

Eton Fives (EF), which is self-officiated at all levels of the game, has potential to benefit those that play it by promoting the development of self-regulation (SR). A combination of cognitive challenges, present in the complexity of the game and its self-officiated structure, and physical exercise are likely to place demands on a player's ability to self-regulate. The aim of this study was to discover if there are any differences in SR ability between Eton Fives players and those that do not play the sport. Participants completed the Self-Regulation Questionnaire (SRQ), a self-report assessment of general SR skills, distributed via Google Forms and approved by relevant staff at each participating school. 97 participants (aged 13-16 years) from 4 UK state schools completed the SRQ, of which 58 played EF and 39 did not. Initial evidence points towards a correlation between playing EF and higher scores on the SRQ compared to those that do not play EF ($p = .002$). The two groups were further divided into four categories for analysis: Eton Fives players that only play EF (E5; $n=6$), Eton Fives players that also played other sports (E5_OS; $n=52$), other sports only (OS; $n=18$) and non-sports participants (NS; $n=21$). Comparisons between these groups showed significant differences in SRQ scores between E5_OS and NS ($p = .007$), as well as significant differences in SRQ scores between E5_OS and OS ($p = .013$). A significant difference in SRQ scores between various levels of experience in EF was observed ($p = .013$), with all groups with any level of experience outscoring those with no experience on average. The correlation between participation in Eton Fives and higher scores on the SRQ, even when compared to other sports, indicates potential for the intrinsic properties of the game to have a positive impact on the development of SR skills.

Background

“Sport can be an effective and unique vehicle to develop strength of character, such as determination, justice, and teamwork, which are valued as ‘good’ by wider society” (The Jubilee Centre for Character and Virtues, 2020). Character development in sport is widely studied and it is generally accepted that sport develops character (The Jubilee Centre for Character and Virtues, 2020). This belief is widely used to mobilise the use of sport as an educational tool in schools, with physical education and extra-curricular sporting activity forming part of most curricula across the UK. To fully understand the value of a sport in an educational context, the character traits being developed and the mechanisms through which these character traits are developed need to be identified. As far back as 1831 there have been claims of the benefits of sport in developing character in education, often referred to as *affective development* in educational literature.

“Because of the opportunities to teach ethical values and to influence moral behaviour of students through sports and games, it is thought that physical educators might well place an increased emphasis on the problems of ethical judgements and morally responsible behaviour in sports.” (Park, 1983).

Morally responsible behaviours are developed through opportunities in sport and games where players must balance both their own rights and responsibilities with the rights and responsibilities of others (Solomon, 2013). This is demonstrated when students show a willingness and capacity to maintain this balance of rights between participants. In sport, as in life, not everyone shows a willingness to play by the rules and external motivations for participating impact behaviour. People play sport for money, glory, social status, pride and other externally motivated factors (Vallerand & Ratelle, 2002; Vallerand, 2007). These external influences endanger our first point, that willingness to maintain rights and moral responsibilities. In these situations where there is a strong external motivation for participating in sport, other than for the enjoyment of the game, we can sometimes assume that participants might not always have the willingness to act morally and mutually protect their own rights as well as others. In these instances, we see a breakdown of willingness that leads to the requirements of third-party officials. However, where there is willingness, the requirements of that external referee might be lessened. Capacity to maintain rights and moral responsibilities of all participants highlights the concept that willingness might have its limits and that the act of maintaining rights and responsibilities can take its toll on participants to the point where there is a breakdown in behaviour. Once again, this is where third-party officials might be required to intervene. Even those with the best intentions can experience lapses in judgement over a prolonged period of maintaining desirable behaviour.

In psychological literature, this breakdown in behaviour due to sustained maintenance of moral and ethical behaviour in pressured situations is referred to as *Ego Depletion* (Baumeister, Bratslavsky, Muraven & Tice, 1998). When a person experiences ego depletion, they are more likely to fail in attempts to maintain goal directed behaviour, such as playing by the rules and/or performing to the best of their ability. This is often where

mistakes, breakdowns in performance and the most fouls are committed and a third-party official needs to step in.

Baumeister considers the resources used up by exerting self-control as an energy source (Baumeister, 2002; Baumeister, Vohs & Tice, 2007; Baumeister & Alquist, 2009). The energy model assumes that the energy used up is a limited, but global, resource (Baumeister & Vohs, 2016). This means that the energy needs to be conserved or it will run out, leading to ego depletion and that the use and depletion of this resource has an effect on everything a person does. The term self-regulation (SR), refers to the capacity to override one's emotions, thoughts and actions, both consciously and unconsciously, guided by goals and standards (Baumeister, 2002). Once again, this idea of capacity is essential when considering whether or not a person will be able to maintain moral reasoning and behaviours. Increasing this capacity is a challenge, one that is seemingly accomplished by engaging in activities that cause a drain on self-regulatory resources (Baumeister, Tice & Vohs, 2018). Through the experience of these challenging situations, the person learns to manage and conserve these resources economically and delay or prevent the onset of ego depletion more effectively (Baumeister et al., 2018).

If the experience of challenging situations that drain our SR resources is necessary for developing increased SR capacity, then are we limiting the potential growth of this capacity by intervening with third-party officials? Would there be more potential growth if the players were responsible for making official decisions themselves?

Eton Fives (EF) requires players to adopt both the roles of the player and the official, with each player having equal say in officiating the game. All four players on court, in their pairs, cooperate in the shared responsibility of ensuring the game is played according to the rules. This applies from youth beginners through to top level adults. In theory, we could assume that the dual-role of player and official creates a dichotomy between the goals of a player (performance) and the official (moral responsibility and maintenance of the rights of all participants) that will challenge players beyond other sports that allow for third-party intervention when rules are broken. If this player-official dichotomy has an effect, then people participating in Eton Fives should exhibit a higher capacity to self-regulate than those that do not play the sport. If playing a sport has the potential to develop self-regulatory capacity, which is associated with many positive life outcomes,¹ then there is clear value in this sport in an educational context and potential extrapolation of the player-official dichotomy into other sporting contexts. To investigate this theory, we conducted a small research project to understand whether this avenue is worth pursuing further.

The Study

The purpose of this study was to see if there were any differences in Self-Regulation Questionnaire (SRQ) scores between those that play EF and those that do not. The

¹ including task performance, school and work success, popularity, mental health and adjustment, and good interpersonal relationships (Baumeister, 2007)

hypothesis was based on the strength model, which suggests that self-regulation operates by consuming a limited energy resource and that self-regulation can be improved through exposure to demands on this resource (Baumeister & Vohs, 2016). This paper suggests that the player-official dichotomy present in Eton Fives might place an increased demand on SR resources and thus lead to improvements in players' self-regulatory skills.

The idea here is that Eton Fives does not necessarily explicitly teach these specific skills, but playing the sport might lead to higher ratings on each question due to a general effect on self-regulatory capacity. For example, someone rating themselves low on question 41, 'I am able to resist temptation', might rate themselves higher if they have a higher capacity to self-regulate.

97 players from four Eton Fives-playing state secondary schools in the UK completed the Self-Regulation Questionnaire (SRQ). The sample was composed of a mix of secondary school settings including single sex and co-educational schools. The SRQ was distributed by staff at each school via email and responses were sent directly to the researchers through Google Forms. Participants were secondary school students aged 13-16 years old that either played Eton Fives or did not (58 played Eton Fives and 39 did not).

No incentives for completion or repercussions for not being involved were mentioned and participants completed questionnaires knowing they were doing so simply to help the EFA, and that they could withdraw at any time. No personally identifiable information was collected and all information was stored in a safe place. Data was analysed through SPSS Statistics, with multiple tests being run (T-tests, ANOVAs, pairwise comparisons) and the main results being reported here (full analyses available on request).

Self-Regulation Questionnaire

The SRQ (Brown, Miller, & Lawendowski, 1999) was developed to assess self-regulatory processes through self-report. The 63-item questionnaire consists of 7-subscales that are considered to be principles of behavioural self-control.

- 1- Receiving relevant information
- 2- Evaluating the information and comparing it to norms
- 3- Triggering change
- 4- Searching for options
- 5- Formulating a plan
- 6- Implementing the plan
- 7- Assessing the plan's effectiveness

The questionnaire is scored in the following ranges:

- | | |
|---------|---|
| >239 | High (intact) self-regulation capacity (top quartile) |
| 214-238 | Intermediate (moderate) self-regulation capacity (middle quartiles) |

<213 Low (impaired) self-regulation capacity (bottom quartile)

All 63 items are scored on a Likert scale.

Quantitative Analysis

The data collected from the SRQ responses from all four participating schools was analysed. This included descriptive statistics and inferential statistics. A total of 97 pupils across four secondary schools completed the SRQ.

	Total (N)	Female (N)	Male (N)
Number of participants	97	14	83

Table 1: total number of responses split by gender

	Total (N)	Aged 13-14 (N)	Aged 15-16 (N)
Number of Participants	97	36	61

Table 2: total number of responses split by age

Table 3 below shows the average SRQ scores according to sport. Eton Fives players scored in the Intermediate Category, whilst the No Sport and Other Sports groups scored in the Low Category of the SRQ.

	Eton Fives Players	No Sport	Other Sports
Average SRQ Score	216.569 (N=58; SD=20.28)	205.736 (N=20; SD=25.15)	199.55 (N=19; SD=17.5)

Table 3: average SRQ scores according to sport played

Table 4 below shows average SRQ scores where the Eton Fives players' age groups have been split. Although the No Sport and Other Sport groups were not split by age, this table illustrates a difference in SRQ scores within the Eton Fives playing group, with the younger

age group scoring in the Intermediate category and the older age group scoring in the Low category. Both age groups still scored higher than the No Sport and Other Sports groups.

	Aged 13-14	Aged 15-16	No Sport	Other Sports
Average SRQ Score	220.176471	211.458333	202.571429	201.555556

Table 4: average SRQ scores split by age of Eton Fives Players

Table 5 below shows the comparison between average SRQ scores based on number of years playing Eton Fives (Non-EF players considered as having 0 years' experience). All three groups that had experience playing Eton Fives scored higher than the group with 0 experience. The highest scores were found in the low experience group.

Years' Experience	0	<1	1<2	3+
Average SRQ Score	202.102564	226.142857	217.269231	212.291667

Table 5: average SRQ scores based on number of years playing Eton Fives

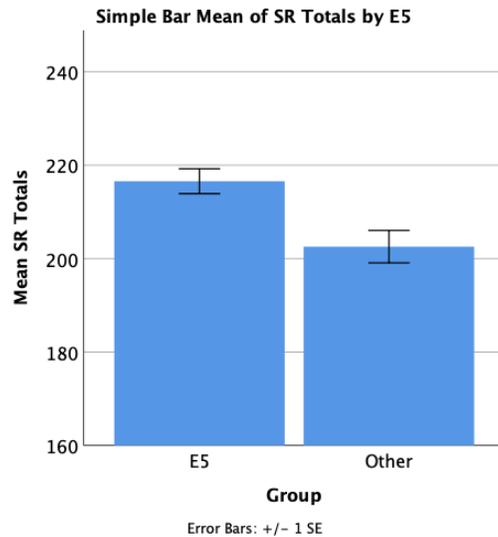
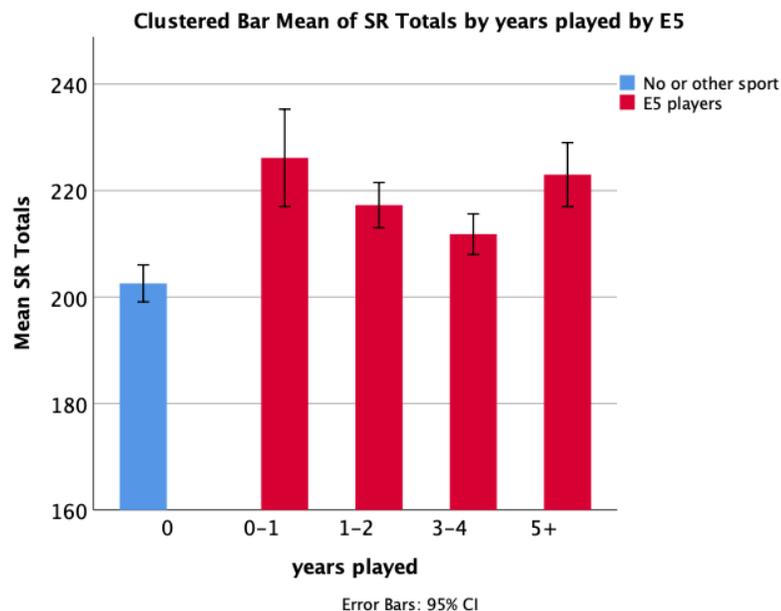


Figure 1: Differences in SRQ scores between those that play Eton Fives and those that do not.

Inferential analysis of differences seen in the above graph has shown a significant difference in SRQ scores between those that play Eton Fives and those that do not ($p=.002$). This illustrates that Eton Fives players scored higher on the SRQ and thus have higher self-regulation capacity than those that do not play the sport. This confirms correlation between playing Eton Fives and higher SR capacity. Whilst there seems to be a link between playing the sport and higher SR capacity, we need to understand if there is causation.

Figure 2 (below) shows differences in SRQ scores between experienced, moderately experienced and inexperienced Eton Fives players.



A significant difference in SRQ scores between various levels of experience in EF was observed ($p = .013$), with all groups with any level of experience outscoring those with no experience on average. This illustrates that Eton Fives players significantly outscored non-sports participants and other sports on the SRQ. However, there was not a significant difference in scores between the Other Sport group and the No Sport groups. This is an important step towards identifying a causal link between Eton Fives and developing SR capacity as this data suggests that not all sports have the same outcomes.

Figure 3 (below) shows differences in SRQ scores between Eton Fives players that also play other sports (E5_OS), Eton Fives only (E5), students that do not play sport (NS) and students that play other sports (OS). Comparisons between these groups showed significant differences in SRQ scores between E5_OS and NS ($p = .007$), as well as significant differences in SRQ scores between E5_OS and OS ($p = .013$). This shows us that significantly higher scores were seen in a participants' first season playing Eton Fives, and that Eton Fives players of all experience levels significantly outscored those with no experience playing the game. The fact that the scores are higher for the younger and the more inexperienced players fits in with the strength model of SR as there will be more demands on SR resources of inexperienced players compared to experienced players. Experienced players learn through practice and become more efficient at either one or both roles on-court, thus reducing the demands of player/official dichotomy on their SR resources. This is promising for schools that offer Eton Fives as part of their PE curriculum for a season, as well as having potential to influence SR capacity over shorter-term interventions.

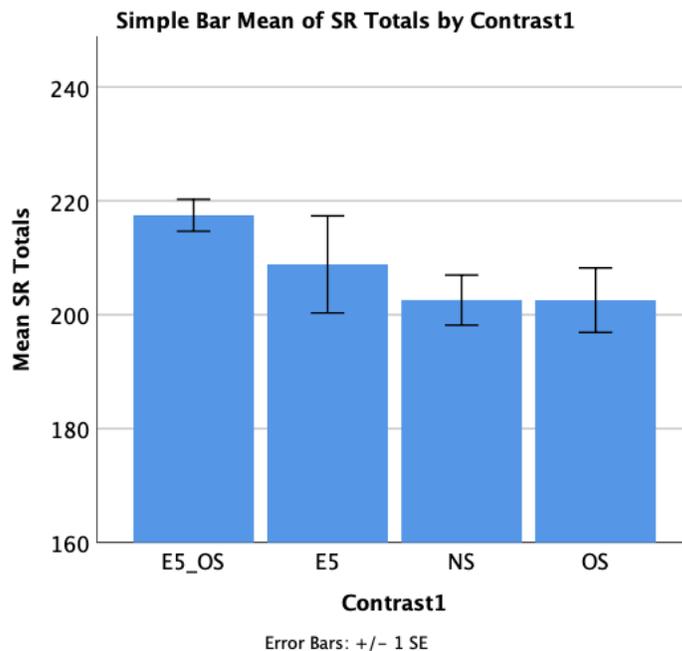


Figure 3: Differences in average SRQ scores between groups

With small sample sizes, these results need to be considered only for the use of informing future research and forming the basis of discussions around character formation and sports, rather than demonstrating generalisable evidence. However, the results are promising in suggesting that this is a direction worth pursuing and that it is highly likely that these results would be replicable in a larger sample.

Discussion

Analysis of the quantitative data has highlighted significant differences in SRQ scores that are in line with the hypothesis that playing Eton Fives might have a positive impact on the development of self-regulatory capacity.

Playing Eton Fives clearly has an effect on self-regulatory capacity and this initial project evidences an opportunity to use the sport as an intervention tool. The fact that inexperience in the sport might lead to greater benefits, indicates that participants in interventions might see improvements within the first year. The player/official dichotomy is complex and we would need to gain a better understanding of the interactions between these roles to pinpoint any direct correlation between self-officiating and improved self-regulation. Research into dual-task performance, decision-making and attentional control all suggest that self-officiating is likely to have an effect on the development of self-regulatory capacity. Here we discuss some potential explanations for the results above.

Complexity and Cognitive Challenges

The Strength Model of self-regulation views SR as a global but limited energy source that can be depleted through use in tasks requiring self-control (Baumeister, 2007; Baumeister, Tice & Vohs, 2018). Cognitively and physically complex tasks, physical activity and the additional requirement for players to objectively officiate the game whilst simultaneously aiming to perform at their best as players, all might cause a drain on SR resources. Whilst these tasks might drain these resources, engagement in such activities is the same method through which people develop greater SR capacity. Eton Fives is a game of hazards. The three-walled court has slopes and angles that change the direction of the ball and increase the complexity of the game. Additionally, there is a step in the middle of the court that separates it into hemispheres and different levels. Finally, the buttress juts out from the centre left of the court and provides a unique target to kill the ball. These hazards increase the cognitive challenge of the game by increasing unpredictability, providing more options for shot selection, decreasing available reaction time and creating difficulty for strategic decision-making and anticipatory efforts.

The Spirit of the Game

Due to the lack of a third-party referee, there is increased emphasis on sportsmanship as a prerequisite for the game to be played. Rather than being seen as good etiquette, ideals of sportsmanship and fairness are required to play or else the game could descend into one-upmanship and grind to a halt.

The role of the coach

Eton Fives coaches must not only teach rules and skills, but the application of those rules and the motivation to abide by these rules without adult supervision. Eton Fives players learn how to self-officiate at a young age and rehearse this in varying levels of the game over time. Coaches guide players through moral reasoning and allow them to discover their own levels of integrity through playing.

Lets

Lets are a core component in Eton Fives and embody the application and interpretation of rules and scenarios by the cooperative but competitive group of players on court. Lets are applied in any situation where the point must be reset, rather than awarded to a particular pair/opponent. There are many contexts for the awarding of a let, such as when players cannot agree on an outcome or a player or the ball is impeded by an opponent. The Eton Fives Association website (www.etonfives.com) describes the importance of lets as follows:

“Nowhere does the adherence to the spirit of the game become more important than in the requesting and granting of lets. If in doubt: play a let. Lets should be offered if a player is impeded in any way but they need not always be accepted. Offer more lets than you accept. Lets should only be accepted if a player feels he would probably have returned the ball. He is not entitled to a let just because he was impeded.”

Lets are a built-in part of the game that acknowledge that there may be disagreements between players and pairs during the game, but that these disagreements will not lead to favouring either pair but rather lead to replaying the point. Essentially, opponents offer each other the opportunity to replay the point and are expected to only accept if they truly believe they would not have lost the point if it weren't for the infringement. This concept encourages fair play as all see it, rather than as an individual or even third-party official might see it.

Executive Function as an alternate explanation

Executive Function is a term used in neuropsychology used to describe a set of mental skills that are made up of working memory (WM), inhibitory control (IC) and cognitive flexibility (CF). These Executive Functions of the brain are conceptually similar to SR, which

requires us to be flexible in our thinking and manage our impulses to remain on track to achieve our goals.

“The ‘Executive Functions’ (EFs) of inhibitory control, working memory, and cognitive flexibility enable us to think before we act, resist temptations or impulsive reactions, stay focused, reason, problem-solve, flexibly adjust to changed demands or priorities, and see things from new and different perspectives” (Baumeister, 2013; Diamond & Ling, 2015).

Diamond and Ling (2015) summarized their conclusions about various studies of different methods to improve executive functions. These points are summarised below:

1. Executive function training appears to transfer, but the transfer appears to be narrow.
2. Whether EFs’ gains are seen depends on the amount of time spent practising.
3. Whether EFs’ gains are seen depends on the way an activity is presented and conducted.
4. EFs need to be continually not just used, but challenged to see improvements –
5. Those with the poorest EFs consistently gain the most from any programme that improves EFs.
6. Once practice ends, benefits diminish.
7. Often, differences between the treatment and control groups only appear when participants’ EFs skills are pushed near their limit.
8. Aerobic exercise, or resistance training, without a cognitive component produces little or no EFs benefit.

Using these insights in parallel to our research on SR, we might enhance our understanding and explanation of the results in this and future studies. For example, with the integration of EF to further explain our observations, we might note that:

- a) Improvements in SR need to be tracked across multiple domains.
- b) Time and frequency of activity need to be controlled.
- c) There needs to be a measure of ‘challenge’ to the individual’s SR resources.
- d) Those that are able to adopt both roles of player and official autonomously are unlikely to benefit as much as those that are new to the game.
- e) Post-tests need to measure how long these benefits last.
- f) The cognitive demands of the sport may vary depending on the complexity of the match and the decision-making requirements placed upon the individual.

With these additional factors in consideration, we can take the necessary steps towards identifying *how* Eton Fives might lead to an increase in self-regulation capacity.

There is a close relationship between EF and the strength model of self-regulation used as a conceptual framework in this study. Future research may follow the path of executive function and developmental cognitive neuroscience to conceptualize and explain the mechanism through which playing Eton Fives might develop self-regulatory skills.

More specifically, future research will aim to identify:

1. Whether self-officiating is a medium for improving self-regulation.
2. How much time it takes for significant improvements to occur.

3. If these improvements are significant off-court.
4. If these improvements remain robust over time after discontinuing the sport.

Limitations

As previously mentioned, the sample size is small and there are disparities between the number of participants in groups by age, gender, sport and experience. Although these disparities exist, the results show that this is a promising direction to follow with future research. It is also necessary to acknowledge that research conducted in this manner is likely to draw in more responses from Eton Fives players than from other sports. Without incentives, the participants that do not play the sport might have felt less inclined to fill in a 63-item questionnaire, from a governing body for a sport they do not play, and could rush through it. This potential lack of motivation to complete the questionnaire might have an effect on the scores of those that do not play. Additionally, this data was gathered after months of being in lockdown during the Covid-19 pandemic and the participants might not have been playing any sport at or around the time of completing the questionnaire. The fact that Eton Fives is considered an outdoor sport could have allowed more Eton Fives players to continue their sport, with many other sports were unable to continue. For this research to apply to future contexts, it would be helpful to gather data from a 'normal' season.

The Other Sports group was comprised of multiple sports, of which, some Eton Fives players also participated. Future research will aim to populate the Other Sports category more effectively and allow for comparison between individual sports rather than the grouping of all other sports into this category. This should further help to pinpoint whether or not there is a mechanism for SR capacity development specific to Eton Fives.

Conclusion

This study evaluated the differences in scores on the SRQ between those that play Eton Fives and those that do not. The results showed a significant difference between these two groups, as well as differences between experience, participation in other sports and non-sports participants. These results are a promising starting point for future research that will include a larger and more evenly distributed sample. At this point, we are on the right track towards understanding the differences between Eton Fives and other sports and why participation in Eton Fives might be beneficial in the development of self-regulation. It is still to be seen whether the strength model of self-regulation is the future direction of this work or if further exploration of executive function will provide a more robust explanation of what we have observed in these initial results. The data shows clear differences in self-regulation scores in those that play Eton Fives and those that do not and schools with access to courts might be encouraged to take advantage of this fact. If the player/official dichotomy and self-officiating aspect of Eton Fives is responsible for the development of such vital skills, then

this work and future work on this topic may encourage other sporting national governing bodies to find ways of incorporating these structures into youth sports. The opportunity to develop self-regulatory skills (amongst others) through sport and physical exercise, rather than through a classroom-based programme, is exactly the reason that sport is such a valuable tool within educational institutions.

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