

Running head: SELF-EFFICACY AND SPORT PERFORMANCE

TACKLING THE RELATIONSHIP BETWEEN SELF-EFFICACY AND
PERFORMANCE IN RUGBY

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Abstract

Some consider self-efficacy to be the most important psychological construct contributing to sporting performance. To test five hypotheses regarding the nature of relationships between performance and self-efficacy, and assess any changes in these relationships over the course of a season, 26 professional rugby players filled out self-efficacy surveys before and after each game they played throughout a competition. In contrast to the hypotheses, no relationship was found between self-efficacy and performance, and performance was not found to mediate the relationship between self-efficacy before a game and self-efficacy following a game. Additionally, there was not found to be any change in the self-efficacy-performance relationship over the course of the rugby competition. The implications of the lack of findings are discussed within the context of the strengths and limitations of the study, and the wider understanding of self-efficacy and performance.

Tackling the Relationship between Self-Efficacy and Performance in Rugby.

Sports teams are frequently looking for ways to give their team an advantage over their competitors, often sparing no expense in order to do so. This has led to teams putting a strong focus on nutrition, conditioning and, more recently, the mental wellbeing of their athletes. Arguably the most important psychological variable, when considering sports performance, is self-efficacy (Feltz, 1988). Many studies have found a link between self-efficacy and sporting performance (Locke, Frederick, Lee, & Bobko, 1984; Martin & Gill, 1991; Moritz, Feltz, Fahrback, & Mack, 2000; Weinberg, Gould, & Jackson, 1979). However, there remains very little knowledge about the nature of this relationship. Therefore, the aim of this study was to further investigate this relationship between self-efficacy and performance in sport. Specifically, this study looks at rugby and whether performance mediates the relationship between self-efficacy for tackling before a match and self-efficacy for tackling after a match. It also looks at how the relationship between self-efficacy and performance changes over the course of a rugby season.

Introduction to Self-Efficacy

Bandura's seminal work (Bandura, 1977) on behavioural change has been important in developing an awareness of how cognitive factors can be influential in performance in a variety of settings, including within a sporting domain (Feltz, 1988). The term *self-efficacy* was first used by Bandura in the development of his *self-efficacy theory*, which was an attempt to explain behaviour from a social-cognitive point of view. Traditionally, behaviour had been explained as being either innate or learned (Bowlby, 1969; Chomsky, 1965; Skinner, 1957). However, Bandura (1986; 1997) pointed out that both of these ways of explaining behaviour are often limited, and that while experience may be influential in most types of learning, innate factors also generally play a part. Therefore, Bandura developed self-efficacy theory, which states that behaviour, environmental factors and physiological and

cognitive factors all have an impact on each other. An important part of Bandura's self-efficacy theory is the term self-efficacy, a task-specific construct that can differ vastly depending on task-specific variables. The term self-efficacy refers to the beliefs held by an individual about their ability to perform the necessary behaviours to successfully complete a particular task. That is, self-efficacy relates to specific activities rather than being a general self-evaluation of one's ability. This means that self-efficacy for passing a rugby ball to another player does not necessarily relate to self-efficacy for tackling an opposition player in football (Bandura, 1997)

Sources of Self-Efficacy

Bandura (1997) theorized that efficacy beliefs stem from processes of appraisal and persuasion about the self, relying on information from a variety of different sources, including vicarious experience, persuasion information, and physiological feedback. Research has subsequently supported these sources identified by Bandura, showing that watching a similar person perform a task (Gould & Weiss 1981; Weinberg, Gould, & Jackson, 1979), being persuaded by a credible and knowledgeable source (Vargas-Tonsing, 2004), and particularly in sports, physiological feedback (Feltz & Riessinger, 1990) can be influential in affecting the self-efficacy of an athlete.

However, the most influential source of self-efficacy is prior experience, as it is based on one's own mastery experiences (Bandura, 1997). As self-efficacy is task-specific, the player must have performed the task in question previously, or at least a similar one, or they cannot have accurate beliefs about their ability to perform the task in question (Bandura, 1997; Feltz 1988). Accurate self-efficacy beliefs are important because if those who have high self-efficacy, yet low abilities, set lofty goals and fail to meet them, they may become discouraged from the task in question. If people have low self-efficacy, yet high abilities, they may not

perform as well as they could do if their self-efficacy matched their abilities (Bandura & Cervone, 1986).

A study by Valiante and Morris (2013) supported Bandura's assertions about mastery experiences being an important self-efficacy source. They asked players to outline their careers, including their successes, their failures, and how these successes and failures affected their subsequent thinking patterns, expected outcomes and emotional states. Valiante and Morris found that professional golfers were able to maintain high self-efficacy over a long time period by recalling their previous successes. This is important as these athletes reported that their self-efficacy beliefs lead to mind-sets that enabled them to be calm and more productive than they otherwise would have been, which then enabled them to perform better. This suggests that mastery experiences are an important consideration in professional athletes as these can be beneficial to future performance and that these effects can be influential over a long time frame. Given that the participants in this study are professional athletes, we would then expect mastery experiences (i.e. past performance) to be influential. Therefore, these results suggest that rugby players' self-efficacy after a game should correlate positively with performance within that game.

It is important to note that with mastery experiences, it is the individual's perception of the situation, rather than prior performance on a task that has an effect on self-efficacy. Self-efficacy, then, represents the individual's perception of these external outcomes (Bandura, 1997). Therefore, while successful experiences usually increase self-efficacy and unsuccessful experiences usually decrease self-efficacy, this is not always the case (Feltz, Short, & Sullivan, 2008). For example, Bandura and Cervone (1986) found that participants who succeeded on a difficult task did not increase their self-efficacy or their goals for a task if they did not believe they could achieve this outcome again.

Introduction to Self-Efficacy in Sport Performance

It is important to consider the influence that self-efficacy could have in sports, as there have been numerous studies that have found self-efficacy to be positively related to sporting and athletic performance (Locke et al., 1984; Moritz et al., 2000; Weinberg et al., 1979). Martin and Gill (1991), for example, found that self-efficacy beliefs that runners held about their distance running had a very high correlation with how they actually performed. This means that those with higher self-efficacy ran faster times on the track. While such a relationship between two variables does not mean one is a cause of the other, Bandura's (1977; 1997) self-efficacy theory proposes that this is the case. This would suggest that for an athlete to perform to the peak of their abilities, it is not sufficient to just be strong and physically healthy. In addition to being physically fit and healthy, self-efficacy theory predicts that athletes benefit from being confident in their abilities to complete the required tasks. For example, it is then possible that two weightlifters of equal physical strength may not have the same performance if they have different beliefs about their ability to lift the weight (weightlifting self-efficacy).

This is supported by Weinberg et al. (1979), who tested the effects of manipulating the efficacy beliefs of participants who were about to participate in a muscular leg endurance task by having them first watch a confederate perform the task. The participants were told that their goal was to outperform the confederate by performing the task for a longer time period. Their 'competitor', either performed poorly on the task and claimed to have a leg injury, or performed well and was said to be a varsity track athlete. The 'competitor's' injury induced high self-efficacy in participants, as they perceived themselves as being more likely to outperform the confederate, while their 'competitor' stating that they were a varsity track athlete induced low self-efficacy in participants, as they saw themselves as having little chance of being competitive in this situation. Participants who competed against the injured

confederate reported higher levels of self-efficacy prior to performance and endured longer in the task.

Effects of Self-Efficacy

The three outcomes of increased self-efficacy through which Bandura (1977; 1982) theorized to lead to improved performance on a task were increased pursuit of challenges, effort expended, and willingness to work hard to overcome obstacles. Effort, persistence and pursuit of goals are particularly important in professional sport and have the potential to be the point of difference between athletes, particularly as they are often training hard and can sometimes be quite similar in terms of physical characteristics and skill level (Weinberg & Gould, 2011). Bandura hypothesized that higher self-efficacy would result in an increased pursuit of challenges, increased effort expended and an increased likelihood of persistence in the face of potential failure. Finding these factors led to better performance does not necessarily mean that self-efficacy led to better performance, but as far as self-efficacy theory goes, it is a necessary precondition. Therefore, any such findings could help to advance arguments that self-efficacy is beneficial to performance.

Bandura's (1997) predictions would mean that those who have high self-efficacy for a task may perform better as they set more challenging goals for themselves in terms of the task performance. Research has, in fact, supported the idea that people set goals in activities for which they have high self-efficacy, and avoid those activities for which they have low self-efficacy (Feltz, 1982). Bandura also suggests that those who have reasonably accurate impressions of their ability will set reasonable, yet challenging goals for themselves. As their competence increases, they will then be motivated to set more challenging goals. However, those who judge their ability as being lower than it is miss out on the potential benefits that come with the activities that they avoid participating in, and fail to develop in this area. This is supported by research from Locke et al. (1984) who found that athletes with higher self-

efficacy chose more challenging goals for themselves, in addition to performing better than those with low self-efficacy. The support of Bandura's hypothesis that those with higher self-efficacy set more difficult goals also provides support for self-efficacy impacting on performance. This helps us to understand how self-efficacy might operate and come to have an influence of performance. Therefore, this research would suggest that rugby players with high self-efficacy for tackling would tackle better than those who have low self-efficacy for tackling.

Feltz et al. (2008) have suggested that self-efficacy influences goal setting through creating discrepancies between goals and outcomes. When performance standards do not meet the goals an individual sets out, they will react with dissatisfaction. If the discrepancy is not too large, and the individual has high self-efficacy for the task, then the dissatisfaction from a failed goal should be an incentive to expend more effort in order to meet the goal. Otherwise, the failure to meet the goal will discourage the individual from further attempts to meet this goal (Bandura, 1997; Carver & Scheier, 1981). In situations where those with high self-efficacy fall far short of their goals, they generally continue to participate in the task, but re-evaluate the goals they set out for themselves, making them less challenging (Bandura & Cervone, 1983). Those who match or surpass their goals generally react with satisfaction, and those with high self-efficacy will set more challenging goals for themselves. However, meeting goals that are not challenging can result in a lack of motivation, and subsequently, lowered performance levels (Miller, 1993). In short, this means that those with high self-efficacy, through a process of discrepancy reduction between goals and performance, are expected to perform highly. This then suggests that in this study it should be expected to see that those with high self-efficacy perform to a high level.

Several studies have assessed the perceived effort exerted during a task for those with different fitness levels, finding effort to be negatively related to self-efficacy (Borg, 1985;

Hutchinson, Sherman, Martinovich, & Tenenbaum, 2008). Hutchinson et al. also found that those with higher self-efficacy found the task more enjoyable, and suggested their findings shows self-efficacy increases an individual's tolerance to exertion in such tasks, enabling them to perform the task for a longer period of time. The relationship between persistence and self-efficacy has been analysed more thoroughly, though most of the literature assesses the persistence of students within educational settings. In a review of the literature involving muscular endurance tasks, Biddle (1986) concluded that positive beliefs about one's ability lead to increased persistence. This supports the predictions put forward by Bandura (1997), and also supports his predictions that self-efficacy may be beneficial towards performance, by helping develop an understanding of how this outcome may occur. Assuming, then, that increased effort and persistence do lead to better performance, it would be expected to find within this research that self-efficacy correlates with performance.

Self-Efficacy Relationship with Sport Performance

There have also been many studies that have directly looked at the relationship between self-efficacy and performance in sport (e.g. Barling & Abel, 1983; Feltz & Lirgg, 1998; Kitsantas & Zimmerman, 2002; Treasure, Monson, & Lox, 1996). The majority of these studies find support for a positive relationship between self-efficacy and performance, finding that higher self-efficacy tends to be associated with higher performance outcomes. These studies have found a positive relationship between self-efficacy and performance in a variety of different sporting or athletic pursuits, ranging from basketball (Kavussanu, Crews & Gill, 1998) to wrestling (Treasure et al., 1996).

While some studies have found negative relationships between self-efficacy and performance (e.g. McCullagh, 1987), the majority of studies show support for a positive relationship between these variables. Moritz et al. (2000) found the average correlation over

45 studies to be .38. This indicates that there is a moderate relationship between self-efficacy and performance.

However, this meta-analysis was largely concerned with finding out about moderators as to how self-efficacy was measured, and did not assess the influence of other causal variables. Therefore, this merely suggests that there is some kind of relationship, but does not tell us anything more about the nature of the relationship. It is possible that some other variable causes both increased performance and enhanced perceptions of an individual's ability. For example, those with higher ability would not only be expected to perform better, but should also have higher perceptions of their ability. This means that we cannot tell if self-efficacy influences performance above and beyond what would be expected from ability alone.

A study by Feltz, Chow and Hepler (2008), involving repeated trials of a diving tasks, however, assessed the self-efficacy-performance relationship and controlled for the effects of ability. Performance overestimates ability, as it affected by other factors, such as self-efficacy. Therefore, the effects of self-efficacy were removed from the calculation for past performance. It is important to remember that self-efficacy not only affects future performance but has also affected past performance (Bandura, 2012). Feltz et al. found that self-efficacy remained significantly correlated to performance, even after controlling for other factors, such as previous performance.

A number of studies sought to further knowledge of the relationship between self-efficacy and sporting performance through manipulating self-efficacy beliefs (Boyce & Bingham, 1997; Wells, Collins, & Hale, 1993) or through path analysis techniques (e.g. Theodorakis, 1995). For example, as mentioned previously, Weinberg et al. (1979) manipulated self-efficacy and found that those with high manipulated self-efficacy performed better than those who were manipulated to have low self-efficacy. This has been supported through a further study by Weinberg, Gould, Yukelson & Jackson (as cited in Feltz et al., 2008). As some may

question whether manipulated self-efficacy may differ to self-efficacy obtained through more normal sources, Weinberg, Gould, Yukelson & Jackson tested the importance of manipulated self-efficacy compared to pre-existing self-efficacy within a muscular endurance task, which was rigged so that participants lost both trials, and found that both were important to performance. Participants with high pre-existing self-efficacy, and with low pre-existing self-efficacy were selected and were randomly assigned to one of two conditions. These conditions involved a self-efficacy manipulation, one for high self-efficacy, and the other for low self-efficacy. The manipulation led to those with high-manipulated self-efficacy performing better than those with low-manipulated self-efficacy. Pre-existing self-efficacy was more influential for performance in the first trial, but manipulated self-efficacy was found to be more influential in the second trial, suggesting manipulated self-efficacy overrides the impact of pre-existing self-efficacy. The findings of these experiments in which self-efficacy was manipulated provide strong evidence to support the idea that self-efficacy is an important causal factor in performance in the sporting and athletic domains. They collectively demonstrate that athletes holding strong efficacy beliefs perform better than athletes who have low self-efficacy.

Moderators of the Self-Efficacy-Performance Relationship

As part of the meta-analysis they performed, Moritz, et al. (2000) helped to distinguish measurement-related moderators of the relationship between self-efficacy and performance. It is important to consider these factors when planning a study, as it could be the difference between obtaining a strong correlation, or a weak one. As such, as much as possible, the current research has taken these factors in account.

Concordance was found to be the most important moderator of the self-efficacy-performance relationship. Concordance is a term indicating that the self-efficacy measures and the performance measures are both assessing the same competencies. That is, even if the

self-efficacy measures and performance measures are measured well, if they do not refer to the same information, then self-efficacy and performance will not be expected to correlate. For example, when measuring the tackling self-efficacy of a player, it would not make sense to use the difference in team scores as a measure of individual tackling performance. The types of self-efficacy measures (whether the self-efficacy assessment was a general assessment or task-specific), types of performance measures (subjective, objective, self-reported), the nature of the task (whether or not it is a task that is new to participants) and the timing of assessments (pre or post performance) were also found to be of some importance.

Moritz et al. (2000) also found support for the idea that task-specific self-efficacy correlates more highly with performance than general self-efficacy measures. Additionally, if the task is a task that participants are familiar with, correlations tend to be higher. Therefore, in this study, which involves professional athletes who are not only highly familiar with tackling situations, but are also being assessed through a tackling-specific self-efficacy measure, it should be expected to find a positive correlation with both pre and post-game self-efficacy measures.

In this research, tackling self-efficacy will be linked to objective tackling performance measures, meaning that they will be concordant. While subjective performance measures were found to have higher correlations between self-efficacy and performance, this could be because most of the studies with subjective measures were concordant (Moritz et al., 2000). Also important is that the self-efficacy measure used is a measure that has been developed particularly with tackling in mind. Therefore, it is task-specific. Lastly, both pre-performance and post-performance self-efficacy measures will be used in this study. Post-performance measures have been found to correlate more highly with performance than measures completed prior to the task being completed (Moritz et al, 2000).

Self-Efficacy Relationship with Performance over Time

As argued by Yeo and Neal (2006), the effects of time have the potential to be an influential moderator when assessing self-efficacy relationships with performance. However, there have been mixed findings in previous research attempting to address the effects that time has upon this relationship. There have been a number of studies that have found a trend of a declining relationship between self-efficacy and performance through within-participant analyses as more trials are completed (Chen, Gully, Whiteman & Kilcullen, 2000; Feltz, 1982; Mitchell, Hopper, Daniels George & James, 1994). This means that as one performs a task more often, the correlation between their self-efficacy and subsequent performance weakens. However, conversely, some studies have shown the self-efficacy-performance relationship remaining stable over time (Lee & Klein, 2002) at the between-persons level, or even increasing in strength at the within-person level of analysis (Vancouver et al., 2001).

Yeo and Neal (2006) have argued these differing results are due to different stages of the skill acquisition process being represented in these studies, making mention of resource allocation theory (Kahneman, 1973). Resource allocation theory states that cognitive resources, such as attention, are limited and, therefore, people regulate the resources that they put into tasks in view of achieving their goals. Yeo and Neal (2006), have suggested that during the early stages of learning a task, the more resources (or effort and ability) that are allocated to the process, the better the performance. However, once skill-level has improved, the process becomes more automatic, requiring less allocation of resources, meaning the dependence on cognitive effort and ability weakens, along with their effects. Resource allocation theory would then predict that as these are highly skilled professional athletes, they should be able to tackle automatically, requiring little effort and, therefore, pre-game self-efficacy would not be expected to correlate with performance.

However, this theory struggles to account for findings from a study conducted by Slobounov, Yukelson and O'Brien (1997), who looked at Olympic-level springboard divers.

Yeo and Neal (2006) would predict that the performances of these elite springboard divers do not require much in terms of cognitive resources, meaning less effort is required. This would lead to little relationship being found between self-efficacy and subsequent performance. However, self-efficacy was found to be related to performance, suggesting that even for those who are skilled at a task, self-efficacy can be influential. However, this does not tell us how the relationship between self-efficacy and performance might change over the course of a season.

While there is little on the effects of self-efficacy over a long time period, the nature of collective efficacy has been assessed over the course of a season within seven college-level hockey teams (Myers, Payment and Feltz, 2004). Collective efficacy is a term that describes the shared beliefs of a team that they can perform sufficiently in order to meet their goals (Bandura, 1997). Myers et al. (2004) found that the relationship of collective efficacy with performance remained stable over the course of the season. Self-efficacy is a different measure than collective efficacy, so it is not known whether the same pattern will be found within this study. These measures do share similarities, though, in that they are both measures of perceptions of ability. In summary, Yeo and Neal (2006) would predict that the relationship between self-efficacy and performance should decline over the course of the season. However, research by Slobounov (1997) contradicts expectations that follow from Yeo and Neal's theory. This, paired with the stable relationship found in collective efficacy over the course of season, could suggest that Yeo and Neal's (2006) theory as to the nature of the self-efficacy performance relationship may be incorrect.

Aim and Hypotheses

In this research the focus is concerned with examining the relationships between self-efficacy and performance within a professional rugby team. Performance information has been gathered from their fixtures in a professional provincial rugby tournament. Specifically,

the research focuses on tackling performance and tackling self-efficacy, which will be tracked over the course of a season. Of particular interest is how the relationship between self-efficacy and performance changes over the course of a season. There is limited research tracking self-efficacy in this way over the course of a season.

Due to the limitations of studies that have shown negative correlations between self-efficacy and performance, and the vast number of studies that have shown there is a positive correlation between these variables, it is expected that there will be positive correlations found between pre-game self-efficacy and performance at a between subjects level of analysis and post-game self-efficacy and performance.

What is particularly important is that the participants in this study are competing at a professional level, and, therefore, should be very knowledgeable not only about the tasks that they are performing, but about their abilities in terms of tackling effectiveness. This is important because many studies have used undergraduates completing unfamiliar tasks, while Bandura (1997) has said that prior performance of the task is necessary for accurate assessments as to whether the individual can perform well or not. It is also important to see whether these results support those found in the majority of studies, in which undergraduates or members of the ordinary public are used within the sample.

Therefore, these hypotheses were proposed:

Hypothesis 1: Pre-game tackling self-efficacy will be positively and significantly correlated with tackling performance.

Hypothesis 2: Post-game tackling self-efficacy will be positively and significantly correlated with tackling performance.

Additionally, based on findings by Moritz et al. (2000), it was proposed that performance would correlate more highly with post-self-efficacy measures than with pre-self-efficacy measures. As stated by Moritz et al., this would demonstrate that performance plays a

powerful part in influencing subsequent self-efficacy measurement, but self-efficacy is just one of many important factors when determining performance. Therefore, the third hypothesis is:

Hypothesis 3: The correlation between post-game self-efficacy and performance will be stronger than that of pre-game self-efficacy and performance.

As pre-game self-efficacy and post-game self-efficacy are measuring the same construct, but at different time points it is also hypothesised that pre-game self-efficacy will be positively correlated with post-game self-efficacy. Self-efficacy is not a stable trait (Feltz & Riessinger, 1990), but it is still expected that there will be some relationship between the two variables. The next hypothesis, then, states:

Hypothesis 4: Pre-game self-efficacy will be positively and significantly correlated with post-game self-efficacy.

It is also expected that at least some of the relationship between pre-game self-efficacy and post-game self-efficacy will be explained by performance, particularly given the lack of other events that would appear to be important in terms of affecting tackling self-efficacy between the two points of measurement. It is also important to remember that mastery experiences are thought to be the most influential self-efficacy source (Bandura, 1997), so while there may be instances of imagery and verbal persuasion being used to influence self-efficacy in the lead up to a game, the most influential factor should be the players' perceptions of their game day performance.

Therefore, it is predicted that:

Hypothesis 5: Performance will mediate the relationship between pre-game self-efficacy and post-game self-efficacy.

In summary, the aim of this study was to further explore the relationship between self-efficacy and performance, particularly through following self-efficacy over a long period of

time. Five hypotheses were proposed in an effort to further understanding of how performance influences changes in self-efficacy, particularly in professional athletes.

Method

Participants

The participants were 26 males who were members of the Canterbury rugby squad competing in the 2015 ITM Cup rugby competition, a semi-professional provincial rugby tournament in New Zealand. The mean age was 22.65 years ($SD = 3.12$). Players volunteered to participate in response to a request by coaching staff, who first outlined the nature of the study and the potential benefit for the players and the club. All of the players involved in the study provided their written consent prior to any involvement. Players did not receive any form of compensation for participating in this research.

Of the 26 players that agreed to participate, 23 of them received some game time during the season (12 matches), however two of those who received game time did not respond to any of the surveys. A further two participants who did respond had large amounts of missing data from each responses and hence their data was excluded. Accordingly the participant pool was reduced to 19 active participants. However, 15 of the active participants were involved in at least half of the games throughout the season.

Materials

Self-efficacy was assessed using three different adaptations of the Physical-Self-Efficacy (PSE) scale (Ryckman, Robbins, Thornton & Cantrell, 1982), as detailed below. The PSE scale is a measure of the extent to which an individual perceives themselves to be physically self-confident, and has been shown to have high reliability (Ryckman et. al., 1982)

and validity (McAuley & Gill, 1983) in a sporting context. Copies of each of the scales are included in the appendix.

Full Self-Efficacy Scale. To assess player self-efficacy in relation to their tackling ability prior to and following the season, one of the two sub-scales of the PSE – Physical Self-Presentation Confidence - was removed, due to being unrelated to the areas of interest in this study. The items from the remaining subscale – Perceived Physical Ability (PPA) - were adapted to refer specifically to self-efficacy in relation to tackling ability.

The items making up the PPA scale were changed from being about perceived physical qualities, to being about the participant's physical qualities in relation to ability to tackling effectively (e.g. whether they considered themselves strong enough to make effective tackles). An additional five items were also added to the scale to address specific factors relevant to perceptions of tackling ability, such as perceptions of tackling technique and tackle selection (i.e. making the correct decision about who to tackle). Participants were asked to specify the extent to which they agreed or disagreed with each of the 13 statements (see Appendix A). For each statement, a 7-point scale was used, with possible answers ranging from 1 (*totally disagree*) to 7 (*totally agree*).

This survey was completed on GamePlan (Lemonadestand, 2015), an application that aims to improve collaboration and management within a team. The majority of players had access to this through its use in the Canterbury Rugby Football Union.

Shortened Self-Efficacy Scale – pre-game. The pregame self-efficacy scale (see Appendix B) was completed shortly before each game, only by those players selected for the game. It comprised of five items that asked players to assess their ability to make tackles in the upcoming game, particularly in relation to qualities that could affect tackling performance. The scale also asked players to rate their ability to make effective tackles relative to the opposition team. This shortened scale could be completed either through GamePlan or by text

message, depending on the preferences of the individual players. The questions were each answered on a 7-point scale, with participants indicating the extent to which they agreed with the statements in the item.

Shortened Self-Efficacy Scale – post-game. The postgame self-efficacy scale (see Appendix C) comprised of two items that asked players to evaluate how well they tackled throughout the game, and how much they could improve their effectiveness. This was completed via a text message shortly after the game had finished, by all those who participated in the game. The scale was not made available to complete on GamePlan. The questions were each answered on a 7-point scale, with participants indicating the extent to which they agreed with the statements in the item.

Performance Measurement

The measure of tackling performance used in this study was taken from a number of performance analyses carried out by Opta, a sports data company contracted by NZ Rugby to collect, analyse, and package performance data from all ITM cup matches. For each game that they analyse, Opta utilise three trained coders to record performance and match details, with one coder assigned to each team and a third coder who checks for consistency. In the 48 hours following the match a secondary check is made to ensure the accuracy of the data (Opta, 2015).

For the measure of tackling performance, each attempt by a player to make a tackle is categorised into one of eight mutually exclusive tackle outcomes, some positive (e.g., tackles made, turnover tackles, try-savers, passive tackles, dominant tackles) and some negative (e.g., offloads allowed, missed tackles, penalty tackles) outcomes. Each type of tackle is then given a numerical value, with more effective tackles being given higher values than less effective

tackles.¹ At the conclusion of a match, these values are then aggregated for each player and divided by the number of tackle attempts made by that player to give a measure of overall tackle performance.

Procedure

All Canterbury rugby players who were part of the Canterbury provincial squad in the week leading up to their first ITM Cup fixture of the 2015 season, were invited by coaching staff and the researchers to participate in this project. This occurred in the Canterbury rugby squad's meeting room, at the start of the team meeting in the week leading up to their first competitive game of the season.

All players heard an explanation of why the study was useful for individual players, the Canterbury Rugby Football Union and the researchers, and details were provided about the nature of the study and the requirements of participation. Additionally, they received an Information Sheet (see Appendix D), and were asked to sign a Consent Form (see Appendix E) if they agreed to take part in the study.

Shortly after the meeting, players received a text message introducing them to the researcher, as well as an additional brief outline of the procedure. A couple of days following this, players were asked to fill out the pre-season survey in the week leading up to their first competition game. They received a reminder about this one week following the initial request.

In addition to the preseason survey, each participant was sent a pregame survey prior to each match that they were named in the team for. This survey was made available on GamePlan two days before their game started, with a text version sent on the day before the

¹ The precise weighting given to each tackle type is commercially sensitive and cannot be reported here.

game. Additionally, a reminder was sent on the morning of the game to those who had not responded.

Following each match, the players involved were texted the post-match self-efficacy survey within an hour of the game finishing. Those who had not responded by the following morning were sent a text reminder.

At the end of the season, all the players were asked to complete the post-season self-efficacy scale, and were informed that they had a week to complete this. The research was completed after review and approval by the University of Canterbury Human Ethics Committee.

Results

Table 1 displays the number of responses per game obtained for each measure, (pre-game self-efficacy, post-game self-efficacy and performance). Table 2 displays how many participants completed all the measures for a set number of weeks (pre-game survey, post-game survey and played on game day) (e.g. three players fully completed all the measures for ten separate games). In total, 17 players had at least one week in which they completed both surveys and played. The first game of the season was considered a practice to get the players used to the habit of responding to the surveys and when they would be required to respond. As more prompting was required for this game, it was not considered in any data analysis.

Table 1
Number of participants for each measure per game

Game	Participants	Pre-game SE	Post-Game SE
2	16	15	11
3	14	14	9
4	15	11	11
5	17	11	10
6	12	10	9
7	15	11	6
8	14	11	9
9	16	12	12
10	18	12	11
11	18	13	13
12	14	11	6

Table 2.
Number of games participants completed all measures for

Games	Participants
1	3
2	1
3	0
4	2
5	2
6	1
7	1
8	3
9	1
10	3

Table 3 shows information regarding the mean and variability of the measures obtained. The performance and post-game self-efficacy scores show variation throughout each game, however the lack of variation shown in the pre-game self-efficacy measures could

be of some concern, particularly as variance is necessary in order for relationships to be found.

Table 3

Mean and Variability of Measures per Game

Game	Pre-game SE			Post-game SE			Performance		
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range
2	6.15	0.92	4.25–7	4.23	1.38	2.5–6	4.57	1.35	2–7
3	6.43	0.6	5.5–7	5.78	1.23	3–7	5.98	3.31	-3–11
4	6.45	0.66	5–7	5.14	1.86	1–7	3.99	2.63	-4–6
5	6.5	0.64	5–7	5.56	1.19	3.5–7	6.56	2.8	2–11
6	6.46	0.57	5.5–7	5.78	1.54	3.5–7	4.18	2.65	-1–7
7	6.32	0.49	5.75–7	5.38	1.27	3.5–7	4.34	3.12	-3–8
8	6.64	0.44	5.75–7	5.06	1.98	1–7	4.14	2.72	-1–10
9	6.67	0.39	6–7	5.96	1.1	4–7	6.39	3.63	-3–10
10	6.56	0.44	5.75–7	5.23	1.35	3.5–7	5.59	2.2	3–10
11	6.54	0.55	5.25–7	4.88	2.07	1–7	3.55	3.07	-4–10
12	6.66	0.39	6–7	6.03	1.8	2.5–7	5.79	2.93	.4–10

Prior to any statistical tests, the reliability of the pre-game self-efficacy scale was analysed to ensure that there was internal consistency within the scales so that a single self-efficacy score could be computed for each player. The Cronbach's alpha ranged from $\alpha = .49$ to $\alpha = .63$ across games, with an average of $\alpha = .52$. An item removal analysis was conducted, and from this it was determined that removal of question three would result in a scale that would be more internally consistent. Therefore, to increase the reliability of the pre-game self-efficacy scale, question three was removed.² The scale with item three removed had Cronbach's alphas ranging from $\alpha = .21$ to $\alpha = .85$. The average Cronbach alpha level was $\alpha = .56$, which was considered to be satisfactory given the low number of items (four) making up the scale. This enabled a mean pre-game self-efficacy score to be calculated for each player for each game in which they played.

The reliability of the post-game scale was determined by calculating the Pearson product moment correlation between the two items. Correlations for each game ranged from $r = .16$ to 1.0 , with an average correlation of $.64$. This was considered to be sufficient for creating a single post-game self-efficacy score from these two items.

The post-season and pre-season self-efficacy surveys were not used due to low response rates, so no reliability analyses were conducted for these measures.

In undertaking a process of exploratory data analysis, scatterplots of pregame self-efficacy and performance, and postgame self-efficacy and performance (see Appendix F) were visually inspected in order to determine whether or not the relationships between these variables looked to be of a linear or curvilinear nature. However, there was no discernible pattern. However, to test Hypothesis 1, that there is a relationship between pre-game self-efficacy and performance, a Pearson product moment correlation test was conducted between

² The inconsistency with item three may be because it was reverse scored, and the participants failed to identify this.

pre-game self-efficacy and performance for each game played (see Table 4). The correlations ranged from $r = -.5$ to $.49$, with the average correlation being $-.11$, though none were found to be significant (note that a significance level of $p < .5$ was used for all analyses). This means the correlations do not show a relationship between pre-game self- efficacy and performance, and do not show support for Hypothesis 1.

Table 4
Correlations Between Pre-Game Self-Efficacy and Performance for Each Game

Game	r	p
2	-0.13	.66
3	-0.07	.83
4	-0.5	.18
5	0.43	.43
6	-0.45	.19
7	-0.27	.45
8	0.29	.48
9	0.19	.56
10	0.05	.89
11	-0.50	.08
12	-0.26	.53

To test Hypothesis 2, that there would be a positive relationship between post-game self-efficacy and performance, Pearson product moment correlations were conducted between these two variables. The correlations ranged from $r = -.53$ to $.53$, with the average being $.12$ though none of these relationships were significant (see Table 5). This means that these correlations do not show a relationship between post-game self-efficacy and performance, and do not show support for Hypothesis 2.

Table 5
Correlations Between Post-Game Self-Efficacy and Performance for Each Game

Game	<i>r</i>	<i>p</i>
2	0.06	.85
3	0.46	.26
4	0.38	.32
5	-0.02	.97
6	0.26	.53
7	0.53	.174
8	-0.53	.15
9	-0.15	.64
10	-0.01	.97
11	0.42	.16
12	0.02	.96

Hypothesis 3 stated the prediction that the relation between post-game self-efficacy and performance (Hypothesis 2) would be stronger than between pre-game self-efficacy and performance (Hypothesis 1). The Pearson product moment correlations of both pre-game self-efficacy and performance, and post-game self-efficacy and performance were transformed from *r* values to *Z*-scores to enable comparison between them. Table 6 shows the *Z*-scores obtained for the difference between the pre-game self-efficacy relationship with performance, and the post-game self-efficacy relationship with performance for each match. Negative *Z*-scores indicate that the post-game self-efficacy-performance was stronger than the pre-game self-efficacy-performance relationship. This table shows that for game 11 post-game self-efficacy was correlated with performance more strongly than pre-game self-efficacy. However, this is an anomaly and overall, no significant difference was seen between these two relationships. This means there is no support for Hypothesis 3, that post-game self-efficacy is more highly correlated with performance than pre-game self-efficacy.

Table 6

Z-scores for the difference between pre-game SE correlated with performance and post-game SE correlated with performance

Game	Z-Scores	<i>p</i>
2	-0.43	0.67
3	-1.07	0.28
4	-1.63	0.1
5	0.92	0.36
6	-1.29	0.2
7	-1.48	0.14
8	1.46	0.14
9	0.73	0.47
10	0.12	0.90
11	-2.22	0.03
12	-0.39	0.7

Additionally, Hypothesis 4 was tested, which predicted that there would be a positive relationship between pre-game and post-game self-efficacy. The Pearson product moment correlations ranged from $r = -.33$ to $.74$, though none were found to be significant (see Table 7). Therefore, Hypothesis 4 was not shown to be supported, and no positive relationship was found between pre-game and post-game self-efficacy.

Table 7
Correlations Between Pre-Game Self-Efficacy and Post-Game Self-Efficacy for each Game

Game	<i>r</i>	<i>p</i>
2	-.33	.32
3	0.22	.57
4	-0.01	.98
5	0.34	.33
6	0.41	.22
7	0.20	.68
8	0.49	.27
9	0.28	.40
10	-0.16	.68
11	-0.02	.94
12	0.74	.09

Lastly Hypothesis 5 stated the prediction that performance would mediate the relationship between pre-game self-efficacy and post-game self-efficacy. However, a mediation analysis assumes that there is a correlation between the three variables involved, that is, that support for Hypotheses 1 to 3 was found. The results of this study did not meet these assumptions, so it was not necessary to test further for any mediation effects. Therefore, Hypothesis 5, the prediction that performance would mediate the relationship between pre-game self-efficacy and post-game self-efficacy, was not supported by this research.

To assess whether change in self-efficacy, rather than absolute self-efficacy values, were related to performance, self-efficacy difference scores were calculated by subtracting the pre-game self-efficacy from the post-game self-efficacy measure. For every game, performance was then correlated with the self-efficacy difference scores. The results for this can be found in Table 8. The relationship between self-efficacy difference and performance was not found to be significant.

The difference between post-game self-efficacy for one match and the pre-game self-efficacy of the next match was also correlated, however no relationship between these variables was found.

Table 8
Relationship Between SE Difference and Performance

Game	<i>r</i>	<i>p</i>
2	-.04	.92
3	.65	.06
4	.52	.19
5	-.29	.41
6	.33	.42
7	.3	.52
8	-.56	.2
9	-.21	.59
10	-.08	.84
11	.53	.06
12	.11	.84

The extent to which the relationship between pre-game self-efficacy and performance changed over time was assessed. Correlations between pre-game self-efficacy and performance were regressed over time, with a positive correlation indicating a positive change in this pre-game self-efficacy-performance relationship over the course of the season, and a negative correlation indicating a decrease. It was found that the relationship between pre-game self-efficacy and performance did not significantly change over time, $r = -.043$, $n = 11$, $p = .9$.

Similarly, the relationship between post-game self-efficacy and performance was assessed for changes over time. The correlations between post-game self-efficacy and performance were regressed over time, with a positive correlation indicating a positive change in the post-game self-efficacy-performance relationship over the course of the season,

and a negative correlation indicating a decrease. It was found that the relationship between post-game self-efficacy and performance did not significantly change over time, $r = -.25$, $n = 11$, $p = .47$.

Discussion

The aim of this study was to further investigate the relationship between self-efficacy and performance in sport. The research protocol tested five hypotheses regarding the relationships between self-efficacy and tackling performance in players within a provincial rugby union squad.

Hypothesis 1 stated that pre-game self-efficacy for tackling would be positively and significantly correlated with performance. However, correlations between pre-match self-efficacy and tackling performance revealed no significant relationship between these two variables. Therefore, the results have not supported this hypothesis. The prediction of a positive correlation between pre-game self-efficacy and performance was based on the large amount of evidence that has found a positive correlation between self-efficacy and subsequent performance (Weinberg et al., 1979; Moritz et al., 2000). Bandura (1977; 1982) has claimed that increasing self-efficacy improves performances through three processes. These three processes include increased goal setting and challenging of one's limits, increased effort expended towards accomplishing these goals, and increased persistence towards these goals, overcoming barriers and setbacks. There has also been research that has supported the ideas that increased self-efficacy leads to more challenging goals (Locke et al., 1984), increased effort expended (Hutchinson et al., 2008) and increased persistence (Biddle, 1986). There are a number of possible explanations for why there were null findings in this study.

Firstly, there is the issue of sample size. It is important to use professional athletes in sports research to ensure that results obtained with participants from the general public can be generalized to the sporting elite, who will likely differ in many ways both mentally and physically. However, the use of professional athletes does also bring its challenges. One of these challenges is that it is then harder to obtain a sample size large enough to detect any effects. In this research, results came from one rugby team, meaning that each game provided around 10-14 sets of results. This means that each correlation only contains 10-14 sets of variables. A power analysis revealed that 41 participants should be necessary to reject the null hypothesis. However, this alone is not enough to explain the lack of significant results. When the results are pooled together from all of the games, there is still no significant effect, ($r = .105$, $n = 134$, $p = .292$). This is not a statistically sound approach, as some participants are included several times, while others are included only once or twice. However, it is simply intended to provide an indication as to whether the small sample size was the main issue. As this analysis finds no significant effect with a much higher sample size, this suggests that sample size was not the issue in this research.

There is another explanation that probably plays a large part in the lack of a relationship found between pre-game self-efficacy and performance. There is an extreme lack of variability in the pre-game self-efficacy scores that were obtained, with scores consistently at the upper range. Variability is necessary for correlations to occur, and as such the lack of variability in the self-efficacy scores has certainly contributed to this. This raises the question of why there is such an extreme lack of variability.

Firstly, it is possible that comparisons of ability were made to the general population, rather than the average professional rugby player. Support for this theory comes from question four of the pre-game self-efficacy survey, in which players were asked how they thought they would tackle in comparison to the other team, who would have also been made

up of professional rugby players. The average of this question was lower than the average of the other questions, which did not specify a comparison groups in their wording. This could mean, even though it would be intuitive to think that players would use their immediate reference group as a comparison (i.e. other professional rugby players), that they instead used the average person as their comparison for these questions, except for question four when the comparison group was suggested to them. This could be combatted by providing a frame of reference for participants to compare their ability against (i.e. against the rest of the team, or the opposing athletes).

Another possibility is that the professional environment in which the rugby players are a part of encourages individuals in their abilities to the point that they all have high self-efficacy about their abilities. However a study by Slobounov et al (1997) found positive relationships between self-efficacy and performance with Olympic-level springboard divers, so self-efficacy should still vary among elite athletes.

A similar possibility is that players were trying to convince either the people that could see the information (they were not told that the coaches would not be able to see their responses) or themselves that they believed in their tackling ability. These athletes play rugby for a living, and reporting that they do not believe in their abilities, especially heading into a tough match could be seen as detrimental to their chances of being selected. This would generally not have implications for most studies, which use undergraduate participants, as lack of belief, or failure in the task, would not result in any significant detrimental outcomes for the student. The effects of this might have been reduced by asking players about their other skills, (such as their self-efficacy for their ability to kick and pass), which may have enabled participants to 'save face' by rating themselves highly in self-efficacy for other important skills.

Additionally, it is possible that this is due to a self-selection bias within the research in

that those who were not confident in their abilities did not feel comfortable participating in this research.

It is also possible that the lack of variability in self-efficacy stems from how it was measured. This could be due to the small number of items within the survey. The shortened nature of the survey was considered necessary in order for the survey to be as nonintrusive as possible, given the participants are elite athletes with busy schedules. More questions would have been even more intrusive to the participants who took part in the study, and may have led to fewer responses in what was already a small participant pool relative to those found in other research studies. However, the reliability of the scales was found to be acceptable, despite the small number of items, indicating that this may not have been much of an issue. However, if there were more questions, there would likely be more variability. Another possibility is introducing a larger rating scale, such as from 0-100, though the increased variability may not be meaningful, as the differences between two responses may be arbitrary.

There was also a lack of support for Hypothesis 2, the prediction that post-game self-efficacy would be positively and significantly related to tackling performance. This was based on extensive research where performance has been found to be positively correlated with self-efficacy. Bandura (1997) has claimed that that performance is a causal predictor of self-efficacy, and the most important of the four sources of self-efficacy that he identified. A number of studies have found a linkage between performance and post-performance self-efficacy, most noticeably a meta-analysis of 45 studies performed by Moritz, et al. (2000).

A factor that may have been influential in the lack of findings here is that in most studies participants perform the expected behaviour once, and seeing the results of their performance, are then asked for self-efficacy feedback. However, this is not possible within a continuous competitive setting. After the player has first made or missed a tackle there is no opportunity

for the researcher to obtain self-efficacy feedback, and there will likely be many more scenarios throughout a match which will require the player to make a tackle. This means that eventually, when self-efficacy feedback is obtained, it is a significant time period after the first performance of the skill occurred. This is problematic as memory is not simply a video recording of events (Loftus & Palmer, 1974), and therefore, while this information will be aggregated, it might be done so in a biased way. An example of this is the recency effect (Furnham, 1986), which is the tendency people have for recalling more recent items or events first, and having better recall of them. Therefore, while performance information is aggregated evenly, the self-efficacy information is potentially not aggregated evenly, causing a mismatch between these. Perhaps in future, to combat this, self-efficacy information should be obtained after feedback is given to the players by the coaching staff. This might reduce the effects of any memory biases, and allow for a stronger match between self-efficacy and performance measures.

Hypothesis 3, which stated that the relationship between performance and post-game self-efficacy would be stronger than the relationship between performance and pre-game self-efficacy was not supported. Post-game self-efficacy was predicted to correlate more highly with performance than pre-game self-efficacy correlated with performance, based on the findings of a meta-analysis conducted by Moritz et al. (2000). In this meta-analysis, the correlation between post-performance self-efficacy and performance was found to be stronger than that of pre-performance self-efficacy and performance, though both correlations were significant. This could be due to the delayed nature of the self-efficacy feedback obtained, creating an imbalance between how post-game self-efficacy and performance scores were measured, as discussed previously.

As stated by Hypothesis 4, it was expected that the relationship between the pre-game and post-game self-efficacy measures would also be positive and significant. However,

correlations between the two variables were not significant, showing no support for this hypothesis, and no relationship was detected between these variables. Pre-game and post-game self-efficacy were predicted to be correlated as they are measuring the same construct, just at separate points in time roughly two days apart. However, these were not expected to correlate perfectly, as self-efficacy is not a stable construct. Performance within the game should impact upon self-efficacy, in addition to other factors that may be a part of the normal match day routine, such as imagery or persuasion from an influential person (such as a coach). As discussed previously for Hypothesis 1, variability is needed for measures to relate to each other. However, the pre-game self-efficacy survey scores did not vary much at all. This hypothesis would also have been affected by the imbalance between the post-game self-efficacy scores and the information obtained for performance.

Lastly, Hypothesis 5 stated that the relationship between pre-game self-efficacy and post-game self-efficacy would be mediated by performance. However, the necessary preconditions to test this hypothesis were not found. This analysis requires that there is a significant relationship between pre-game and post-game self-efficacy, and additionally, that there is a significant relationship between performance and both pre-game and post-game self-efficacy. However, none of these relationships were significant. Performance was predicted to mediate the relationship between pre-game and post-game self-efficacy because the most significant source of self-efficacy should be mastery experiences, at least theoretically (Bandura, 1986; 1997). There may be other influential sources of self-efficacy in the lead up to a game, such as imagery and persuasive information, however the effects of self-efficacy gained from actual performance should be the most important self-efficacy source. The failure to find relationships between pre-game self-efficacy, post-game self-efficacy and performance, which were necessary preconditions for this hypothesis, led to this not being tested. Therefore, the reasons for the lack of findings are to do with the issues of variability in

addition to the mismatch between performance measurements and post-game self-efficacy, as discussed for Hypotheses 1 and 2.

The relationship between self-efficacy and performance was also assessed over the course of a season. This was done for both pre-game and post-game self-efficacy. While there are many studies assessing the nature and implications of self-efficacy for sporting performance, very little has been written about self-efficacy over a longer time period, as in this study. There was not found to be any significant relationship between either pre-game or post-game self-efficacy and performance, and no changes in the self-efficacy performance relationships were found over the course of the season. The lack of findings most likely are the same as those discussed for Hypotheses 1 and 2. That is, the lack of variability did not allow significant pre-game self-efficacy relationships with performance to be obtained. Also, the mismatch between post-game self-efficacy and performance measurements may have weakened any correlations between these two variables.

Limitations and Strengths

To summarize the major limitations of this study include the small sample size and the lack of variability. While working with professional athletes does limit the sample size available, it is still very important to see if results from the public generalize to professional athletes, who will likely differ in terms of physical ability, skillset and mind-set. Otherwise results that are true for the general public might be applied to sports teams when they are not relevant.

There are a number of different explanations identified as to how the lack of variability may have occurred. However it came about, the result is that it is hard to gain much understanding of self-efficacy as the self-efficacy scores do not vary enough to show any form of meaningful relationship with performance.

While this study had several limitations, it also had some strengths. Self-efficacy relationships with performance have been found in a number of different sports, but this is the first known study to look at how rugby performance is affected by self-efficacy. While the findings of previous studies (e.g. Moritz et al., 2000) were not supported, it is still important to test results, from one context, in different contexts and situations.

This is also one of few studies to look at self-efficacy over a long timeframe rather than a simple, small 'snapshot' of self-efficacy, taking just a single performance of a task. It is important to assess whether the relationship between self-efficacy and performance can change over the course of a season as this could be important information for coaches or trainers. Coaches have the potential to influence the self-efficacy of their athletes (Vargas-Tonsing, 2004), and information on how this impacts on performance at different time points could determine how likely they are to attempt self-efficacy interventions. However, this is not only important for coaches, but has implications for many other domains, for example in education (e.g. learning maths), job performance (e.g. performing heart surgery). While the results from this study were not significant, other researchers interested in looking into self-efficacy can learn more from this study about how to assess this relationship, including what they should be careful of.

It is also important to remember that in research, results that are non-significant as well as results that are significant should be considered. Non-significant results offer crucial information about the potential inaccuracy of a theory. In addition, it would be unscientific to not consider such information, as science is the search for truth, whether this truth is support for a new theory, or evidence against a theory previously adhered to (Sterling, Rosenbaum & Weinkam, 1995).

There is still a lot of value in future research on self-efficacy, particularly studies assessing the performance-self-efficacy relationship over a longer term. While this study did

not find any change in this relationship over the course of a season, this is like due to issues with validity. To help combat this, future researchers should ensure that items of the self-efficacy scale provide an objective reference point for the players to respond to. This reference point could be whether or not the individual believes themselves to be better than the average player within their team or competition. Additionally, more items could be included in any future surveys assessing self-efficacy. This should help to increase the variability of self-efficacy responses, and maximize any chance of significant correlations being obtained. Even items that are related to other important skills could be considered to reduce the chances of athletes responding highly simply to maintain a reputation, or to present themselves favourably.

Conclusion

In conclusion, this study assessed the nature of the self-efficacy-performance relationship across a full season of professional sport. No relationships were found between pre-game tackling self-efficacy and tackling performance or post-game tackling self-efficacy and tackling performance. The main limitation of the research is the lack of variability found in the self-efficacy measures. Requiring respondents to rate themselves relative to their teammates could help to address this concern. Overall, the impact of self-efficacy is very important to assess for sporting organizations, and there are many opportunities for further research in this area.

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Appendix A

Full Self-Efficacy Scale – to be completed by each participant before and after the ITM

Cup Season:

Individuals are asked to indicate the extent to which they agree with each of the items in the scale. Each item is responded to on a 7-point scale from 1 – “*totally disagree*” to 7 – “*totally agree*”.

Items 2, 4, 5, 10, 11, and 12 are reverse scored before a mean score is computed for each participant. Higher scores then indicate higher self-efficacy

1. My excellent reflexes enable me to position myself to tackle effectively
2. I am not agile and graceful enough to consistently make good tackles.
3. My physique is sufficiently strong for me to tackle effectively
4. I can't run fast enough to consistently make good tackles
5. I have relatively poor muscle tone, leading to ineffective tackling
6. I take pride in my ability to tackle effectively
7. My speed has helped me to make some tough tackles
8. I have a strong grip in tackle situations
9. I am able to make tackles which many others could not make.
10. Sometimes I find myself in the wrong position to make an effective tackle
11. My technique in tackle situations may require work
12. I have relatively poor fitness, which impacts on my tackling ability
13. I am able to make correct decisions about which players I need to tackle during a game.

Appendix B

Shortened Scale – completed before each game (if within the 23 player squad)

Individuals are asked to indicate the extent to which they agree with each of the items in the scale. Each item responded to on a 7-point scale from 1 – “*totally disagree*” to 7 – “*totally agree*”.

Item 3 is reverse scored before a mean score is computed for each participant. Higher scores then indicate higher self-efficacy

1. I will be able to make effective tackles in this game
2. My physique is strong enough to make effective tackles in this game
3. My fitness and strength are not good enough to make good tackles in this game
4. I can tackle more effectively than my opposition in this game
5. I am confident that I will make the correct decision about which players I need to tackle

Appendix C

Post-match – completed only by those who participated in the game

Individuals are asked to indicate the extent to which they agree with each of the items in the scale. Each item responded to on a 7-point scale from 1 – “*totally disagree*” to 7 – “*totally agree*”.

Item 2 is reverse scored before a mean score is computed for each participant. Higher scores then indicate higher self-efficacy

1. I tackled as well as I expected to in this game
2. I was not as effective in my tackles as I expected to be

Appendix D

Department of Psychology

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Tackling the Relationship between Self-Efficacy and Sporting Performance Information Sheet for Canterbury Rugby Players

I am a post-graduate student at the University of Canterbury completing a Master's degree in Applied Psychology. As part of the degree requirements I am undertaking a research project which is studying the relationship between self-efficacy and performance in sport. Self-efficacy is basically the extent to which an individual believes that he or she has the skills and ability to perform certain tasks. My study is looking at self-efficacy in relation to tackling skill.

I would like to invite you to participate in this study. Your involvement will include the completion of a self-efficacy survey at the start and at the conclusion of the ITM Cup season, a shortened survey prior to each game you play throughout the ITM Cup season and a couple of questions following games in which you played. The survey will be designed to assess your self-efficacy in relation to tackling ability and can be completed electronically, taking no more than 5 minutes. This information will be paired with data regarding your tackling performance (as determined by the CRFU video-analysts) throughout the ITM Cup season.

Your data will be stored anonymously with only the researchers and the CRFU coaching staff being able to match the scores to individual players. A copy of the project report will be sent to CRFU at the conclusion of the project. If you would like your own copy please contact me (Anthony.rasmusen@pg.canterbury.ac.nz).

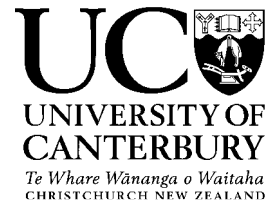
Participation is voluntary and you have the right to withdraw at any stage of the ITM Cup competition. If you withdraw, I will remove information relating to you, provided that this is still practically achievable.

The results of the project may be published, but you may be assured of the complete confidentiality of data gathered in this investigation: your identity will not be made public without your prior consent. To ensure anonymity and confidentiality, any data that could personally identify you will be securely locked, and only made available to the research team in addition to the coaching staff. Following the completion of the study, this data will be kept for a further 5 years, before being destroyed. Any results that are presented will be done so in such a way that participants cannot be identified. This dissertation is a public document and will be available through the UC Library.

The project is being carried out as a requirement for the Master's degree in Applied Psychology Bob Rasmusen under the supervision of Professor Lucy Johnston and Dr Brad Miles. I can be contacted at Anthony.rasmusen@pg.canterbury.ac.nz) and Lucy can be contacted at lucy.johnston@canterbury.ac.nz; we would both be pleased to discuss any concerns you may have about participation in the project.

This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, and participants should address any questions or complaints to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz).

If you agree to participate in the study, you are asked to complete the consent form and return it to Tabai Matson or Bob Rasmusen

Appendix E

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**Tackling the Relationship between Self-Efficacy and Sporting Performance
Consent Form for Canterbury Rugby
Players**

I have been given a full explanation of this project and have had the opportunity to ask questions. I understand what is required of me if I agree to take part in the research.

I understand that participation is voluntary and I may withdraw at any time without penalty. Withdrawal of participation will also include the withdrawal of any information I have provided if this is practically achievable.

I understand that any information or I provide will be kept confidential to the research team and coaching staff and that any published or reported results will not identify the participants. I understand that a thesis is a public document and will be available through the UC Library.

I understand that all data collected for the study will be kept in locked and secure facilities and/or in password protected electronic form and will be destroyed after five years.

I understand that I am able to receive a report on the findings of the study by contacting the researcher at the conclusion of the project.

I understand that I can contact the researcher Bob Rasmusen (email: anthony.rasmusen@pg.canterbury.ac.nz) or supervisor Professor Lucy Johnston (email: lucy.johnston@canterbury.ac.nz) for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch (human-ethics@canterbury.ac.nz)

By signing below, I agree to participate in this research project.

Name:

Date:

Signature:

Please return the consent form to either Tabai Matson or Bob Rasmusen

Appendix F

