

Tough Teammates: Training Grit and Optimism Together
Improves Performance in Professional Footballers

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Abstract

Many psychological constructs under the heading of Positive Psychology are important to the careers of athletes and other high level performers. Grit and optimism have both been linked to performance outcomes in multiple disciplines, and interventions have been trialed to develop these factors in individuals and groups, with varying levels of success. Using an adapted version of the Penn Resiliency Program (PRP) and Master Resilience Training (MRT) programs used to train resilience in both education and military settings, we implemented a mental toughness training intervention with a group of professional football players ($n = 22$) and also followed a control group ($n = 13$) in the same team. Results show the training was effective at increasing optimism but not grit, and had a positive impact on performance over the following season that was moderated by previous performance levels. Correlations and regression models also showed that optimism and grit together were subsequently predictive of consistency and performance. We discuss the moderating effects of the player's pre-training level of ability as well as potential leadership effects, and offer recommendations for future research into the links between optimism, grit and performance.

Author Note

Like any significant undertaking, this entire project has been made possible through the support, participation, guidance and input of a community of great people. I would like to thank the players who took part in the program, the club for their permission to do something so groundbreaking, the guidance of great minds such as Angela Duckworth, Karen Reivich, Martin Seligman, Adam Grant and Reb Rebele, and the tireless help and attention to detail of Rachel White. Without all of you this journey of discovery would not have been possible. Thank you.

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“I believe one of my strengths is my ability to keep negative thoughts out. I am an optimist. I believe this results from the fact that I set realistic goals – ones that are difficult to achieve, but within reach. You might say I’m a realistic optimist.”

- John Wooden, Wooden: A Lifetime of Observations & Reflections On and Off the Court

As a three-time All-American player in college, coach of ten NCAA national championship teams with a lifetime winning percentage of over 80 percent, and the only man ever elected to college basketball’s hall of fame as both player and coach, John Wooden is as well placed as any to understand what separates a great performer from the rest of the pack. His philosophy, captured in the epigraph at the beginning of this paper, highlights the key psychological characteristics of those who reach the very top in any industry: the ability to deal with adversity or negative thoughts, and persist towards a long-term goal through difficulties with dogged determination. Even to the amateur observer this makes sense. Those who respond quicker to setbacks, attend to the details of the situation, and reorient themselves towards their target should move ahead of those who are slow to respond or refuse to do the uncomfortable work of critical reflection in order to stay on target. For performers and those who coach or teach them, therefore, the ability to isolate these skills and train them like any other ability is a competitive advantage.

Around the same time as Wooden was at the peak of his coaching powers, two leading psychologists began looking into the elements that make up a ‘positive psychology’. Mihaly Csikszentmihalyi was working to solidify a concept he had originally observed whilst studying the creative process during the 1960s. He had noted that when work on a painting was going well, the artist would become single-mindedly absorbed in the process, ignoring hunger, discomfort and fatigue whilst experiencing a euphoric sense of elevation (Nakamura & Csikszentmihalyi, 2002) – a state which he labeled ‘flow’ (Csikszentmihalyi, 1990), but which the coaches and athletes may know better in sports as ‘the zone’. Martin Seligman was also working on an observation he made in a laboratory study, when he noted that dogs who were shocked and learned they had no control over subsequent shocks eventually assumed behaviors similar to what he had seen in depressed patients. This insight prompted a whole new branch of work into what was originally labeled learned helplessness, and eventually led to Seligman’s theory of ‘learned optimism’.

The two psychologists joined forces at the turn of the century to introduce the concept of positive psychology to the world, in an attempt to encourage psychologists to utilize rigorous scholarship and scientific research to reorient the science towards human strengths (Seligman & Csikszentmihalyi, 2000). When proposing the new branch of psychology, they suggested that by focusing on positives rather than negatives, psychologists could study positive qualities of individuals, and help grow more optimism, interpersonal skills, work ethic, courage, perseverance and, ultimately, happiness. Seligman himself put forward one of the most popular models of well-being, the PERMA model, which theorizes that five domains – positive emotion, engagement, positive relationships, meaning and accomplishment – are the elements of human experience that individuals have always pursued as ends in and of themselves, and are measurable either independently or together (Seligman, 2012).

Research in positive psychology has spawned a number of different positive interventions that can be implemented in healthy populations to improve elements of their well-being, from exercises focused on positive emotion to improved relationships. One focus of this research has been the A (for accomplishment) in the PERMA model, and it is here that the links between positive psychology and performance have emerged. Of particular relevance to this investigation, positive psychology studies have identified links between two separate but related constructs – grit and optimism – that show promise as avenues for interventions to be deliberately applied with the intention of improving an individual's well-being through increased accomplishment.

Grit and performance

One of the most well known links between positive psychology research and individual achievement is grit. Duckworth and colleagues introduced the concept, defined as passion and perseverance for long-term goals, arguing that happiness is found in longer-term accomplishments and normally requires working through challenges (Duckworth, Peterson, Matthews, & Kelly, 2007). Their research showed a clear link between grit and achievement, particularly in areas involving learning and tasks that require perseverance: A high grit score among college students correlated with a high GPA, while grittier cadets were more likely to complete summer training at West Point military academy (Duckworth et al., 2007). In subsequent studies, the impact of grit on long-term achievements was confirmed in other arenas. Sales employees were more likely to keep their jobs, soldiers were more likely to complete an Army Special Operations selection course, and men were more likely to stay married if they were grittier (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Intuitively, this makes sense: individuals exhibiting stamina in the face of adversities will be likely to achieve more in life - a consistent level of effort is a prerequisite of success over the longer term. But digging a little deeper, researchers have found that it was not the simple

presence of grit itself that improved performance and subsequent achievements, but rather what grit makes people do. In a study of finalists in the National Spelling Bee, grittier children were found to have completed more hours of deliberate practice, and this extra time spent on deliberate practice fully explained correlation between grit and spelling bee performance (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011). Rather than grit directly impacting on their performance, it turns out that the grittier kids were simply more likely to do the hardest, least pleasurable practice due to their higher levels of passion for the work.

In athletes and other elite performers, this concept is likely to be seen in the grittier individual returning to practice with full commitment the day after defeat, engaging in the type of uncomfortable reviews or practice required to correct errors and minimize mistakes for the next competition. Studies have also shown that this type of deliberate practice improves athletic and sports performance (Ericsson, Krampe, & Tesch-Romer, 1993), and specifically working memory (Ericsson, 2004), which has been highlighted as not only a strong predictor of performance (Hambrick & Meinz, 2011) but also a key element required to enter flow (Dietrich, 2004). While the constructs of flow and grit may seem mutually exclusive – one relating to effortlessness, and the other relating to tough, hard, effortful work – in reality they have a complimentary relationship: Grit increases an individual's likelihood of reaching flow in a given task due to their tendency to engage in more deliberate practice, whilst flow is likely to increase an individual's passion, and therefore perseverance and grit, in relation to that task.

Researchers are only now beginning to look into the antecedents of grit and how to improve it in an individual. Tentative links have been made between grit & growth mindset (Duckworth & Eskreis-Winkler, 2013). Deliberate attempts to increase grit could also start with a simple goal setting exercise with a friend, which has been found to be a significant

factor in whether an individual persists with a goal over time (Locke & Latham, 2006). Duckworth, Grant, Loew, Oettingen and Gollwitzer (2011) demonstrated how a particular goal setting strategy they call “mental contrasting with implementation intentions” (MCII) improved high school students’ persistence in studying for the PSAT. Mental contrasting, developed from studies into the ineffectiveness of positive thinking alone, refers to contrasting the ideal of a desired future with possible obstacles and challenges that goal may present in reality. In a randomized experiment, MCII students received a PSAT workbook and were asked to write about positive outcomes of finishing the practice tests, two obstacles that could prevent them from doing so, and two plans to overcome each of the two obstacles they had identified. Compared to control students who received the same workbook but did not do the mental contrasting exercise, MCII students completed substantially more of the workbook during their summer vacation.

Optimism and performance

A broad range of research has shown numerous benefits of optimism. Studies have found that optimism leads to better moods, morale, increased perseverance, greater success in school sport and even socially, as well as good health and longevity (Peterson, 2000). Most research on optimism suggests there are two ways to measure optimistic thinking patterns (Gordon, 2008). The Life Orientation Test (LOT) looks at how likely an individual thinks a positive event is to occur before it happens, otherwise known as ‘dispositional optimism’, which the creators of the scale presume to be a stable personality trait with little scope for change (Peterson, 2000). Alternatively, the Attributional Style Questionnaire views optimism as an explanatory style – a way of explaining events that have already occurred (Buchanan & Seligman, 1995). Much like a style of clothing it is considered changeable. Given this program in part aims to change levels of optimism, it is this second measure we will be focusing on.

Explanatory style was originally proposed as ‘Attributional style’, in line with the attributional reformulation of learned helplessness theory (Abramson, Seligman, & Teasdale, 1978), to identify the way an individual usually explains good or bad events (Peterson, 2000; Peterson & Park, 1998). People who generally explain bad events as caused by things that are unstable (“this won’t last forever”), local (“this won’t impact everything I do”), and external (“it’s something else’s fault”) and who explain good events with the stable, global and internal causes are said to have an optimistic explanatory style. The opposite of an optimistic style - a pessimistic explanatory style - places us at an extreme disadvantage, mostly by preventing us from responding to adversity in ways that make it easier to surmount. Telling ourselves, for example, that we failed in a key moment because we lack innate talent may discourage us from preparing for or even trying in a subsequent competition, leading us to fail it again. On the other hand, if we tell ourselves we failed a test because we didn't practice enough – something we control – then we’re more likely to redouble our efforts, try again the second time around and potentially nail it. This example is strongly linked to the findings on the types of feedback that help in the development of a growth mindset (Dweck, 2006), which has also been shown to have moderate, positive associations with grit (Duckworth & Eskreis-Winkler, 2013).

Within the three elements that make up an individual’s explanatory style, one in particular – stability/instability – shows promise as an avenue to improved performance. Whilst the internality subscale does provide some insight as to an athlete’s idea of personal control over bad events, this is perhaps the least important of the three subscales. Not only has it been found to have the lowest internal validity (Ashforth & Fugate, 2006), practically it may not always be easy to detect one ‘optimal’ style for performance. In some instances a coach would want a player to take full responsibility for a mistake; in another, the athlete may be better to externalize the causes of a negative event to maintain their engagement and

cushion the stress of uncontrollable events – an approach, known as ‘defensive pessimism’ (Norem & Cantor, 1986), that has been found to be particularly effective under stress. The global/local subscale, meanwhile, has little relevance to performance as it is, by definition, comparing one area of life to another. Given the focus of this training program is on performance as a means to well-being, and not on well-being primarily, the present study is interested in explanatory style within the individual’s performance domain only. The ‘stability’ subscale – indicative of a belief that negative events are generally fixed or temporary – provides the most performance relevant information, as it has been shown in multiple studies to be the most related to performance outcomes in various sports (Bond, Biddle, & Ntoumanis, 2001; Gernigon & Delloye, 2003) and is clearly related to an individual’s likelihood of responding positively to bad events with an expectation that previous results don’t necessarily predict future ones. Of all the subscales, evidence suggests it is the most amenable to change as well (Gillham, Reivich, Jaycox, & Seligman, 1995).

Multiple interventions that aim to increase optimism, and subsequently decrease pessimism, have been tested using the ASQ, with consistently positive results. Group interventions run in classroom settings at upper elementary and middle school level have shown effectiveness at reducing depressive symptoms and improving well-being (Horowitz & Garber, 2006). The Penn Resiliency Program (PRP) is perhaps the most well know group intervention, with almost twenty controlled studies evaluating it’s efficacy and concluding that participants have fewer depressive symptoms than control groups for up to 24 months. Importantly, the majority of the change within the PRP was found to occur in the stability subscale of the ASQ (Gillham et al., 1995). The Master Resilience Training (MRT) is another large scale, group level program, designed for adults, delivered to non commissioned officers (NCOs) in the US Army. This program has been found to be effective at reducing depression

rates, as well as lowering behavioral incidences that are common in stressful situations (Harms, Herian, Krasikova, Vanhove, & Lester, 2013).

Of particular interest to this investigation, numerous studies have investigated a link between optimism and performance in sports as diverse as swimming, baseball, golf, track, basketball and soccer (Seligman, Nolen-Hoeksema, Thornton, & Thornton, 1990; Rettew & Reivich, 1995; Bond et al., 2001; Gernigon & Delloye, 2003; Martin-Krumm, Sarrazin, Peterson, & Famose, 2003; Gordon, 2008). This abundance of positive evidence suggest the translation of resilience training components into the sporting and performance arena, along the addition of elements focused on improving the skills that make up grit, will produce great results in many performance contexts. As one of the founders of positive psychology remarked, “The future of optimism appears rosy indeed. Or does it?” (Peterson, 2000, p. 44)

Realistic optimism

Despite the overwhelming evidence of the benefits of optimism, experts warn against the virtues of being overly optimistic. Numerous studies have shown that people’s predictions tend to be excessively and unrealistically optimistic, resulting in negative performance and psychological consequences (Armor & Taylor, 2002). Many believe that realistic and optimistic views are mutually exclusive, however Schneider (2001) contends that both concepts may peacefully co-exist. Differentiating realistic and optimistic views may significantly affect current individuals’ views, which may have a direct relationship with positive psychology. Optimism balanced with realism, including objectivity and rationality, helps maintain logical consistency at the same time as functioning with an optimistic view that can still bring about positive ends (Schneider, 2001).

This psychological balancing act is perhaps best summed up by Jim Collins in his seminal book, *Good to Great* (2001). Collins observed that every good company in their study faced significant adversity on the way to greatness. In each case where the business

made the leap to being great, the management team responded with a balance: on the one hand they faced the brutal facts of reality while on the other hand they kept an optimistic outlook towards the end goal. Confronting the reality of the adversities they faced allowed the companies to make accurate assessments of their needs and the existing terrain around them to better respond, and therefore generate an advantage over the competition within their industry. Collins called this tightrope-like state of mind the “Stockdale Paradox”, named after Admiral James Stockdale, who survived eight years as a prisoner of war in Vietnam. Whilst explaining that he never lost faith in the fact he would get out, he also noted that it was the overly optimistic prisoners who did not survive. “They were the ones who said, ‘We’re going to be out by Christmas.’ And Christmas would come, and Christmas would go. Then they’d say, ‘We’re going to be out by Easter.’ And Easter would come, and Easter would go. And then Thanksgiving, and then it would be Christmas again. And they died of a broken heart” (Collins, 2001, p. 83) The author then summed up the lesson perfectly: “You must never confuse faith that you will prevail in the end—which you can never afford to lose—with the discipline to confront the most brutal facts of your current reality, whatever they might be” (Collins, 2000, p. 84).

Even those at the forefront of research and interventions focused on optimism share this view, and do not advocate for pure unbounded optimism that would ace the ASQ. Reivich and Shatte (2003) note that resilience is what determines how high we rise above what threatens to wear us down, from battling an illness, to bolstering a marriage, to carrying on after a defeat or loss. In their model, a resilient view is characterized by *accurate* and *flexible* thinking, and consists of creative problem solving, the capacity to see other points of view and to challenge one’s own views, and the ability to move on with daily life despite obstacles. Seligman (2011) also agrees that optimism's benefits are not unbounded, stating that “pessimism has a role to play, both in society at large and in our own lives; we must have the

courage to endure pessimism when its perspective is valuable” (p. 292). It is in this ‘courage to endure’ and engage in uncomfortable challenges to one’s own views, where grit can be seen to play a role in cultivating this important balance that is required to improve performance.

Despite an exhaustive search of the literature, we could find no agreed measure that quantifies an individual’s level of ‘realistic optimism’ with regards to performance. The most widely used technique comes from Weinstein (1980), and involves the individual comparing their own chances of given events happening to them with the average chances for their peers, and using the difference to determine how realistic their predictions are. This approach may be useful in assessing how realistic a prediction is in relation to health, career or life events for the average population, however it is not a reliable measure in an elite performance population. By definition, elite performers are not average, and even within this population there can be major differences between the expected outcomes in any given a performance context making it impossible to determine how realistic a prediction is just by comparing it to the ‘average’: for example, the best player in the league would be right to estimate he is 100% more likely to earn a higher contract than the average player. This study proposes that the combination of grit & optimism – specifically the performance relevant expectation that adversities are temporary, complimented by a gritty willingness to engage in and endure the attention to detail required to improve – may be a simple but effective correlate for this important combination in elite performers.

Hypotheses

Using both psychological and performance data from a professional football team who underwent a mental toughness training program, this investigation aims to test five separate but related hypotheses:

H1: that, given the benefits to optimism found in previous programs such as PRP and MRT, the training will improve the optimism of the participants

H2: that, given it is considered a stable trait, the training will not improve grit

H3: that, given the links found between optimism and performance in many different sports, the training will improve performance

H4: that, in line with the correlations found between both of the psychometric measures and performance outcomes in other competitive arenas, a player's levels of grit and optimism will predict their subsequent performance

H5: that, in line with the theory of realistic optimism, the predictive ability of grit and the performance specific element of optimism – stability – will be greater in combination than separately

Method

Participants

The participants in this study were professional Australian Football players ($N = 45$, *mean age* = 23.27 years, $SD = 3.35$), all of whom were men aged 18 to 32 and on the primary list of an AFL Club at the beginning of the 2014 season. Twenty-nine of these players completed a mental toughness training program ('intervention') prior to the start of the season, while 16 did not complete the program ('control'). Players were selected for the intervention based on three criteria: 1) all players who were still in their first three years as a professional footballer, the criteria for inclusion in the club's 'development program'; 2) established first team players without formal leadership titles; or 3) players who scored lowest on previously assessed mental health screening scales. To include performance-relevant variables, the following analyses were limited to participants who played a full game in the first team during the 2014 season ($n = 35$, *mean age* = 23.91 years, $SD = 3.37$). Two subjects who completed the training in full were not available to fill out the post-treatment measures,

and therefore were excluded from the analysis leaving a final $n = 33$. About 15% of participants were Indigenous Australians.

Measures

Attributional Style Questionnaire. To measure optimism, all players in the intervention group responded to the negative event items on the Attributional Style Questionnaire (ASQ; Dykema, Bergbower, Doctora, & Peterson, 1996; Peterson, et. al, 1982) prior to the resilience program. Compared to the original ASQ, this version is shorter and uses more direct language (Dykema et al., 1996). Players were asked to imagine themselves in 12 hypothetical negative situations from everyday life (e.g., “You have financial problems”). Each situation was followed by three questions, which measured their explanatory style on three dimensions: internal-versus-external (‘internality’), stable-versus-unstable (‘stability’), and global-versus-specific (‘globality’). The first question required players to write the one major cause to which they attributed the situation if it were to occur; all responses to this question were assessed and scored on the 7-point internality scale by a single researcher (0 being totally external causes, 7 being totally internal causes). If a player did not provide a cause, or provided a nonsensical cause, all data for that situation was excluded from analysis. The remaining two questions for each situation asked players about the likelihood of the cause continuing to affect them (stability), and the degree to which the cause affects just that situation or pervades other areas of their life (globality), via ratings on 7-point scales. A composite ASQ score was obtained by summing each player’s score on the three dimensions. Players in the intervention group completed the ASQ again shortly after completion of the resilience program.

Grit Scale. To measure the effect of the training on all players’ ability to persevere towards long term goals, we looked for changes in each player’s score on the 8-item Grit Scale from pre- to post-intervention (Duckworth & Quinn, 2009). This measure formed part

of the psychological health screening that the team implemented 3x yearly with each player on the list, and is designed to measure trait-level perseverance and passion for long-term goals. The 8-item grit scale has predictive validity amongst adults associated with educational attainment, fewer career changes, and retention in elite military training environments (Duckworth & Quinn, 2009).

Career statistics. Traditional markers of career success were used for descriptive statistics, specifically statistical measures of experience (total games played prior to 2014 season) and the player's age.

Performance measures. Post-season analyses were done using measures of performance, namely the coaches' numeric votes that are given to rate a players' performance for each game, given on a scale of 0 to 8 (0 denoting a poor performance, 8 denoting the best possible performance). These votes are used to score the club's annual best-and-fairest (MVP) count, and go beyond just game statistics to include expert understanding of how the player's opponent, matchup, team role and execution contributed to overall team performance. The average number of votes per game played was used for the purpose of quantifying each player's performance level over the course of the 23 game season, and will be referred to as 'votes' in subsequent analyses. To quantify a player's consistency levels, detailed analyses were performed using coefficient of variation (relative standard deviation) of a player's votes. While a simple standard deviation of a player's votes over the course of the season could be used, this would unfairly favor those with lower average scores as they would have less room to vary from week to week. We computed this by taking the player's SD and dividing it by their average score. Players were blind to their exact scores throughout the season, however weekly individual game reviews with their line coach would have given them some idea of their subjective performance level.

Procedure

Timeline. Players in both the intervention and control groups had already filled out the Grit Scale in line with the rest of the team as part of the psychological health screening at the beginning of the pre-season. The intervention was delivered within the normal pre-season training program for the 2014 season, beginning as practice games were starting and ending just prior to the start of regular season games. Participants were advised of their involvement in this training in a regular briefing session with a coach, and were given only the timetable for the program showing four 60-min sessions, spaced over a two months during pre-season training. There were two weeks between each session. Prior to the first session for each group, participants filled out the ASQ. A trained facilitator met with the players in small groups of 7 to 15 during the sessions. At the end of the fourth session, participants again filled out the primary measure, and the psychological health screening was conducted again one week later. Performance measures were kept by coaches across the course of the season, and performance analyses were performed only after the season was finished. A timeline of the procedure is outlined in Figure 1 below.

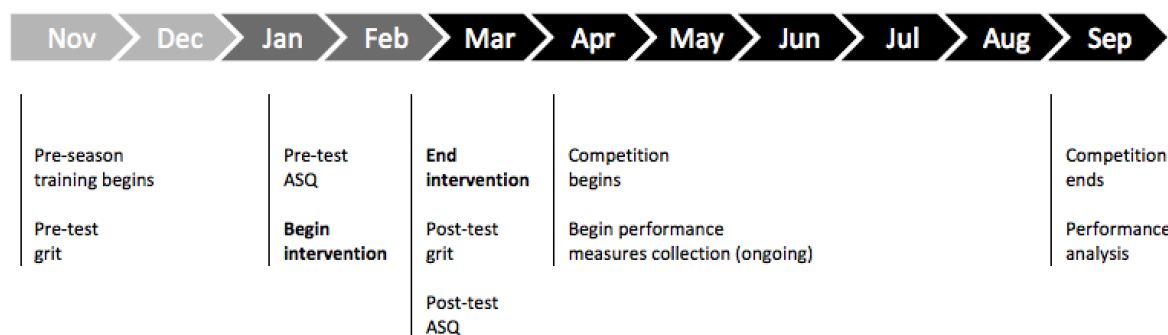


Figure 1. Timeline of measures and program delivery.

Mental Toughness Training Intervention. During the first session in all groups, the facilitator introduced “a program designed to make you tougher” based in part on training given to soldiers in the US Army (Reivich, Seligman, & McBride, 2011). A brief overview of

the resilience, optimism and explanatory styles research was given to the participants, with particular emphasis placed on sports examples (Seligman et al., 1990; Rettew & Reivich, 1995), as well as information on the link between perseverance and performance as defined by previous research on grit (Duckworth et al., 2007). The introductory exercise began with a simple game designed to invoke frustration and feelings of intellectual failure, and then observe each participants reaction to those circumstances. Group discussion was facilitated using such questions as “Who stuck at it?” and “Who spat the dummy and stopped?” At the end of the first session, a worksheet was passed around asking participants to set a goal for one area (in their football or home life) they would like this training program to help them get tougher in, or deal with better.

Thereafter in each subsequent session, the previous model was revisited, and a short discussion was facilitated within the group discussing how it had been applied or played out in the two weeks between sessions. Subsequent sessions touched on models based on Resilience Training and Optimism Training developed at the University of Pennsylvania (Reivich & Shatte, 2003; Seligman, Ernst, Gillham, Reivich, & Linkins, 2009), including experiential exercises designed around exploring Explanatory Style, Adversity - Belief - Consequence links, Thinking Traps, Problem Solving, and Real Time Resilience (Reivich et al., 2011). Each session also allowed for revision and reflection on the initial goal set by each participant, including action plans developed in an if - then format to assist in changing habitual responses to adversity to more effective ones in a given situation (Gollwitzer & Sheeran, 2006).

No handouts, reference or reminder materials were left with the players. The training programs finished as pre-season games began, and over the course of both these games and regular season all participants and non-participants had access to both the facilitator and an

experienced performance psychologist on a weekly basis. No formal review or follow-up sessions were performed during the season.

Statistical Approach

All statistical analyses were conducted using SPSS 20. To evaluate the impact of the resilience program on explanatory style, paired-samples t-tests were conducted to compare pre- and post-program scores for each ASQ dimension (i.e., internality, stability and globality) and composite score within the intervention group as they were the only participants to receive this measure. ANCOVA analyses were conducted to analyze differences between treatment and control groups' post-program grit scores and performance variables, while controlling for baseline differences using pre-program grit and performance scores as covariates. Finally, hierarchical linear regression was performed to investigate the unique impact of the psychometric measures on performance variables above and beyond traditional career statistics.

Results

The current investigation proceeded in a series of three separate analyses. First, we test the effectiveness of the intervention by analyzing for impacts of training on both psychometric and performance measures. Next, we look for links between the psychological and performance measures. Finally, we conduct an exploratory analysis to test a theory of realistic optimism specific to performers - namely that it is the combination of grit and optimism - that best predicts superior performance on the field.

Impact of Training

Preliminary analyses. We first compared the training and control groups to assess baseline differences in descriptive statistics or on the targeted psychometric and performance variables. A breakdown of the descriptive statistics is shown in Table 1. As a training cohort, intervention participants did not differ from non-participants on age, however there was a

difference in experience (defined by the number of games they had played prior to the 2014 season). There was no difference between groups on 2013 performance variables or baseline grit, and the remaining psychometric variable – optimism – was only tested in the intervention group as part of the training program.

Table 1

Descriptive statistics of training and control groups, as measured at baseline

	Training ($n=20$)	Control ($n=13$)	Cohen's d
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	
Age	23.27 (3.36)	25.00 (3.24)	0.52
Experience (games played prior to 2014)	48.86 (53.81)	91.54 (74.10)	0.66*
Prior performance (average votes in 2013)	1.84 (0.80)	1.71 (1.04)	0.14
Prior consistency (relative SD in 2013)	0.86 (0.30)	0.91 (0.31)	0.14
Grit	3.59 (0.47)	3.91 (0.61)	0.47

Psychometric changes. Optimism improved for those in the training program, $t(20) = 3.65, p < .01, d = 0.72$. Using a paired-samples t-test, we found the largest difference from pre- to post-intervention on the ASQ was in the stability subscale, $t(20) = 8.43, p < .001, d = 1.73$, suggesting that players who went through the mental toughness intervention were subsequently more likely to see adversity and problems as less permanent than they had previously. In contrast, we found no differences on internality or globality. To test whether the intervention increased grit, we ran an ANCOVA predicting post-intervention grit from condition, controlling for baseline grit and experience. No significant changes were found in grit levels of the players as a result of the training, $p = .53$. Pre- and post-intervention scores on psychometric variables are reported in Table 2 below.

Table 2

Pre and post intervention psychometric results

Variable	Pre-intervention	Post-intervention	Cohen's <i>d</i>
	<i>Mean (SD)</i>	<i>Mean (SD)</i>	
Attributional Style Questionnaire (ASQ)	14.96 (1.44)	13.87 (1.65)	0.72**
<i>ASQ – Internality Subscale</i>	5.75 (0.56)	5.71 (0.63)	0.07
<i>ASQ – Stability Subscale</i>	5.29 (0.51)	4.35 (0.60)	1.73***
<i>ASQ – Globality Subscale</i>	3.91 (0.79)	3.80 (0.84)	0.14
Grit scale	3.59 (0.47)	3.73 (0.45)	0.30

** $p < .01$, *** $p < .001$

Performance changes. To ascertain if there were any effects from the training on player's performance in the 2014 season, we compared their 2014 output to the same variables in 2013. An ANCOVA comparing treatment and control groups, and controlling for differences in experience and prior performance, revealed that the training improved a player's performance in the 2014 season, $F(1,26) = 4.12$, $p = .05$, $\eta_p^2 = .14$ (see Table 3). However, this effect was moderated by baseline performance levels, $F(1,26) = 6.59$, $p < .01$, $\eta_p^2 = .41$. Specifically, as illustrated in Figure 2, the training was more effective for players with low prior performance: players who were below average performers in 2013 and received the training outperformed their counterpart in the control group, whilst there was no difference in the changes seen for the above average performers in either group. A similar result was found when testing for the effect of treatment on a player's consistency: an ANCOVA controlling for differences in experience and prior consistency revealed that the training improved a player's consistency in the 2014 season, $F(1,26) = 5.19$, $p = .03$, $\eta_p^2 = .17$ (see Table 3). Again, this effect was moderated by prior consistency levels, $F(1,26) = 6.28$,

$p = .02$, $\eta_p^2 = .19$. Specifically, as illustrated in Figure 3, the training was more effective for players with low prior consistency: players who were inconsistent performers in 2013 and received the training improved more than their counterparts in the control group, whilst there was minimal difference between treatment and control for those who were already consistent performers.

Table 3

ANCOVA analyses for effect of training on each of the performance variables

	Performance		Consistency	
	<i>F</i>	η_p^2	<i>F</i>	η_p^2
Corrected Model	2.88*	.31	2.00	.24
Intercept	14.88***	.36	9.94**	.28
Experience	0.01	.00	0.01	.00
Treatment	4.12*	.14	5.19*	.17
Prior Performance	4.46*	.15	-	-
Treatment x Prior Performance	4.99*	.16	-	-
Prior Consistency	-	-	1.56	.06
Treatment x Prior Consistency	-	-	6.28*	.19

* $p < .05$, ** $p < .01$, *** $p < .001$

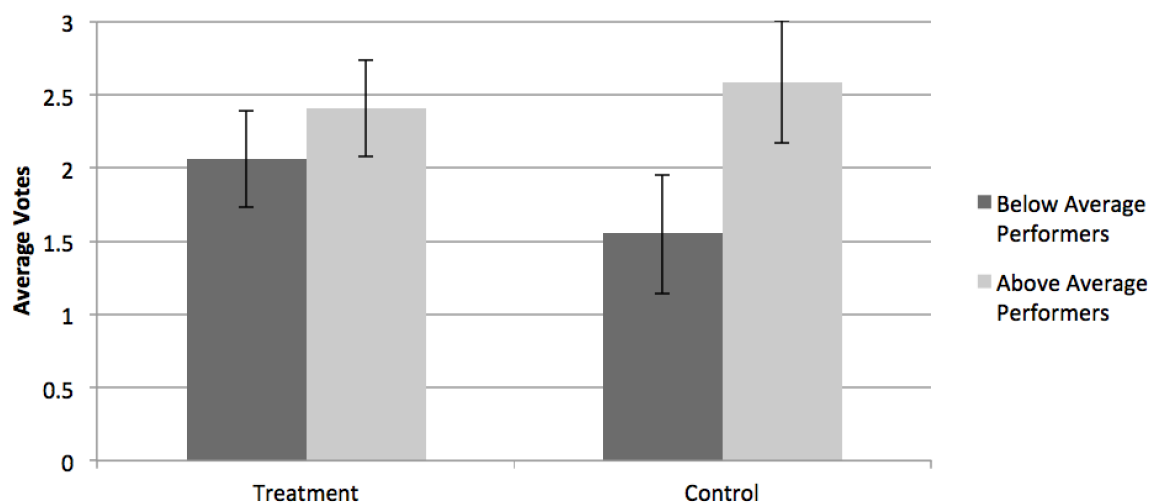


Figure 2. Estimated marginal means for performance, controlling for experience and prior performance (Median split for illustrative purposes only). Error bars represent *SE*.

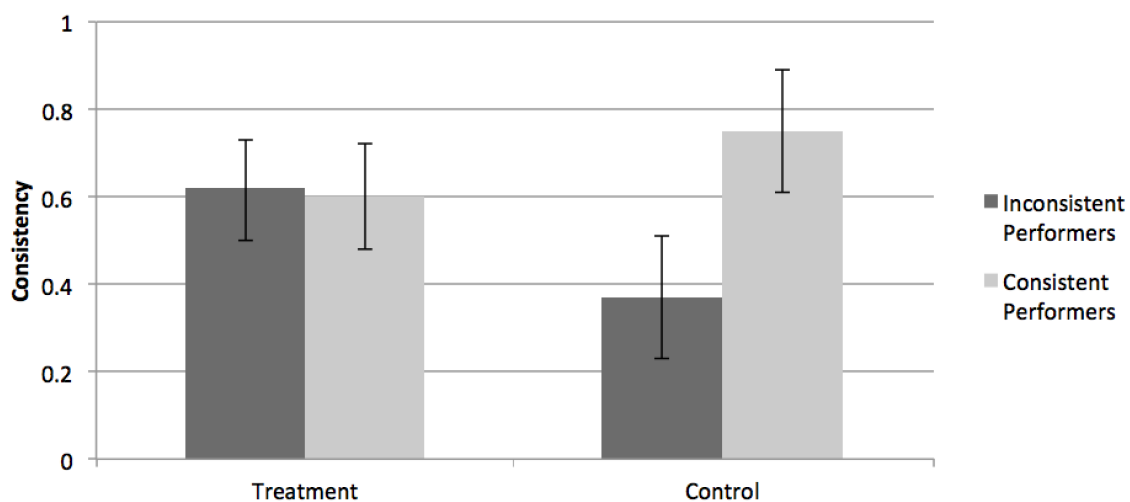


Figure 3. Estimated marginal means for performance, controlling for experience and prior consistency (Median split for illustrative purposes only). Error bars represent *SE*.

Links Between Grit, Optimism and Performance

To uncover links between the psychological and performance measures that may explain this effect on performance, we tested for correlations between grit, optimism and the performance measures for all of the players who had every measure available ($n = 20$, see Table 4). The level of consistency for a player during the season was strongly predicted by a players level of grit, $r(20) = .44, p = .05$, prior to the start of the season, with gritty players showing greater levels of consistency than their less gritty counterparts. A marginally significant correlation with consistency was also seen for optimism, $r(20) = .38, p < .10$. Of particular note, the stability subscale of the ASQ also showed a strong relationship with consistency, $r(20) = .48, p = .03$, indicating that players who see events as more temporary and less permanent show greater consistency over the course of the season. This element of a player's explanatory style also showed a marginally significant correlation with performance levels, $r(20) = .41, p = .07$.

Table 4

Bivariate correlations between performance measures, career statistics and psychometric variables

	Avg				ASQ-	ASQ-	ASQ-		PRO	
	Votes	Consist.	Age	Exp.	ASQ	intern.	stability	globality	Grit	score
Average Votes		.89**	-.01	.22	-.23	-.26	-.41†	.03	.19	.43*
Consistency			-.04	.15	-.38†	-.36	-.48*	-.14	.17	.56*
Age				.81**	-.64**	-.60**	-.40†	-.53*	.35*	.43†
Experience					-.55*	-.65**	-.39†	-.31	.26	.33
ASQ						.68**	.86**	.84**	-.52*	-.81**
ASQ-internality							.44	.27	-.40	-.49*
ASQ-stability								.64**	-.45*	-.88**
ASQ-globality									-.40	-.61**
Grit										.82**

* $p < .05$, ** $p < .01$, † $p < .10$

Next, we wanted to assess the effects of the psychometric measures on performance measures over and above traditional statistical indicators, so we ran two separate hierarchical linear regressions predicting average performance levels and consistency. In both models, the traditional career markers of age and experience were entered in block 1, and optimism and grit in block 2. Optimism marginally predicted performance, $\beta = 0.24, p = .09$, whereas grit predicted consistency, $\beta = 0.49, p = .05$, controlling for these experience factors. Together, these psychometric variables added to the predictive power of experience variables only for consistency, $\Delta R^2 = .39, F(2,14) = 5.45, p = .02$. Full results provided in Table 5.

Table 5

Regression analyses for each of the performance variables

	Performance		Consistency	
	Block 1	Block 2	Block 1	Block 2
Age	-0.24	-0.62	-0.28	-0.79*
Experience	0.84	0.72	1.19	1.03
Grit		0.36		0.49*
Optimism		0.24†		0.32
ΔR^2		0.21		0.39*

Note. All numbers are standardized beta coefficients (β)

* $p < .05$, † $p < .10$

Realistic Optimism and Performance

Finally, we wanted to explore the possibility that, in line with the theory of realistic optimism, performance would be related to strengths in *both* grit and optimism. This Performer's Realistic Optimism (PRO) score (a sum of grit + unstable attributions) was

strongly related to consistency, $r(20) = .56, p = .01$. Moreover, this combined PRO score is the only psychometric variable that predicted higher performance levels, $r(20) = .43, p = .05$. Separate regression analyses showed that a player's PRO score significantly predicted performance ($\beta = 0.56, p = .03; R^2 = .27, p = .02$) and consistency ($\beta = 0.69, p = .00, \Delta R^2 = .39, p < .01$) over and above traditional career statistics (see Table 6). These results suggest players who see adverse events as temporary and *also* engage in uncomfortable reflection and attention to detail outperform those who are either just purely optimistic or gritty alone. Of interest to this particular study, a retrospective analysis using a paired samples t-test showed that PRO score was also increased as a result of the training, $t(20) = 6.71, p < .001, d = 1.16$.

Table 6

Regression analyses for PRO score on each of the performance variables

	Performance		Consistency	
	Block 1	Block 2	Block 1	Block 2
Age	-0.24	-0.49	-0.28	-0.58
Experience	0.84	0.72	1.19	1.04
PRO score		0.58*		0.67**

* $p < .05$, ** $p < .01$. All numbers are standardized beta (β)

Discussion

This investigation aimed to test the effectiveness of a training program aimed at improving grit, optimism and performance. Overall, the program was effective at improving player's ability to respond to adversity, as evidenced by improvements in optimism, average performance levels and consistency in the season that followed the training. Further analyses confirmed the findings of previous research showing links between optimism and

performance in sports, as well as the links found between grit and achievement in other performance contexts.

On a psychological level, optimism improved for those involved in the training program, in line with H1. Given previous findings and the fact the curriculum was based in part on previous interventions and research which has been shown to be effective, this is not surprising. Worth noting is the majority of the change occurred in the stability subscale, which replicates the findings of Gillham et al., (1995) in their two year follow-up with schoolchildren. Given the earlier discussion of the performance relevance of the stability subscale, as well as the findings of this study showing the stability subscale was predictive of performance measures, this is an encouraging finding and suggests the training should continue to be effective for performers in future implementations. Grit did not improve in line with the expectations of H2. This finding is not surprising given grit is considered a trait and therefore relatively stable, suggesting it is not subject to change easily, but in this case may also be due to the study being underpowered. A much larger sample may have yielded a significant finding.

Most importantly from a practical standpoint, performance improved following the training in line with H3, moderated by prior levels of performance and consistency. These findings suggest this type of training may be more effective for players who are yet to reach an elite standard of performance on a consistent basis. One reason for this may be found in the links between the combination of grit, optimism and performance, which suggest a large reason for talented performers not consistently being top performers are deficits in one or both of these areas. It therefore makes sense that training aimed at these elements will help those lacking in that areas more than others. Just as there is greater margin for improvement available in muscle strength for athletes who have never entered a gym when compared to

seasoned bodybuilders, this training should be more effective for those who have lower ‘mental strength’ than those who are already world class.

As these results came from a non-random assignment study, they may be suggestive of a simple regression to the mean. Given that the significant differences between treatment and control are mainly concentrated in the lower performers – those with performance or consistency that was below average the prior season – this argument does not hold. If regression to the mean were present, it would occur at both ends of the spectrum, and the effect would cancel itself out. The significant findings therefore suggest this type of training has the potential to be a clear competitive advantage for teams in competitive sports, producing immediate performance improvements in players on the field. These findings have clear implications for leaders of sports teams in particular, and indeed managers of any performance focused team. Not only does this provide evidence that supports the inclusion of mental toughness training into any results-focused program aimed at performers, the effects may even be enhanced further if the coaches and managers themselves become involved along with all of the performance team. Not only could a coach benefit from improving their own ability to respond to failure or adversity, the improved expectations of player’s coping abilities and stronger relationships that could result from shared experience in the program may bring added benefits. Numerous studies have shown that a leader’s expectations of their subordinate’s abilities improves their actual performance (McNatt, 2000), and overall organizational and peer support have been found to have a positive impact on both individual coping ability and group performance (Rhoades & Eisenberger, 2002; Mummery, Schofield, & Perry, 2004).

The correlations mentioned above confirmed H4, with results showing clear links between grit, optimism and performance for this population. Of particular interest was the fact that grit predicted consistency while optimism marginally predicted performance levels, both

over and above traditional experience statistics and prior performance levels that are traditionally used to make assumptions regarding future performance. This confirms and adds to previous literature that has identified the predictive nature of grit on achievement of long-term goals, as well as numerous studies connecting optimism with performance and specifically how it helps performers in responding to failure.

In line with H5, the investigation uncovered a potential factor to identify realistic optimism in performers. The PRO score was strongly correlated with both grit and optimism, but had greater predictive power than either measure in relation to performance and consistency. While this new proposed measure shows promise as a strong predictor of performance that could be used in future research as well as practically within recruiting and development in sports, this is only a preliminary test using one set of data. More work is required on replicating these findings using other performance populations, validating whether this accurately measures the construct of ‘realistic optimism’, and also investigating if it is as strong a predictor of well-being outcomes as it is of performance.

It is this final point – the potential twofold benefit of increasing well-being at the same time as improving performance – that perhaps holds the most promise within the field of positive psychology. Although the current investigation did not explicitly look at any changes in well-being resulting from the training, the findings show great promise and suggest a powerful positive intervention given other research on similar programs in both education and military populations have found similar increases in optimism and corresponding improvements in other well-being measures (Gillham et al., 1995; Harms et al., 2013). Given the unique potential of elite sports teams to impact the lives of those in communities that support them, champion players may also become champions of the messages and methods of positive psychology within the community: their improved performances can highlight the value of improved coping skills for all of us as we tackle the game of life.

Limitations

The current study has a number of limitations. Firstly, the experiment and subsequent data analyses involved small sample sizes, an inevitability when working within one professional sporting team. The small sample used in the study compromised the power available for the statistical analyses. It may be possible that, given an effect size of $d = 0.30$ for grit, a much larger sample size is required for this kind of small effect to be statistically significant. Another result of the context surrounding a professional sports team was that there was no random assignment due to competitive realities that demand all players receive any intervention that is suspected of being supportive to team performance. Mitigating these concerns are the strong findings within the study, which found significant changes, correlations and predictive validity regardless of these issues. Given that research is conducted with the hopes of translating into real-world situations, this limitation should actually provide confidence to those involved in professional teams that this intervention can still be effective within this context.

A third limitation due to the time and resource limits within the professional sports team environment was the absence of control data for the optimism (ASQ) measures, which were specifically administered only to those players involved in the resilience training due to time limitations for the remainder of the squad. Whilst the paired-samples t-test did show significant changes, the conclusions drawn from the analysis would be more reliable if we were able to show this held when compared to a control group.

One final limitation was the restriction of resources applied to the program – only one facilitator was involved (no coaches) and data collection was limited to one season. Studies show the level of trust in a leader have large implications on team performance (Dirks & Ferrin, 2002), including high level sports teams in the NCAA (Dirks, 2000), and trust in leaders or significant others has also been shown as an antecedent to explanatory style

(Eisner, 1995). In this case, the absence of coaches from the program may have detrimental effects on both the performance of any coaches who may have possessed relatively pessimistic explanatory styles, as well as the player's own explanatory styles specific to football adversities given the link between trust and explanatory styles. We could have enhanced the design by including other staff and coaches, using a 'train the trainer' model, in order to improve scalability and longevity. This type of design would also allow more of a longitudinal study and data collection to be implemented, giving us a very interesting data set to do ongoing analyses with and to assess the long-term implications of such a program.

Future Research

Whereas the findings of this paper are strong and may interest practitioners, they are taken from a very specific population of professional Australian Rules footballers. It is recommended this program be replicated with multiple other teams, across different sports, as well as with women and non-professionals to generalize the results. Two strengths of this research – the presence of clear performance data and the presence of an embedded facilitator with full access for support – are elements which will likely help in further replication.

The program design itself may benefit from more deliberate intervention on skills which may enhance grit, such as MCII planning and goal setting to improve the participant's perseverance skills and addresses overly optimistic or wishful thinking. Whilst the current intervention did ask players to set a goal and then continued to refer back to that goal over the course of the 4 session program, this was delivered with a focus only on implementation intentions, and not the full MCII protocol. It may have been more effective to teach the skills of MCII specifically so the players could use it as required throughout the season, as well as increase the energizing effects of the mental contrasting.

Another area of particular interest to recruiters and managers within this study is the proposed PRO score that we suggested as a reflection of an individual's level of realistic

optimism. This combination of grit and the stability subscale will need to be tested for reliability and validity with other populations and performance arenas if it is to be used in future research and practice, however the findings of this first analysis are promising. As suggested above, further investigations should also include well-being measures to ascertain if these findings are potentially even more valuable given additional ‘off-field’ benefits.

One final area ripe for research in relation to this program is the analysis of potential team level impacts. Whilst it did not form part of this analysis, it was interesting to note that the improvement in results at the individual level didn’t translate to changes in team performance (there was no practical change in win/loss results when comparing the 2013 to 2014 seasons). Further investigation of the factors that limit or enhance the impact of this intervention on team performance would provide even greater confidence in coaches and managers who are considering implementing in their environment. As mentioned in the discussion section, research suggests the impact of leader expectation, organizational support and interpersonal relationships may have significant ramifications on the performance and coping abilities of subordinates (McNatt, 2000; Rhoades & Eisenberger, 2002; Mummery et al., 2004), indicating potential areas for enhancement of the training intervention that was the focus of the current investigation.

Conclusion

Consistent with decades of research on optimism and more recent findings on grit, the current investigation found there was an effect of mental toughness training on players’ optimism and subsequently performance, but not on grit. Players higher in these characteristics were more consistent and had higher average levels of performance, and a combined score was predictive of both performance and consistent over and above traditional predictors based on experience and talent level. Future research should focus on related questions: do these effects exist in other sports and performance populations? What are the

impacts at a team level? And is the new combined measure proposed to reflect realistic optimism valid and reliable across multiple populations? To the extent we can identify the key elements of an individual performer's makeup that contribute to both performance and well-being, and then deliberately increase those elements, we have a powerful tool that can help us win, on and off the field.

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