biomechanics for effective execution (Hume, Keogh, & Reid, 2005). This demonstrates the complexity and number of grip position variations involved in racket and club sports which are essential for performance, and therefore emphasising the importance of accurate skill development of grip positions.

Historically, techniques such as visual imagery (static and dynamic), repetition and skill decomposition with correct technical motor patterns have been used to develop sport specific skills (Féry & Morizot, 2000; Nicholls, Polman, & Holt, 2005; Moran, Murphy, & Marshall, 2012). It is well understood that effective skill progression can be both linear and non-linear (Williams & Hodges, 2005; Lee et., 2014), and typically requires an extended period of time to make permanent changes in technique (Elliott, Reid, & Crespo, 2009). For effective skill development, an athlete requires time to adapt to biomechanical changes through continual motor learning. Tools which physically-constrain the hand/finger positions of an athlete are being increasingly used by coaches in racket and club sports to improve motor skill development when athletes are in their foundational stages.

Many tools have been created as ‘training aids’, purported to improve and streamline skill development. In racket and club sports, moulds of specific grip positions which are applied externally to the handle physically guide the athlete’s hand and fingers into the optimal position for the grip (Bouchet-Lassale, 1994; Baker, 2007; Thomas, 2010; Thomas, 2014). Anecdotally, these devices are used by professional instructors for novice and/or junior athletes for skill development. These devices claim to improve athlete knowledge and execution of grip positions in racket and club sports, however, these devices are separate to the athlete’s original racket or club, and possibly pose functionality issues while in use. Further, the transfer of learning from the use of physically-constraining tools to an athlete’s skill and biomechanical development is yet to be explored for racket and club sports.

Therefore, it is important that a scoping review be conducted to provide an overview of grip training aids; what types of tools have been used to teach sport-specific gripping skills, and understand the effectiveness of the tool for sport-specific skill development for grip positions.

Inclusion Criteria

Types of Participants

The scoping review will consider studies that include adolescents where physical training aids are being used to develop sport-specific gripping skills in racket and club sports.

Concept

The concept examined by this scoping review is the various types of physical training aids that are used to develop sport-specific grip skills in racket and club sports. Specific data that will be extracted from the included studies will be the reported types of physically-constraining training aids that are used in grip training for racket and club sports. The type of grip, associated training methods, and any data comparing two or more types of training aids for sport-specific skill development will be included in the scoping review.

Context

The current scoping review will consider articles that have utilised training aids for the development of sport-specific skills in any racket or club sport that involves gripping. Sports that don't require the participant to grip the handle of an object (for example Rugby, Australian Rules Football and Football [soccer]) will be excluded.

Types of Studies

The current scoping review will consider all peer reviewed articles, including quasi-experimental, true-experimental and case studies. Grey literature will also be considered for this scoping review.

Search Strategy

The search strategy will aim to find published studies in English language. An initial limited search of google scholar and MEDLINE (Ovid) will be completed to identify articles on this topic, followed by an analysis of the search terms contained in the titles, abstracts, and key terms used to categorise these articles. The initial search terms that will be used are ‘tennis’ OR ‘golf’ AND ‘skill acquisition’ AND ‘grip’. An initial search strategy is provided in Appendix I. Citation chain searches will be performed on included studies to ensure all relevant data is captured. The databases to be searched for the scoping review will include Web of science, google scholar and EBSCO (Sport discus).

Data Extraction

Data included in the scoping review will be extracted by two independent reviewers using the extraction tool (Appendix II). The data extracted will include the Author, concept, context, inclusion/exclusion criteria, source type, participant details, tool type, intended sport-specific skill, time using the tool and the outcome of the paper with measures (data extraction form). Regarding any missing or additional data, the authors of papers will be contacted to request the relevant information where required. The data extraction tool will be modified and revised as necessary during the process of extracting data from each included study (Khalil et al., 2016; Peters, 2016). In line with Joanna Briggs Institute methodology, any additional relevant data may be extracted from included studies as

determined by the review team during the screening process of the scoping review. Any modifications will be detailed in the full scoping review article.

Presenting the Data

Data will be presented in line with the developed PRISMA format for scoping reviews (Moher et al., 2009). The tables and/or charts will report on distribution of studies by sport, type of tool, type of study, year of publication, research methods and findings where appropriate. Additional data identified that is relevant to the objectives of the scoping review will also be presented in diagrammatic form. The results will be accompanied by a narrative review and will describe how the results relate to the review's objective and questions.

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Appendix I: Initial Search

	Draft search terms
Participants	Racket and club sports
Initial search strategies	***Search 1*** – Tennis OR Golf AND skill acquisition AND Grip ***Search 2*** - Tennis OR Badminton OR Hockey OR Golf OR Baseball OR Squash OR Cricket AND skill acquisition AND Grip ***Search 3*** - Tennis OR Badminton OR Hockey OR Golf OR Baseball OR Squash OR Cricket OR Softball OR Lacrosse AND skill acq* OR skill develop*
Context	Racket and club sports that involving the skill of gripping handles in certain hand positions
Study types	Quasi-experimental, true-experimental, case studies, systematic reviews, meta-analysis and grey literature

Appendix II: Draft Data Extraction Form

Scoping review main details					Results/data extraction					
Author (Year)	**Concept**	**Context**	**Inclusion/exclusion criteria**	**Type of source**	**Participant information; Sex, Age (years), Height (cm), Weight (Kg), Playing level**	**Type of Tool**	**Sport-specific skill**	**Type of analysis (Time using tool)**	**Outcome measures**	**Key findings**