HOW INDIVIDUALISM AND COLLECTIVISM RELATE TO TEAM PERFORMANCE, TEAM COHESION, AND COLLECTIVE EFFICACY IN A MULTILEVEL ANALYSIS

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Abstract

Individual-level individualism (IND) and collectivism (COL), team performance, and team cohesion were investigated as predictors of collective efficacy using Hierarchical Linear Modelling (HLM). Participants were 153 elite netball players comprising 16 teams competing at either of two national tournaments. The netball players completed a questionnaire the day before their tournament consisting of Carron, Widmeyer, and Brawley's (1985) Group Environment Questionnaire measuring four types of team cohesion ('individual attractions to the group-social', 'individual attractions to the group-task', 'group integration-social', and 'group integration-task'), Triandis and Gelfand's (1998) IND-COL scale (measuring horizontal individualism, horizontal collectivism, vertical individualism, and vertical collectivism), and a collective efficacy measure designed for netball players by Wilkinson, Fletcher, and Sachsenweger (2011). Team performance was measured as the percentage of games won by each team at their tournament. The four types of IND-COL were analysed as individual-level predictors, and performance and team cohesion were included as team-level predictors, of collective efficacy. HLM was used to analyse main effects of individual-level and team-level predictors, and any cross level interactions simultaneously. As overall team cohesion and team performance increased, collective efficacy increased, consistent with previous research. However, when the four types of cohesion were specified as team-level predictors, only the 'individual attractions to the group-task' (ATGT) type of cohesion significantly predicted collective efficacy, and performance no longer remained a significant predictor of collective efficacy. Furthermore, at high levels of ATGT, players higher on vertical collectivism tended to have greater collective efficacy. Whereas at low levels of ATGT, players higher on vertical collectivism tended to have lower collective efficacy. This type of interaction had not been explored in research previously, and was a new finding. Therefore, the study highlighted the value in research on how individual-level IND and COL relate to team cohesion and collective efficacy, and offered the first insight into their relationship in a team context.

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Table of Contents

List of Tables

List of Figures

Chapter 1: Literature Review

Introduction

Groups are fundamental to human society. Even the most independent people do not completely live in isolation, and are influenced by others in their environment. With groups and teams in particular, the way in which people influence each other has been the focus of study across a range of disciplines. For example, as workplaces have increasingly recognised the benefits of teams, industrial and organisational psychology researchers have investigated what characterises an effective work team. Also, as elite team-sport involves high stakes for performance, sports psychology research on teams has been used for gaining an edge over the competition. Most of the focus has been on team characteristics such as team cohesion, collective efficacy, and performance. Less research has been conducted on how these team characteristics relate to individual differences such as individualism and collectivism. Extensive group dynamics research in occupational settings, sport, and a range of other contexts, have complemented each other in contributing to the development of knowledge about how people influence each other within teams. However, there is still a lack of understanding about how individual-level and team-level variables interact.

Definition of a Team. It is tempting to equate groups with teams and vice versa. However, there is a distinction between what it means psychologically to be a member of a team versus a group (Stillman, Fletcher, & Carr, 2007). Stillman, Fletcher, and Carr (2007) used signal detection theory and found that participants implicitly defined teams as "…more structured and demanding, requiring commitment and effort in pursuit of shared goals". They also found that people emphasise cohesiveness as being important in teams, whereas diversity and individuality were highlighted as more important for groups. Both teams and groups were perceived to provide a supportive environment where people had shared interests (Stillman et al., 2007). However, the most important distinction is that working towards shared goals is characteristic of teams, and is not a neccesity in groups. The present study had a focus on teams as opposed to groups, studying elite netball teams as an example of a competitive type of team with clear structure and goals.

Unit of Analysis in Team Dynamics Research. Another important consideration in research on teams is the unit of analysis (Kenny, Kashy, & Bolger, 1998). Individuals are nested within teams, and there are two possible levels of analysis: the individual-level, and the team-level. In the past, team dynamics researchers have had to choose between the individual or the team-level data as the unit of analysis. In single level analysis techniques such as multiple regression and analysis of variance (ANOVA), independence of observations is a key assumption (Hair, Black, Babin, & Anderson, 2009). This is because standard errors can be estimated incorrectly when there is dependence between individuals within groups which is not accounted for (Raudenbush & Bryk, 2002). When analysing team concepts with individual-level data as the unit of analysis, the assumption of independence is often violated (Kenny et al., 1998). This is because members of real teams are not independent from each other, as they influence each other through interactions and common environment (Kenny & Voie, 1985). If an individual-level characteristic is represented by aggregation into the team-level for analysis, overgeneralisations can be made, and the meaning of the variable could be completely different (Hox, 2002; Moritz & Watson, 1998). Furthermore, individual-level and team-level characteristics can influence each other, which single-level analysis cannot test (Moritz & Watson, 1998). In summary, when researching teams, single level analysis techniques have many limitations in their ability to handle the hierarchical or nested nature of team data. Therefore, the present study used multilevel analysis in order to analyse both individual-level and team-level variables simultaneously.

Hierarchical Linear Modelling (HLM) is a type of multilevel analysis, which can be used to conceptualise and analyse individual-level and team-level variables simultaneously. HLM is a solution to the dilemma of deciding which level to analyse in teams, allows the researcher to assign variables to the appropriate level, and test for any interactions between levels (Kenny et al., 1998; Raudenbush & Bryk, 2002). Multilevel analysis is also a solution to the conflict between methodological holism and methodological individualism in research epistemology (Courgeau, 2003). By analysing individual-level variables within their wider social context of the team in multilevel analysis, researchers can determine how individual differences and more holistic team effects interconnect (Courgeau, 2003). Although HLM has been around for several decades, it has been under-utilised in team dynamics research (Kenny et al., 1998). Therefore, the present study used HLM to investigate how individual-level individualism and collectivism relate to team performance, team cohesion, and collective efficacy, which has not been considered before.

Brief Introduction to Team Cohesion, Collective Efficacy, Team Performance, and Individual-Level Individualism and Collectivism. One of the most important, and widely studied concepts in group dynamics is team cohesion (Carron, Colman, Wheeler, & Stevens, 2002; Kleinnert et al., 2012). Team cohesion can be defined as “a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives” (Carron, 1982, p. 124). Team cohesion has been shown to have a positive relationship with performance, and can be improved through team building (Carron, Bray, & Eys, 2002; Carron & Eys, 2012; Kleinnert et al., 2012). Another concept which has been positively linked to performance, and also team cohesion, is collective efficacy (Carron & Eys, 2012; Kozub & McDonnell, 2000; Spink, 1990). Collective efficacy can be defined as a team's "…shared beliefs in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments…" (Bandura, 1997, p. 477). In summary, there is evidence to suggest that the greater a group's cohesion, the greater its belief in its abilities, then the greater the group's performance (Kozub & McDonnell, 2000; Spink, 1990). However, very little is known about how these team-level characteristics interact with individual differences such as individualism and collectivism.

Individualism and collectivism (IND and COL) are two key individual differences which have been studied in a team context, predominantly in organisational psychology research. IND and COL describe the way in which people tend to relate to others, in terms of their self-identity, and the extent that they value their team's goals. In general, individualism is characterised by valuing personal goals above team goals (Earley & Gibson, 1998; Oyserman, Coon, & Kemmelmeier, 2002). Whereas collectivists are more likely to value team goals, and to view their team as an important part of their identity (Earley & Gibson, 1998; Oyserman et al., 2002). Previous research has assessed how IND and COL affect performance, finding that collectivism tends to be positively correlated with performance, and individualism negatively correlated with performance (Bell, 2007; Dierdorff, Bell, & Belohlav, 2011; Earley, 1993; Eby & Dobbins, 1997; Gundlach, Zivnuska, & Stoner, 2006; Jackson, Colquitt, Wesson, & Zapata-Phelan, 2006; Thomas, 1999). However, there have been inconsistencies in the level that IND and COL have been analysed. Furthermore, to date there is minimal published research on the relationships between IND-COL and team cohesion, and IND-COL with collective efficacy. The author was unable to find any published research which has studied these variables in a single analysis. Therefore, it is unclear as to how individualism and collectivism relate to both team coheison and collective efficacy, and whether there are any interactions between them. The present study addressed this gap in the literature.

The aim of the present study was to determine how individual-level individualism and collectivism, team performance, team cohesion, and collective efficacy, relate to each other in elite netball teams. Two different types of individualism (horizontal individualism and vertical individualism) and two types of collectivism (horizontal collectivism and vertical collectivism) were analysed as individual-level predictor variables in relation to team cohesion, team performance, and collective efficacy. Relationships were investigated using HLM whereby collective efficacy was the outcome variable, and individual-level IND-COL, team-level performance, and team-level cohesion were the predictor variables (see Figure 1). The use of HLM allowed the possibility of main effects of the individual-level variables and team-level variables, and cross level interactions, to be investigated simultaneously. The remainder of the chapter will go into more detail, outlining the definitions of team cohesion, collective efficacy, and IND-COL as conceptualised in the present study. It will also detail how the present study has aimed to address the gaps in the literature on the relationships between team performance, team cohesion, and collective efficacy, with individualism and collectivism.

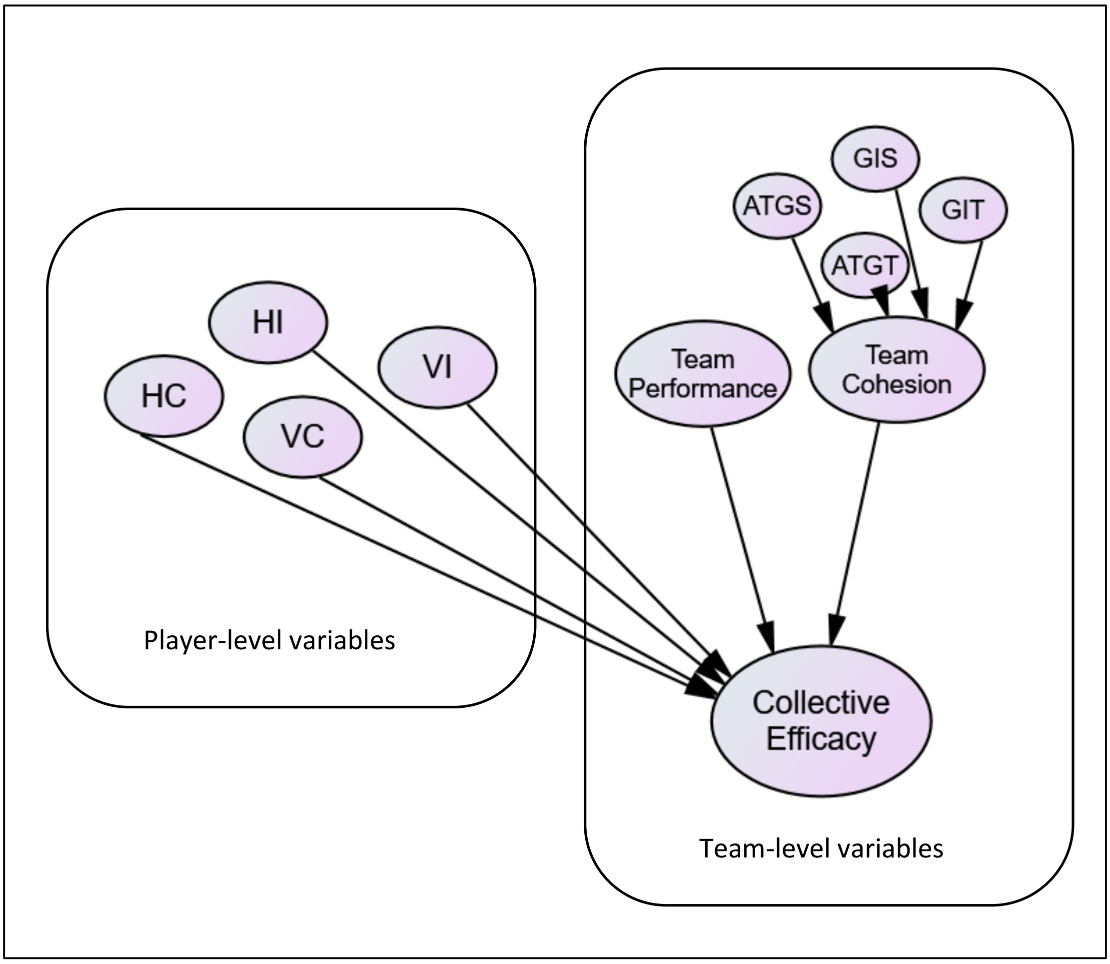

Figure 1. Diagram showing possible main effects between player-level predictor variables, team-level predictor variables, and the team-level outcome variable of collective efficacy. HC = horizontal collectivism; HI = horizontal individualism; VC = vertical collectivism; VI = vertical individualism; ATGS = attractions to the group-social; ATGT = attractions to the group-task; GIS = group integration-social; GIT = group integration-task.

Conceptualisation of Team Cohesion

The conceptualisation of team cohesion as defined in the present study was grounded in the development of group cohesion theory. The first formal group cohesion theory was presented by Festinger, Schachter, and Back (1950). Their definition of cohesiveness was "…the total field of forces which act on members to remain in the group…" (Festinger et al., 1950, p. 164). These 'forces' are characteristics of the group which give group members reason to remain group members. Festinger et al. (1950) divided these group forces into two types: aspects which make the group attractive; and the extent to which group membership helps one to achieve important goals. Festinger et al.'s (1950) theory was developed from a study they conducted on housing projects in the USA. They asked residents to name the three people within the housing complex that they socialised most with, and looked at the proximity of where these people lived (Festinger et al., 1950). A limitation of this work in terms of defining team cohesion as opposed to group cohesion, is that the study was based on informal groups in housing projects, where the concept of cohesion was derived from friendships between the residents. As suggested by Carron and Eys (2012), friendships do not necessarily bind groups together or prevent the group from breaking up when there is conflict, and there can be cohesion with the absence of friendship. In other words, friendship is not likely to equal cohesion. However, the initial theory of group cohesion offered by Festinger et al. (1950) provided a foundation for further development in group cohesion theory.

A major development in cohesion theory has been the recognition that group cohesiveness is 'attraction-to-group', rather than attraction to individuals in a group (Carron, 1982; Carron & Eys, 2012; Gross & Martin, 1952). Consistent with the idea of cohesion being attraction to the group, in sports psychology the dominant conceptualisation of cohesion is Carron's (1982) definition of team cohesion. Carron (1982) defined team cohesion as "a dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of its goals and objectives" (p. 124). The definition conceptualises team cohesion as attraction of individual team members to the group as a collective, rather than person-to-person attraction. Carron's (1982) definition also includes the importance of working towards collective goals, which was missing from earlier definitions of cohesion. Furthermore, Carron (1982) specified team cohesion as a team-level variable, which is appropriate for the specific use in a team context, such as in the present study.

Carron et al. (1985) developed a four factor multidimensional conceptualisation and a measure of team cohesion based on Carron's (1982) definition of team cohesion, which was used in the present study. Carron et al. (1985) distinguished between an individual's perceptions about the group as a whole, and an individual's feelings about their personal attraction to the group (Carron et al., 1985). They named these categories: "group integration" and "individual attractions to the group" (Carron et al., 1985, p. 248). 'Group integration' encompasses how team members perceive the cohesion of their team as a whole. Whereas the 'individual attractions to the group' aspect encapsulates interpersonal attraction to team members overall, individual motivations to remain a team member, and an individual's feelings toward the group aspects of cohesion (Carron et al., 1985). They also distinguished between task and social aspects of team cohesion (Carron et al., 1985). The 'social' category represents the development and maintenance of interpersonal relationships between group members. Whereas the 'task' category covers the working towards group goals aspect of cohesion. As a result of these two distinctions, there are four types of team cohesion in Carron et al's (1985) model (see Figure 1): "individual attractions to the group-social" (ATGS), "individual attractions to the group-task" (ATGT), "group integration-social" (GIS), and "group integration-task" (GIT) (Carron et al., 1985, p. 248). Carron et al. (1985) developed a questionnaire which measures these four types of team cohesion called the Group Environment Questionnaire (GEQ), which remains the most widely used measure of team cohesion in sports teams (Brawley, Carron, & Widmeyer, 1987; Carron et al., 1985; Widmeyer et al., 1985). Overall, Carron's model covers many of the disparate definitions of cohesion, is appropriate for teams, and is widely used in a sports team context (Carron et al., 2004; Dion, 2000).

Carron et al's (1985) conceptualisation of team cohesion is grounded in social cognitive theory. According to social cognitive theory, humans can rationally form judgements about their environment, and make decisions to behave according to the information they gain through interacting with others (Bandura, 1997). From this perspective, Carron, Brawley, and Widmeyer (1998) argued that team cohesion can be measured effectively from individual team members' perceptions, and aggregated into team-level data. This argument is based on assumptions grounded in social cognitive theory such as: the interactions that occur in each group are distinct from other groups, team members develop beliefs about their team through processing information during interactions, and that these beliefs can be measured using a self-report questionnaire (Carron et al., 1998). In summary, using a social cognitive approach justifies the measurement of team cohesion with a questionnaire and aggregating individual team members' responses to form team data, which was adopted in the present study.

Definition of Collective Efficacy

Collective efficacy can be defined as a team's belief in its ability to perform (Bandura, 1997). Like team cohesion, collective efficacy is grounded in social cognitive theory, and can be defined as a team construct (Bandura, 2000). Bandura (1997) defined collective efficacy is an extension of self-efficacy. Self-efficacy is one's belief one can achieve desired outcomes by executing the behaviour required to do so (Bandura, 1997). Whereas, collective efficacy is team members' perceptions about the team's confidence in its ability to perform, and is therefore the team's efficacy (Bandura, 1997, 2000). Zaccaro, Blair, Peterson, and Zazanis (1985) offered a more comprehensive definition of collective efficacy as beliefs about "…a sense of collective competence shared among individuals when allocating, coordinating, and integrating their resources in a successful, concerted response to specific situational demands" (p. 309). Zaccaro et al's

(1985) definition emphasised the idea that collective efficacy represents *shared beliefs* of individual team members (Carron & Eys, 2012). This is congruent with collective efficacy being a team-level variable, whereby individual team members' perceptions are shared by each other, and form a team-level efficacy. Furthermore, collective efficacy is not simply the sum or average of individuals' self-efficacy. To demonstrate this point, it is possible for talented individuals with high self-efficacy to have low collective efficacy if their team does not perform well together (Bandura, 1997). Research has shown that previous performance is the largest predictor of collective efficacy (Carron & Eys, 2012). Therefore, in a team which has been performing poorly, team members are likely to have low confidence in the team's ability to perform, regardless of how strong their individual self-efficacy may have been. Whereas a team which has been performing well, is likely to have team members with strong confidence in the team's ability to continue to perform well. In the present study, collective efficacy was defined as a team-level construct; team members shared perceptions about the team's level of confidence in its ability to perform.

Collective Efficacy and Team Cohesion

Key features team cohesion and collective efficacy have in common are that they are both team-level constructs, and have both been shown to be positive predictors of performance. Previous research has consistently shown that teams high in team cohesion tend to perform better, particularly with studies analysing both variables at the team-level (Beal, Cohen, Burke, & McLendon, 2003; Carron, Colman, et al., 2002; Carron & Eys, 2012; Evans & Dion, 1991; Mullen & Copper, 1994). There is also a large body of research showing that the greater a team's collective efficacy, the greater their performance (Bandura, 1997; Feltz & Lirgg, 1998; Gully, Incalcaterra, A Joshi, & Beaubien, 2002; Heuze, Raimbault, & Fontayne, 2006; Watson, Chemers, & Preiser, 2001). Furthermore, team cohesion and collective efficacy have been found to be positively related. For example, Spink (1990) found that ATGT (individual attractions to the group-task) and GIS (group integration-social) from the GEQ measure of cohesion, positively predicted collective efficacy in a stepwise discriminant analysis (Spink, 1990). The main limitation of the study was its measure of collective efficacy: participants were classified as high in collective efficacy if they reported that they predicted their team to win, and low in collective efficacy if they did not predict to make the top three in their tournament. Their level of confidence in this prediction was not explicit in the classification, and it could have been outcome expectancy rather than collective efficacy that was being measured (Kozub & McDonnell, 2000). A further limitation was that the analysis was exclusively at the level of the individual and did not consider the team-level aspect. Despite these limitations, Spink (1990) was one of the first to demonstrate a positive relationship between collective efficacy and cohesion.

A more accurate measure of collective efficacy than in Spink (1990), was developed by Kozub and McDonnell (2000) who researched cohesion and collective efficacy in elite rugby players. Kozub and McDonnell (2000) administered the GEQ, and a seven-item collective efficacy measure which was developed for the purpose of their study. Their collective efficacy measure tapped into seven different competencies in rugby, in accordance with recommendations by Bandura (1997) that collective efficacy measures should be multidimensional and encompass the competencies required for successful performance (Kozub & McDonnell, 2000). Similarly to Feltz and Lirgg (1998), Kozub and McDonnell (2000) consulted with experienced coaches to identify relevant skills to include in their measure of collective efficacy. In the participant instructions for the measure, they asked participants to rate the degree to which they were confident that their team could successfully perform each of the skills

(Kozub & McDonnell, 2000). Unlike Spink (1990), Kozub and McDonnell (2000) analysed collective efficacy and team cohesion at the team-level rather than the individual-level. Kozub and McDonnell (2000) found that both ATGT (individual attractions to the group-task) and GIT (group integration-task) positively predicted collective efficacy. There was no significant relationship between ATGS (individual attractions to the group-social) and GIS (group integration-social) with collective efficacy. Their main contribution to the literature was in developing a more accurate and comprehensive measure of collective efficacy, and finding that both types of task cohesion and neither types of social cohesion were positive predictors of collective efficacy at the team-level.

Damato, Heard, Grove, and Eklund (2011) developed a collective efficacy measure in accordance with Bandura's recommendations in a similar way to Kozub and McDonnell (2000). Semi-professional soccer players were asked how confident they were in their team's abilities. Damato et al. (2011) found a positive relationship between collective efficacy and ATGT, GIT, and GIS. Unlike Kozub and Mcdonnell (2000) and similarly to Spink (1990), they found GIS in addition to ATGT and GIT to positively predict collective efficacy. Damato et al. (2011) analysed all their data at the individual-level using canonical correlations, stating that their team sample size of nine did not justify the use of HLM. They also included perceived motivational climate, self-efficacy, self-talk in their analyses. Whereas Kozub and McDonnell (2000) analysed both team cohesion and collective efficacy at the team level using multiple regression, which was more appropriate given that both are team-level rather than individual-level variables.

A further improved method for measuring collective efficacy as a team-level variable, is a measure based on participants' perceptions of *their team's confidence* in its ability rather than their personal confidence in their team. The wording used in the collective efficacy measures in Kozub and McDonnell (2000) and Damato et al. (2011) was asking participants what *their personal* belief in their team's abilities was. However, Paskevich, Brawley, Dorch, and Widmeyer (1999) asked participants what they think *their team's belief* in its ability is. This subtle difference is more congruent with the definition of collective efficacy in that it is the team's shared efficacy rather than a collection of individual team members' personal beliefs about the team (Zaccaro et al., 1985). In accordance with suggestions by Bandura (1997), Paskevich et al. (1999) developed a multidimensional scale which included different aspects of collective efficacy relevant to collective skills in volleyball (Paskevich et al., 1999). These included offence and defence, communication, motivation, overcoming obstacles, and a general category. Paskevich et al's (1999) results were consistent with Kozub and McDonnell (2000), and showed predictive validity, having statistically significant relationships with both ATGT and GIT from the GEQ measure of team cohesion. Importantly, Paskevich et al's (1999) approach to measurement was more congruent with both Bandura (1997) and Zaccaro et al's (1985) definition of collective efficacy, by asking participants about *their team's confidence* rather than their personal confidence in the team's ability. The study was limited in its sample size of 70 volleyball players comprising seven teams, and therefore effect sizes could have been underestimated. However, it did confirm previous research which analysed at the team-level, showing that task rather than social cohesion is likely to predict collective efficacy more consistently. Furthermore, Paskevich et al's (1999) further improved on the measurement of collective efficacy.

Consistent with Paskevich et al's (1999) theory-driven approach to measuring collective efficacy, Wilkinson, Fletcher, and Sachsenweger (2011) developed a collective efficacy measure specifically for netball players. Wilkinson et al's (2011) collective efficacy scale consisted of 25 items and six factors: attack, defence, motivation, obstacles, communication, and general. At the team-level, GIT and 'length of time in team meetings' positively predicted collective efficacy. Unlike Spink (1990) and consistent with Paskevich et al. (1999) and Kozub and McDonnell (2000), they found a positive relationship between task cohesion and collective efficacy, but not social cohesion. Furthermore, Wilkinson et al. (2011) improved on previous research by using HLM which could treat collective efficacy as a team-level variable whilst exploring relationships between individual and team-level variables simultaneously. The present study used Wilkinson et al's (2011) measure of collective efficacy, and also used HLM to analyse both team cohesion and collective efficacy at the team-level. Therefore, the present study could confirm whether task cohesion rather than social cohesion would predict collective efficacy at the team-level.

The commonality between, Kozub and McDonnell (2000) and Wilkinson et al. (2011) was that individual team members' perceptions about their team were measured and aggregated to the team-level to measure team cohesion and collective efficacy as team-level variables. Using individuals' perceptions is consistent with Bandura's (2000) recommendation that aggregating individual team members' perceptions about their group's ability is more predictive of collective efficacy than a forced group response. Individual team members' perceptions are more predictive of the team's collective efficacy than a single group response, because the latter fails to tap into the individual variability, and can be skewed by a couple of influential team members (Bandura, 2000). In contrast to Kozub and McDonnell (2000) and consistent with Paskevich et al. (1999), Wilkinson et al. (2011) measured team members' perceptions about *their team's confidence* in its ability to perform rather than their personal confidence in their team's ability. Therefore, more accurately reflecting the definition of collective efficacy. Wilkinson et al. (2011) also used HLM in order to investigate the relationships between team cohesion, collective efficacy, and individual-level variables simultaneously, which previous research on team cohesion and collective efficacy has lacked. Likewise, the present study used Wilkinson et al's (2011) measure of collective efficacy, and HLM. However, the present study investigated how team cohesion and collective efficacy relate to individual-level individualism and collectivism (see Figure 1); individual-level variables which Wilkinson et al. (2011) did not include in their research.

Conceptualisation of Individualism and Collectivism

Individualism-collectivism (IND-COL) is the most frequently studied cultural concept, and similarly to team cohesion and collective efficacy, IND and COL have been studied extensively in the context of teams (Alavi & McCormick, 2004; Cozma, 2011; Earley, 1993; Eby & Dobbins, 1997). In general terms, IND and COL represent two different worldviews and ways of relating to others (Earley & Gibson, 1998; Oyserman et al., 2002). Assumptions underlying individualism include that people are independent, the personal self is central to one's identity, whilst social context is peripheral (Oyserman et al., 2002; Triandis, 1995). However for collectivism, belonging to groups is central to one's self-identity, and common goals and values are more salient (Earley & Gibson, 1998; Oyserman et al., 2002). In a team context, a distinction can be made between IND and COL as beliefs versus as behaviours. Some researchers have used the term collective orientation to describe people's tendency to behave in a more collectivistic manner in a team environment (Driskell & Salas, 1992). However, it is more appropriate to treat individualism and collectivism as personal beliefs, which can differ from actual behaviour depending on the context (Alavi & McCormick, 2004). Furthermore, IND and COL have predominantly been studied in relation to performance in a team context, and not commonly in relation to team variables such as team cohesion and collective efficacy.

IND-COL has been studied both within and across nations, and also at different levels of analysis (Earley & Gibson, 1998; Kirkman, Lowe, & Gibson, 2006; Vijver, Hemert, & Poortinga, 2014). In terms of higher level conceptualisations, Hofstede (1980) conceptualised IND-COL as a uni-dimensional, culture-level construct i.e. "…individualism as opposed to collectivism" (Hofstede, 2001, p. 209). Despite recognising that an individual can display worldviews of both IND and COL in different aspects of life, Hofstede only analysed IND-COL at the level of culture (Hofstede, 2001; Kirkman et al., 2006; Smith, 2002).

Building on Hofstede's (1980) culture-level definition of IND-COL, Triandis and his colleagues studied the distinction between IND-COL at the culture-level versus the individual-level (Hui & Triandis, 1986; Singelis, Triandis, Bhawuk, & Gelfand, 1995; Triandis, 1995, 2001; Triandis, Ching, & Chan, 1998; Triandis & Gelfand, 1998; Triandis, Leung, Villareal, & Clack, 1985). They argued that when culture is the unit of analysis, IND-COL tends to be uni-dimensional consistent with Hofstede's (1980) definition, whereas when individuals are the unit of analysis IND and COL are orthogonal, i.e. two related but independent constructs (Oyserman et al., 2002; Triandis, 1995, 2001; Triandis & Gelfand, 1998). Furthermore, Triandis et al. (1985) proposed that individual-level IND and COL have both a stable personality aspect, in addition to a more context-dependent aspect (Triandis, 1995, 2001). Therefore, an individual could be more individualistic in a certain context, and collectivistic in others, whilst having a unique underlying tendency which remains stable. Throughout the literature, individual-level IND and COL have been called a range of different terms such as allocentrism and idiocentrism, collectivistic orientation, and psychological collectivism (Eby & Dobbins, 1997; Jackson et al., 2006; Triandis et al., 1985). The present study focused on individual-level IND and COL as defined by Triandis et al. (1985), and the names of individual-level individualism and collectivism were used to prevent confusion.

Multidimensionality of Individualism and Collectivism. IND and COL have been further categorised into two underlying dimensions (vertical and horizontal), resulting in four constructs or cultural patterns (Singelis et al., 1995; Triandis, 1995; Triandis et al., 1998; Triandis & Gelfand, 1998). Vertical individualism (VI) is where individuals view themselves as unequal (where it is desirable to be more superior to others) and independent to others (Triandis, 1995). On the other hand, horizontal individualists (HI) view themselves as equal (do not compare themselves to others) and independent (Triandis, 1995). Vertical collectivism (VC) is where people see themselves as unequal to each other, but interdependent. Vertical collectivists submit to group norms and authority, put the needs of the group above their own and may be more competitive against other groups than horizontal collectivists (Triandis et al., 1998). Horizontal collectivists (HC) see themselves as equal and interdependent, and value the social unity of their group, rather than subordination to the group (Triandis, 1995). It is possible that any individual can exhibit any of these four patterns at any time, and that people view all four of these cognitions (VI, HI, VC, HC) depending on the scenario (Singelis et al., 1995; Triandis, 1995). Earley and Gibson (1998) argued that this four factor model overcomplicates IND and COL and does not add to their conceptualisation. However there is good evidence for the validity of this model (Alavi & McCormick, 2004; Shavitt, Lalwani, Zhang, & Torelli, 2006; Shavitt, Torelli, & Riemer, 2011; Singelis et al., 1995; Triandis, 1995; Triandis & Gelfand, 1998).

Singelis et al. (1995) and Triandis and Gelfand (1998) demonstrated the validity of the four contructs of VI, HI, VC, and HC, arguing that it is the most parsimonious model to explain IND and COL. They argued that these four constructs overlap, are consistent with many other concepts of IND and COL, and are superior to other conceptualisations (Singelis et al., 1995; Triandis & Gelfand, 1998). For example, Singelis et al. (1995) measured IND and COL using a wide range of items from previous research and included new items, in a USA sample of 267 university students comprised of a range of different ethnic cultures. They used confirmatory factor analysis and found evidence for using this four factor model over other models (Singelis et al., 1995). Singelis et al. (1995) found the distiction between vertical and horizontal IND and COL to be advantageous, having better internal consistency in its measurement than for more specific and also more generic conceptualisations. Moreover, Singelis et al. (1995) found that VC and HC were significantly and positively correlated, and HI and VI were not. At the same time, the four factor model was superior to a three factor model with HC and VC collapsed into one construct (Singelis et al., 1995). The present study used the four-factor model of IND-COL, as it has been shown to be superior to other models, and is appropriate for use at the individual level.

Level of Analysis of IND-COL

The way in which IND and COL have been measured has not always matched the level of analysis in previous research. For example, Oyserman et al. (2002) found in a meta-analysis on IND-COL that only 87 of the 170 studies actually measured IND-COL, and of these, only 36 measured both IND and COL. The researchers who did not measure IND-COL equated particular cultures with collectivism (e.g. China), and other cultures with individualism (USA), and by simply including samples from both cultures, assumed that they had operationalised culture-level IND-COL (Oyserman et al., 2002). Many of the researchers who did measure IND-COL, assumed that IND-COL was uni-polar at the individual level, which contradicts Triandis et al's (1985) theory that individual-level IND and COL are orthogonal. Although individual-level and culture-level IND-COL could be linked, it is important not to extrapolate from one to the other, and to measure each level appropriately based on theory (Vijver et al., 2014). The present study measured orthogonal individual-level IND-COL with a measure appropriate for studying IND-COL at the individual level (Singelis et al., 1995; Triandis, 2001).

IND-COL and Performance

Similarly to team cohesion and collective efficacy, there is evidence of a positive relationship between collectivism and performance in a team context (Bell, 2007; Dierdorff et al., 2011; Earley, 1993; Eby & Dobbins, 1997; Jackson et al., 2006; Thomas, 1999). Furthermore, there is evidence to suggest that as individualism increases, team performance decreases (Earley, 1993; Gundlach et al., 2006). For example, Earley (1993) found that performance for people high on collectivism was greatest when they were lead to believe they were working with similar others, and performance for those high on individualism was greatest when working alone. Earley (1993) also found a weak mediating effect of group efficacy on this relationship in that collectivists felt more efficacious when lead to believe they were working within a group of similar others. These findings suggest that collectivists perform better and have greater efficacy in a group context than individualists. A major limitation was that participants did not interact at all with each other, true collective efficacy could not be measured, and the generalisability to real team interactions could be questioned. However, Bell (2007) concluded in a meta-analysis of studies looking at the effect of individual characteristics on team performance, that collectivism in a team context is likely to have a medium positive effect on team performance. Therefore, despite Earley’s (1993) methodological limitation, the finding of a positive relationship between collectivism and performance in a team context has generally been supported by other research.

Despite evidence from Bell (2007) that collective efficacy is likely to positively predict performance, there have been inconsistent findings, and inconsistencies in the level of analysis. For example, Eby and Dobbins (1997) found that team-level ‘collectivistic orientation’ did not directly predict performance, rather they found that team cooperation mediated a positive relationship between ‘collectivistic orientation and team performance. However, a limitation with Eby and Dobbins (1997) was that two separate multiple regression analyses were conducted: one at the individual-level, and another at the team-level. Eby and Dobbins (1997) stated that in order to evaluate the relationship between collectivism and team variables, analysis of collectivism at the group-level is necessary, which was not justified. The statement overlooks the need to ground the level of analysis in theory, and the relevance of multilevel analysis such as HLM which is ideal for such a situation. In contrast to Eby and Dobbins (1997), Jackson et al. (2006) analysed collectivism and performance at the individual-level, and found that individual-level collectivism directly predicted individual-level performance in interdependent groups of IT professionals. Jackson et al’s (2006) finding was consistent with Thomas (1999) who analysed both collectivism and participant-rated group effectiveness at the individual level, finding that those higher on collectivism rated their team as being more effective than those lower on collectivism. In another study, Dierdorff et al. (2011) found that aspects of team-level collectivism had different relationships with collective efficacy depending on the time in which performance was measured. For example, preference to being part of a group and concern for their group’s well-being positively predicted team performance measured at the beginning of the study, and cooperation mediated the relationships between aspects of collectivism and performance measured at the end of the study. Therefore, not only is the level of analysis likely to affect how collective efficacy and performance are found to interact, but the timing of the performance measure could affect the findings also. The present study focussed on addressing the level of analysis issue, analysing both individualism and collectivism at the level of the individual, and collective efficacy at the team-level in a multilevel analysis.

IND-COL, Team Cohesion, and Collective Efficacy

Despite there being several studies assessing the relationship between IND-COL and performance in a team context, there are very few publications to date which discuss the relationships between IND-COL and collectivism, IND-COL and collective efficacy, and none looking at their relationships together in one analysis. Therefore, further research is needed, and there is not much current information to base hypotheses about the relationships between IND and COL with team cohesion and collective efficacy.

IND-COL and Collective Efficacy.

There has been very little research on the relationship between IND-COL and collective efficacy. There are two relevant studies published to date which have attempted to investigate the relationship between collectivism and collective efficacy in a team context. Firstly, Gibson (1999) found some evidence that IND-COL could moderate the relationship between collective efficacy and performance in a study on nursing teams in both the USA and Indonesia. Using multiple regression, they found that when collectivism was high in a team, there was a significant and positive relationship between collective efficacy and performance. However, when team collectivism was low, there was no significant relationship between collective efficacy and team performance. In a similar study also with teams of nurses in the USA and

Indonesia, Gibson (2003) found that collectivism negatively predicted collective efficacy using multiple regression. This was inconsistent with their hypothesis that collectivism would positively predict collective efficacy. Their explanation for why this might have occurred was that collectivists wanted to set low expectations for their team so that they were achievable by all team members, and therefore they could 'save face' (Gibson, 2003). However, there were several limitations to both studies. For example, team sizes were relatively small (three to five nurses per team), which could have reduced the statistical power. Also, teams of nurses are potentially more likely to work independently, as opposed to a more structured and interdependent team. A major limitation in the five-item measure of collective efficacy was that teams were asked to respond to one survey, forcing a single team response. This contradicts Bandura's (1997) suggestion that collective efficacy should be measured in order to avoid bias through social influence. A further limitation was that collectivism was aggregated to the level of the team. Although this was statistically justified, it might not have been theoretically justified. Furthermore, only collectivism was measured, no insight could be offered to how individualism might relate to collective efficacy, and four-factor IND-COL was not considered. In conclusion, although these two studies offer a starting point, further research is needed to understand how individual-level individualism and collectivism relate to collective efficacy in a team context.

IND-COL and Team Cohesion.

There are also very few publications discussing the relationship between IND-COL and team cohesion. Wagner and Moch (1986) stated that although collectivism appears to be similar to team cohesion, cohesion is temporary and specific to relationships at any one time. Whereas collectivism is a more stable characteristic for which is the basis for an individual's way of relating to others (Wagner & Moch, 1986).

Wagner and Moch's (1986) evaluation of collectivism is consistent with the stable aspect, but ignores the context-specific component suggested by Triandis (1995). Kirkman and Shapiro (1997) found evidence that collectivistic people will be less resistant to being part of a work team, and attributed the finding to the idea that team cohesiveness requires people to value group welfare over and above their own. However, Kozub and Shapiro's (1997) link between collectivism and team cohesion was speculative and not based on empirical evidence. Thomas (1999) found that individual-level collectivism positively predicted nine aspects of participant-rated group effectiveness which included cohesion, offering some support for a positive relationship between individual-level collectivism and cohesion. However Thomas' (1999) analysis did not break down the relationships between collectivism and the nine different aspects of group effectiveness, and could not offer specific insight into the relationship between collectivism and team cohesion.

Workman (2001) proposed that both collectivistic and individualistic work groups can be equally as cohesive, with the only difference being the types of norms; whether they are predominantly collectivistic or individualistic. A limitation with this proposal is that it might apply to a work group context, but not to more structured teams in which working together towards a common goal is a key aspect such as an elite netball team. Furthermore, it does not specify different types of IND and COL. Triandis and Gelfand (1998) suggested that horizontal collectivism might enhance the social aspect of groups, and that vertical collectivists tend to be focused on performing better than other groups. Therefore, it could be argued that that there could be a link between HC and social cohesion, and between VC and task cohesion. However, there has not been empirical research to support this. In summary, it is not clear as to how IND-COL and cohesion relate to each other in a team-specific context, and further research is required.

The Present Study

Addressing Limitations of Previous Research.

Despite agreement in the literature that team cohesion, collective efficacy, and IND-COL are important team variables, there has not been research investigating how they relate to each other in a single analysis. Furthermore, it has been recognised that the unit of analysis is important to consider, given the hierarchical nature of teams. However, previous research has often failed to measure and analyse variables at the appropriate level. To address these gaps in the literature, multilevel analysis was used in the present study to analyse IND and COL as individual-level variables, and team performance, team cohesion and collective efficacy as team-level variables. Specifically, a four factor model of IND-COL was conceptualised, operationalised and analysed at the level of the individual, as appropriate according to theory and the context of the study (Triandis, 1995). At the same time, team cohesion, collective efficacy and team performance were conceptualised, operationalised, and analysed at the team-level, as this was appropriate according to theory and previous research (Gully, Devine, & Whitney, 1995; Moritz & Watson, 1998). The present study aimed to address theoretical and methodological limitations from past research on IND-COL within a team context. Furthermore, the present study aimed to explore the relationships between individual-level IND-COL, team performance, team cohesion, and collective efficacy in a multilevel analysis, which is missing from previous research (see Figure 1).

Aim and Hypotheses.

The aim of the present study was to investigate how the four constructs of IND-COL (VI, HI, VC, and HC) relate to team performance, team cohesion, and collective efficacy in a multilevel analysis. It was a field study, with participants from 16 teams of netball players competing in at national level for secondary school and under 19 and 23 age groups in New Zealand. The study was cross-sectional and questionnaire-based. HLM was utilised to test whether VI, HI, VC, and HC were player-level predictors of collective efficacy, whether performance and team cohesion were team-level predictors of collective efficacy, and whether there were any interaction effects between player-level and team-level predictors (see Figure 1). The use of HLM meant that player-level effects, team effects, and any cross-level interaction effects could be investigated simultaneously. It was hypothesised based on previous research that team cohesion and performance would positively predict collective efficacy (Kozub & McDonnell, 2000; Spink, 1990). Also, it was hypothesised that ATGT and GIT from the GEQ would positively predict collective efficacy, based on previous research which has found that task cohesion was a more consistent predictor of collective efficacy (Damato et al., 2011; Kozub & McDonnell, 2000; Paskevich et al., 1999; Wilkinson et al., 2011). Finally, it was hypothesised that collectivism (HC and VC) would positively predict collective efficacy, as was hypothesised by Gibson (2003). No predictions were offered for possible interaction effects, due to the lack of previous research.

Chapter 2: Method

Participants

The participants were 153 female elite netball players comprising 16 teams. The number of players which responded from each team ranged from 4-12 players per team. The average number of players in each team was approximately 11. Fifteen teams were from New Zealand and one team was visiting from Australia. Participants were aged 12-24, with only 18 players under the age of 16 (*M* = 17.46 years, *SD* = 1.93 years). All players competing at the New Zealand Age Group Championships U19 and U23 in Dunedin (July, 2014), and also the NZ Secondary School Netball Championships in Palmerston North (October, 2014) were invited to participate, in cooperation with Netball New Zealand. These are two major national tournaments for young women performing at the highest level of netball for their age group in New Zealand, and represent elite netball for these age groups. Participants took part voluntarily and were not compensated. There were 25 teams at the U19 and U23 Championships, and 17 teams at the NZ Secondary School Championships of which Netball New Zealand provided contact details for a total of 36 team managers. Of the 36 teams able to be contacted and formally invited, 16 teams participated; 8 from each tournament. The mean career length of playing netball prior to the tournaments was 9.78 years (*SD* = 1.49 years), ranging from 2.5 to 16 years.

Ethics

Ethical approval was obtained from the Massey University Human Ethics Committee. Team coaches and managers received copies of the information sheet (see Appendix A) to distribute to players at least one week before their tournament, and were encouraged to discuss and ask questions. Players under the age of 16 were given a parental consent form (see Appendix C) and an information sheet for parents (see Appendix D) so that parental consent could be given in advance. It was recommended to coaches that an alternative activity be arranged for players who did not wish to participate. Participants were given the opportunity to ask questions before being asked to sign a consent form (see Appendix B). Under 16 year olds were asked to sign for assent, and required a signature from their parent or guardian to participate. Consent forms and questionnaires were stored in a locked filing cabinet throughout the study. There was no identifying information on the questionnaires, which were kept separate to the consent forms.

Materials

This study employed a questionnaire based design. The pencil and paper questionnaire consisted of demographic questions (see Appendix E), and three different measures. The first measure was the Group Environment Questionnaire (GEQ) which is designed to measure team cohesion. The second measure was designed to assess individualism and collectivism. The third was a collective efficacy measure designed specifically for netball players.

Group Environment Questionnaire (GEQ).

Carron et al’s (1985) GEQ was used for assessing team cohesion (see Appendix F). This scale is designed to measure participants’ perceptions of team cohesion. It consists of 18 items and 4 subscales: Individual Attractions to Group-Task (ATGT, n = 4); Individual Attractions to Group-Social (ATGS, n = 5); Group Integration-Social (GIS, n = 4); and Group Integration-Task (GIT, n = 5). An example of an item from the ATGT subscale is “I’m not happy with the amount of playing time I get”. An example of an item from the ATGS subscale is “I do not enjoy being part of the social activities of this team”. An example of an item from the GIS subscale is “Members of our team would rather go out on their own than get together as a team”. An example of an item from the GIT subscale is “Our team is united in trying to reach its goals for performance”. Items were answered using a Likert scale from 1 (*strongly disagree*) to 9 (*strongly agree*). Twelve of the items are reverse-scored. Scores for each individual were obtained by calculating the means for the measure overall, and for each subscale. Team cohesion was operationalised as the mean scores on the overall GEQ scale. Several studies have advocated for the validity and four factor structure of the GEQ, justifying its use in the present study (Carron et al., 1998; Carron et al., 1985; Widmeyer et al., 1985).

Individualism and Collectivism Scale.

The individualism and collectivism scale (IND-COL scale) consisted of the 16 items with the greatest factor loadings in Table 2 of Triandis and Gelfand’s (1998) study of horizontal and vertical IND-COL (see Appendix G). Triandis and Gelfand’s (1998) factor loadings ranged from 0.40 to 0.68. Evaluations about the validity of measuring IND-COL using the 16 items from Triandis and Gelfand (1998) have overall been favourable. Bearden, Money, and Nevins (2006) found the 16 item scale to be reliable with a sample of participants in business or other professional occupations. Li and Aksoy (2006) found that a four factor structure using the 16 items was superior to one and two factors, with IND and COL as distinct constructs having two different dimensions underlying each. They found this to be true, both within and across different cultures. However, they found three of the 16 items to be problematic, and criticised whether there is a clear enough distinction between horizontal and vertical aspects of IND and COL based on the correlation matrix (Li & Aksoy, 2006). Sivadas, Bruvold and Nelson (2008) argued their version of the scale reduced to 14 items was superior. However, their findings have not been substantiated with further research. Regardless, Triandis and Gelfand’s (1998)16 items as a multidimensional measure of IND-COL has been shown to be a good operationalisation in comparison with other measures (Cozma, 2011). For example, Gyorkos et al. (2012) compared Triandis and Gelfand’s (1998) 16 items with the Auckland Individualism and Collectivism Scale (AICS). The AICS was developed based on five dimensions found through Oyserman et al.’s (2002) meta-analysis, whereas the 16 items from Triandis and Gelfand (1998) were developed based on theory and subsequently tested empirically (Gyorkos et al., 2012). Gyorkos et al. (2012) concluded that overall the 16 item scale from Triandis and Gelfand (1998) was superior to the AICS. One major difference was that the AICS measures behaviours, whereas the HVIC measures values and attitudes. It was argued that the measurement of behaviours is limited as they are less stable over time and in different contexts than values and attitudes (Gyorkos et al., 2012). Furthermore, the 16 item scale was more robust across cultures, had a stronger construct validity, and better model-fit. In summary, the 16 items from Triandis and Gelfand (1998) used as a multidimensional scale, is the best available measure for four factor IND-COL. However, the scale should still be treated with caution, using confirmatory factor analysis to confirm the factor structure in the data before conducting further analyses.

In the present study, the 16 items were answered using a Likert scale from 1 (*strongly disagree*) to 9 (*strongly agree*). However, the wordings of some items were adapted for the present study. The item “The well-being of my co-workers is important to me” from Triandis and Gelfand (1998) was changed to “The well-being of my team members is important to me.” Also, the item “When another person does better than I do, I get tense and aroused” was changed to “When another person does better than I do, I get tense.” The item “If a co-worker gets a prize, I would feel proud” was changed to “If a team member gets a prize, I would feel proud.” There were four items for each combination of vertical and horizontal individualism and collectivism, and the items were presented in randomised order. Participants were simply asked to “indicate your preference" and were not told that the scale was designed to measure individualism and collectivism. The four subscales were designed to produce a score for each of the four types of IND-COL: Horizontal individualism (HI, *n* = 4), vertical individualism (VI, *n* = 4), horizontal collectivism (HC, *n* = 4), and vertical collectivism (VC, *n* = 4). These four constructs were operationalised as the mean scores on each of their corresponding subscales. It was not designed to give an overall scale score.

Collective Efficacy Questionnaire.

The collective efficacy measure used in the present research was developed by Wilkinson, Fletcher, and Sachsenweger (2011) specifically for elite netball players (see Appendix H). It consists of six subscales: attack (e.g. "clear the centre pass successfully," *n* = 16); defence (e.g. "win an opposition centre pass," *n* = 14); motivation (e.g. "remain motivated after losing the previous game," *n* = 17); obstacles (e.g. "overcome dissatisfaction with a game loss," *n* = 17); communication (e.g. "successfully signal centre pass strategies during a game," *n* = 8); general (e.g. "set realistic performance goals, "*n* = 11). Participants were asked to rate each item on an 11 point Likert scale ranging from 0% = (*no confidence*) to 100% (*completely confident*). Only items from a reduced version developed after data collection were used in analyses, as it was shown to be superior to the original scale (Fletcher, Wilkinson, Dalgleish, & Gargulio, Revise & Resubmit). Collective efficacy was operationalised as mean scores on the reduced collective efficacy scale.

Team Performance.

Each team's performance was measured as the percentage of games won at their tournament. This was calculated as the percentage of games the team won from the total number of games the team played in their tournament. Teams each played between four and seven games within their tournament.

Procedure

The author contacted Netball New Zealand to ask permission to invite players competing in the New Zealand Age Group Championships U19 and U23 in Dunedin (July, 2014), and also the New Zealand Secondary School Netball Championships in Palmerston North (October, 2014) to participate the study. Netball New Zealand gave permission, and gave the author contact details of 36 team managers. Netball New Zealand also included information about the study in a newsletter for each tournament beforehand. The teams' coaches and managers were contacted by the author at least one week before their tournament commenced to invite their players to participate. They were also provided with information sheets and parental consent forms for under 16 year olds to get parental consent in advance. The author organised with coaches and team managers a suitable time to meet each team, or alternatively posted the questionnaires to teams to arrive approximately the day before their tournament. On the day of participation, netball players were each provided with an information sheet (see Appendix A), consent form (see Appendix B), and the questionnaire (Appendixes E, F, G, and H). Under 16 year olds were asked to sign for assent on the parental consent form.

Participation involved completing the questionnaire using a pen or pencil at some stage during the day before their tournament. The process took around 20 to 30 minutes for each participant. After signing the consent form, or signing for assent, participants were asked to work through the questionnaire independently. The researcher was not present while participants completed the questionnaires. Therefore, team coaches and managers were asked to make sure players completed the questionnaires independently.

In the first section of the questionnaire, participants were asked to provide information about the nature of their participation in their netball team (see Appendix E). In the second section, participants were asked to rate perceptions about their team in terms of their personal involvement, and their team in general, which was Carron et al's (1985) GEQ measure of cohesion. The third section asked participants to rate their preferences in how they relate to others in the IND-COL scale (see Appendix G). The fourth section asked participants to rate their feelings about their team's confidence in their abilities in the collective efficacy measure (see Appendix H).

Data Analysis

Firstly, descriptive statistics were calculated to show the general characteristics of players and teams. Secondly, confirmatory factor analyses were performed on the three scales to check their structure and whether the psychometric properties were adequate for use in further analysis. Items with standardised factor loadings less than .20 were removed, and reduced scales were used in subsequent analyses. Internal consistency reliability was also checked for the scales and subscales. Next, one-way analyses of variance (ANOVAs) were conducted to assess how much variance there was between teams and to provide the information necessary to calculate intraclass correlations. Intraclass correlations, also known as intraclass correlation coefficients (ICCs) were calculated for each variable to statistically justify whether they should be analysed at the team-level. ICCs can be used test for the level of homogeneity of scores within teams (Moritz & Watson, 1998; Paskevich et al., 1999). They can also be interpreted as an estimate of whether two team members are likely to respond more similarly than two players from different teams, and therefore assess whether there are team effects (Kenny et al., 1998; Paskevich et al., 1999). Furthermore, they can be thought of as the proportion of team-level variance in relation to the total variance (Hox, 2002). When a variable has an ICC which is positive, substantial, and statistically significant, it may be more appropriate to aggregate to the team-level rather than the individual-level (Kenny & Voie, 1985). ICCs were calculated for each scale and subscale using the following formula from Kenny and La Voie (1985), where MS_B is the mean square between groups, and MS_W is the mean square within groups, and n is the number of people in each group:

$$\frac{MS_B - MS_W}{MS_B + MS_W(n - 1)}$$

As the number of players in each team were not equal, the mean number of players across the 16 teams was used as n. Also, to test whether ICCs were statistically significant (significantly greater than zero), two tailed F tests were performed to the 0.05 significance level, using the following formula adapted from Kenny and La Voie (1985), where k is equal to the number of teams of size n:

$$F_{k-1,\ k(n-1)} = \frac{MS_B}{MS_W}$$

Statistical assumptions were checked with the reduced scales, and missing data was considered. Tests for normality, homoscedasticity, and linearity were performed. There was a small proportion of missing data which appeared to be random, and did not warrant any remedies. Some of the missing data appeared to be due to a participant missing a page of the questionnaire by accident for example. Also, there was a demographic question incorrectly answered by a few participants, where a qualitative rather than a quantitative answer was given. Missing data was automatically dealt with by the SPSS, AMOS, and HLM programmes utilised in the study.

Simple correlations were also performed at both the individual-level, and team-level to assess the general structure of relationships between variables. The results helped to confirm whether the proposed individual-level and team-level variables were linked to the outcome variables, and whether there was any value in performing further analyses. Finally, hierarchical linear modelling (HLM) was performed according to the steps outlined by Raudenbush and Bryk (2002).

Hierarchical linear modelling (HLM). HLM can be thought of as an extension to multiple regression, where the regression equation includes two or more levels of independent variables (Bickel, 2007). It can be used to evaluate main effects of the individual and team-level variables on an outcome variable, and also any cross level interactions between individual and team-level variables simultaneously (Raudenbush & Bryk, 2002). Unlike for repeated-measures ANOVAs, multilevel modelling such as HLM can deal with missing data, the non-independence of team members, and uneven numbers of people in each team (Kenny et al., 1998).

In the present study the hierarchical linear modelling was conducted using software called ‘HLM’ (version 6), produced by Scientific Software International. The estimation method employed was Maximum Likelihood. Also, all predictor variables were centred around the grand mean. This was a transformation of the data which allowed more useful interpretation of the intercepts and slopes, and also reduced the chances of problematic covariance between intercepts and slopes (Bickel, 2007). When predictor variables are transformed as a function of their grand mean, intercepts can be interpreted as the mean in the outcome variable given that all the predictor variables are at their mean value (Hox, 2002). In other words, the intercept could be interpreted as the mean outcome value for the average participant in the sample. The first step in performing HLM was to run a one-way ANOVA with random effects.

One-way ANOVA with random effects. This is an intercept-only model, or null model, where only the outcome variable of collective efficacy was being assessed. It was done to show how much variability in collective efficacy there was within and between teams, and provided similar information to the one-way ANOVA and ICC for the collective efficacy scale. It was also done to justify taking the model to the next step, and served as a benchmark in which to compare more complex models against. At the player-level, the equation was

$$Y_{\mathrm{ij}} = \beta_{0\mathrm{j}} + r_{\mathrm{ij}}$$

where Y is mean collective efficacy scores for each player (i) in each team (j), the intercept $\beta_{0\mathrm{j}}$ is the mean collective efficacy score for each team, and r_{ij} is the residual player level variance for each player in each team. At the team-level, the equation was

$$\beta_{0\mathrm{j}} = \gamma_{00} + u_{0\mathrm{j}}$$

where each team's mean collective efficacy score ($\beta_{0\mathrm{j}}$) is equal to the grand mean (γ_{00}) plus random error ($u_{0\mathrm{j}}$). When these two models are combined, the equation is

$$Y_{\mathrm{ij}} = \gamma_{00} + u_{0\mathrm{j}} + r_{\mathrm{ij}}$$

where the grand mean, γ_{00} is a fixed effect, and the team-level random error ($u_{0\mathrm{j}}$) and player level residual (r_{ij}) are both random effects.

An ICC for the outcome variable of collective efficacy was also calculated from this model, using the following formula from Raudenbush and Bryk (2002):

$$\hat{\rho} = \frac{\hat{\tau}_{00}}{\hat{\tau}_{00} + \hat{\sigma}^2}$$

where $\hat{\tau}_{00}$ is the variance in the team-level residual errors $u_{0\mathrm{j}}$, and $\hat{\sigma}^2$ is the variance in the player level residual errors r_{ij}.

Regression with means-as-outcomes. The second step was to run a model with the team-level variables included. This was done in a stepwise manner. This type of model was designed to test whether there was variance among teams in terms of the relationship between the team-level predictor variables of team performance and team cohesion with collective efficacy. Any team-level predictors that do not have statistically significant relationships with collective efficacy that vary across teams, are not justified to be included in the full HLM model. The team-level equation above was amended to

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\%\text{GamesWon}) + u_{0j}$$

where γ_{01} and γ_{02} are the effects of mean GEQ and 'percentage games won' on mean collective efficacy scores. Mean GEQ and 'percentage games won' were both centred around their grand mean so that the intercepts were more meaningful. Combining the player-level and team-level models, the equation is the following, where γ_{00}, γ_{01}, and γ_{02} are fixed effects, and u_{0j} and r_{ij} are random effects.

$$Y_{ij} = \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\%\text{GamesWon}) + u_{0j} + r_{ij}$$

with the fixed effects of γ_{00}, γ_{01}, and γ_{02}, and random effects of u_{0j} and r_{ij}.

Variance explained in collective efficacy between teams when including team-level variables in the model was also calculated with an adapted version of the formula from Raudenbush and Bryk (Raudenbush & Bryk, 2002):

$$\text{Proportion of variance explained in } \beta_{0j} = \frac{\hat{\tau}_{00}(random\ ANOVA) - \hat{\tau}_{00}(MEAN\ GEQ\ and\ \%GamesWon)}{\hat{\tau}_{00}(random\ ANOVA)}$$

where $\hat{\tau}_{00}$ is the variance in the team-level random errors u_{0j}.

A *conditional intraclass correlation*, which estimates the correlation between two players' collective efficacy scores within the same team when the team-level predictors are held constant, was calculated using the following formula from Raudenbush and Bryk (2002):

$$\hat{\rho} = \frac{\hat{\tau}_{00}}{\hat{\tau}_{00} + \hat{\sigma}^2}$$

where $\hat{\tau}_{00}$ is the variance in the team-level residual errors u_{0j}, and $\hat{\sigma}^2$ is the variance in the player level residual errors r_{ij}.

Random coefficient model. The third step was to perform a random-coefficient model, designed to test whether the relationship between player-level variables (HI, VI, HC, and VC) and collective efficacy varied among teams. The four IND-COL variables were centred around the grand means to make the interpretation more meaningful. The player-level model was

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\mathrm{HI}) + \beta_{2j}(\mathrm{VI}) + \beta_{3j}(\mathrm{HC}) + \beta_{4j}(\mathrm{VC}) + r_{ij}$$

where the intercept β_{0j} is the team mean outcome (due to the predictors being centred around team means). The slopes describing relationships between the player-level predictors and collective efficacy are β_{1j}, β_{2j}, β_{3j}, and β_{4j}. Also, r_{ij} is the residual variance when controlling for the four predictors. In the team-level model, the intercepts and slopes were further defined as

$$\beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + u_{3j}$$

$$\beta_{4j} = \gamma_{40} + u_{4j}$$

where the intercept γ_{00} is mean collective efficacy across teams, γ_{10} to γ_{40} are the mean regression slopes for each of the four player-level predictors across teams. Also, u_{0j} is the random error added to the intercept associated with each team, and u_{1j} to u_{4j} are the random errors added to the player-level predictor slopes for each team. Therefore, the combined model is

$$Y_{ij} = \gamma_{00} + u_{0j} + \gamma_{10} + u_{1j} + \gamma_{20} + u_{2j} + \gamma_{30} + u_{3j} + \gamma_{40} + u_{4j} + r_{ij}$$

The player level variables were added to the model in a stepwise manner, where variables were only retained if they varied significantly among teams.

The variance explained at the player level was calculated using an adapted version of the formula from Raudenbush and Bryk (Raudenbush & Bryk, 2002), which compared the random coefficient model with the random ANOVA

$$Proportion\ of\ variance\ explained\ at\ player\ level = \frac{\hat{\sigma}^2(random\ ANOVA) - \hat{\sigma}^2(Individualism\ and\ Collectivism}{\hat{\sigma}^2(random\ ANOVA)}$$

Intercepts- and slopes-as-outcomes model. The previous three steps helped to inform which variables should be included in the full hierarchical linear model. Only team-level variables which statistically significantly varied across teams in the random coefficient model were included in the intercepts- and slopes-as-outcomes model. With collective efficacy as the outcome variable, the team-level predictors were mean GEQ and 'percentage games won'. The player-level predictors which significantly varied among teams were HI, HC, and VC. Therefore, the player-level model was

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{HI}) + \beta_{2j}(\text{HC}) + \beta_{3j}(\text{VC}) + r_{ij}$$

where the intercept β_{0j} and slope β_{1j} are assumed to vary among teams (j=1…J). These terms are described as random coefficients. The team-level model was

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\text{\%GamesWon}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{MeanGEQ}) + \gamma_{12}(\text{\%GamesWon}) + u_{1j}$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{MeanGEQ}) + \gamma_{22}(\text{\%GamesWon}) + u_{2j}$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31}(\text{MeanGEQ}) + \gamma_{32}(\text{\%GamesWon}) + u_{3j}$$

where the regression coefficients γ apply to all teams because they are team-level variables, and are described as fixed coefficients. The residual between-teams variation in the β coefficients (u_{0j} and u_{1j}) have different values for each team, as indicated by the j subscript. The combined model was

$$Y_{ij} = \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\%\text{GamesWon}) + u_{0j} + \gamma_{10} + \gamma_{11}(\text{MeanGEQ}) + \gamma_{12}(\%\text{GamesWon}) + u_{1j} + \gamma_{20} + \gamma_{21}(\text{MeanGEQ}) + \gamma_{22}(\%\text{GamesWon}) + u_{2j} + \gamma_{30} + \gamma_{31}(\text{MeanGEQ}) + \gamma_{32}(\%\text{GamesWon}) + u_{3j} + r_{ij}$$

In HLM there are two options for specifying the residual variance for slopes (u_1, u_2, u_3): either specified as random (i.e. varied among teams) as in the above equation, or restricted to zero and therefore taken out of the regression equation (Raudenbush & Bryk, 2002). To work out which option is more appropriate, both models should be compared. If the more complex model where the slopes are considered as varying among teams does not have significantly better model fit than the simpler and more restricted model, then the simpler model should be used (Raudenbush & Bryk, 2002). This is determined by comparing model fit measures of 'deviance' with a chi square likelihood-ratio test. The team-level model without slope variance was

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\%\text{GamesWon}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{MeanGEQ}) + \gamma_{12}(\%\text{GamesWon})$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{MeanGEQ}) + \gamma_{22}(\%\text{GamesWon})$$

$$\beta_{3j} = \gamma_{30} + \gamma_{31}(\text{MeanGEQ}) + \gamma_{32}(\%\text{GamesWon})$$

Therefore, the combined simpler model was

$$Y_{ij} = \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\%\text{GamesWon}) + u_{0j} + \gamma_{10} + \gamma_{11}(\text{MeanGEQ}) +$$

γ_{12}(%GamesWon) + γ_{20} + γ_{21}(MeanGEQ) + γ_{22}(%GamesWon) + γ_{30} + γ_{31}(MeanGEQ) + γ_{32}(%GamesWon) + r_{ij}

The amount of variance in collective efficacy explained by controlling for the team-level variables was calculated by comparing the team mean variance components from the random coefficient model and the intercepts- and slopes-as-outcomes model. This was done using an adapted version of the formula from Raudenbush and Bryk (Raudenbush & Bryk, 2002)

$$\text{Proportion of variance explained in } \beta_{qj} = \frac{\hat{\tau}_{qq}(random\ regression) - \hat{\tau}_{qq}(fitted\ model)}{\hat{\tau}_{qq}(random\ regression)}$$

The HLM procedure described above was repeated with the GEQ subscales as team-level predictors of collective efficacy.

There are two key differences between a two-level HLM and a single-level multiple regression. Firstly, in HLM, the team-level variables are regressed against the player-level variables so that cross level effects between the two levels can be investigated. This can be done at the same time as looking for main effects between player-level variables and the outcome variable, and team-level variables and the outcome variable. Also, there are unique error terms for each of the player-level effects (r_{ij}) and each of the team-level effects (e.g. u_{1j}) (Raudenbush & Bryk, 2002).

Chapter 3: Results

Descriptive Statistics

On average, participants had been playing netball for 9.78 years, at their elite level for 2.51 years, and reported playing for 34.74 minutes per game shown in Table 1. Also, teams had been together for 14.33 months on average, ranging from less than one month to five years (see Table 1). Teams spent around three and a half hours per week practicing on average, with around 63% of the time spent on team skills, 33% on individual skills, and 38% on team building (see Table 1). They also spent around 22% of their time together in team meetings on average, and just under eight hours per week socialising together (see Table 1). Most of the participants in team 12 did not answer the socialising question as requested, and gave a qualitative answer rather than number of hours such as “a lot”, or “every day”. Only one player responded with a numerical value of 12 hours. Team nine was an outlier in the number of hours reported socialising per week at 35 hours. This team competed at the Secondary School age tournament. Therefore, this relatively large figure could potentially be explained by the players being friends in their daily socialisation at school, and could have included this time as team socialising.

Table 1
Means for Demographic Questions Answered by the 16 Teams

Team	No. of players responded	Age		Netball Playing (years)		Elite Level (years)		Time Together (months)	
		M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	8	18.13	0.83	11.38	1.85	2.50	1.20	10.25	11.42
2	4	21.50	1.00	11.75	2.36	3.00	1.73	12.75	13.00
3	12	18.75	1.06	11.42	0.79	3.50	1.57	2.00	1.21
4	12	18.17	0.58	10.67	3.17	3.08	2.27	7.08	8.34
5	10	18.20	1.14	9.60	2.01	2.40	1.07	2.60	0.84
6	8	17.25	0.46	7.50	1.07	1.63	0.91	5.00	7.69
7	11	21.09	2.07	13.27	2.90	2.09	1.04	14.18	9.96
8	10	18.00	0.67	10.00	1.63	3.45	1.71	5.69	7.49
9	12	16.00	1.61	9.33	1.61	2.75	1.66	27.00	19.90
10	7	16.29	0.76	8.86	2.12	2.57	1.27	22.43	13.71
11	12	16.42	0.90	7.92	2.87	2.50	1.58	23.00	21.72
12	7	17.00	0.82	9.57	1.81	1.57	0.61	16.86	11.81
13	9	16.56	0.73	9.06	2.77	2.56	1.33	28.33	17.18
14	7	16.57	1.27	7.67	0.82	1.57	1.27	11.57	9.05
15	12	15.67	1.23	9.00	1.41	2.25	1.14	20.50	16.42
16	12	15.67	1.23	9.00	1.48	1.73	1.01	12.40	9.35
Total	153	17.46	1.93	9.78	2.52	2.51	1.49	14.33	15.21

Table 1 continued.

Team	Playing Time (minutes)		Practice Time (hours)		Team Skills %		Individual Skills %	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	29.75	14.41	2.23	0.49	66.25	26.25	26.25	17.68
2	45.00	21.21	2.50	0.71	50.00	37.50	37.50	12.58
3	47.08	13.56	4.83	3.13	59.17	24.17	24.17	9.00
4	32.08	18.52	3.12	0.71	68.33	30.83	30.83	21.51
5	35.00	8.50	1.70	0.54	56.00	25.00	25.00	10.80
6	32.50	10.35	2.88	0.35	66.25	20.00	20.00	15.12
7	38.60	14.19	4.15	0.38	64.55	32.73	32.73	24.94
8	26.56	12.96	4.15	1.06	51.00	38.00	38.00	16.87
9	34.58	14.37	3.17	0.40	70.00	37.27	37.27	12.72
10	37.50	13.32	4.29	0.76	68.57	28.57	28.57	10.69
11	31.00	7.38	4.00	1.26	72.50	40.00	40.00	21.74
12	25.71	19.02	3.20	0.45	72.86	44.29	44.29	27.60
13	41.67	17.50	3.29	0.49	52.86	42.86	42.86	21.38
14	20.00	16.33	3.93	0.93	62.86	31.43	31.43	9.00
15	39.17	20.21	5.18	1.25	63.33	44.17	44.17	14.43
16	36.36	22.03	2.21	0.96	51.67	22.50	22.50	9.65
Total	34.74	16.21	3.51	1.50	62.65	32.60	32.60	17.89

Table 1 continued.

Team	Socialising (hours per week)		Team Meetings %		Team Building %	
	M	*SD*	*M*	*SD*	*M*	*SD*
1	1.80	0.45	10.00	20.70	35.00	30.24
2	3.33	1.53	20.00	10.00	22.50	18.93
3	3.50	2.46	10.00	7.39	35.00	23.16
4	5.92	4.31	7.5	17.12	57.50	37.69
5	1.30	1.25	11.00	9.94	23.00	10.59
6	2.75	1.16	2.50	4.63	17.50	10.35
7	2.75	1.16	21.82	23.16	35.45	22.52
8	2.56	1.81	17.00	22.14	51.00	25.58
9	35.46	11.82	40.00	24.49	35.83	24.29
10	3.00	3.16	22.86	11.13	32.86	13.80
11	4.22	2.59	30.83	20.65	40.00	22.16
12	12.00		25.71	25.07	68.57	15.74
13	9.75	6.34	25.71	29.36	30.00	10.00
14	4.86	2.19	14.23	9.76	25.71	12.72
15	9.50	6.44	50.83	11.65	50.00	20.89
16	10.63	11.73	23.64	20.63	29.17	11.65
Total	7.76	10.97	21.68	21.82	37.81	24.25

Table 2

GEQ Mean Scores for Total Sample and Individual Teams

Team	Overall GEQ		ATGS		ATGT		GIS		GIT	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	6.46	1.11	6.08	1.30	8.39	0.84	4.66	1.49	6.83	1.55
2	7.35	0.51	6.50	0.62	8.50	0.71	6.85	0.63	7.65	0.96
3	7.28	0.37	7.10	0.72	8.44	0.59	6.69	0.84	7.00	0.75
4	6.34	0.64	6.52	1.20	8.00	1.16	5.78	0.65	5.28	1.29
5	5.43	1.04	5.62	1.42	6.23	1.57	3.89	0.86	5.89	1.02
6	6.04	1.04	5.81	1.34	7.50	1.42	3.75	1.14	6.84	1.09
7	6.88	0.96	6.20	1.40	7.84	0.92	6.05	0.95	7.45	1.05
8	6.30	0.62	6.12	1.47	6.48	1.53	5.63	0.83	6.88	0.83
9	7.55	0.34	8.20	0.76	8.88	0.43	5.70	1.12	7.32	0.54
10	7.05	0.65	7.11	0.97	8.21	0.70	5.46	1.10	7.31	1.12
11	7.61	0.65	7.67	1.05	8.42	0.94	6.60	1.24	7.69	1.17
12	6.92	1.04	6.91	1.03	7.64	0.97	5.79	1.67	7.26	1.35
13	6.51	0.86	6.48	1.15	7.40	1.79	5.26	1.02	6.94	0.51
14	5.63	0.74	6.20	0.40	6.64	1.66	4.54	1.05	5.11	1.24
15	7.44	0.79	7.48	1.34	8.50	0.76	6.12	0.99	7.60	0.94
16	7.42	0.96	7.13	0.97	8.29	1.32	6.25	1.82	7.96	0.96
Total	6.76	0.77	6.70	1.07	7.84	1.08	5.56	1.09	6.94	1.02

Note. ATGS = individual attractions to the group, ATGT = individual attractions to the group-task, GIS = group integration-social, GIT = group integration-task.

Overall, teams were generally cohesive (*M* = 6.76, *SD* = 0.77), shown in Table 2. Mean team cohesion scores ranged from 5.43 which was fairly neutral, to 7.55 which indicated moderately strong team cohesion (see Table 2). Also, teams tended to score highest on the ‘attraction to group- task’ (ATGT) subscale of the GEQ. Shown in Table 3, teams showed a high level of collective efficacy (*M* = 76.59, *SD* = 8.83), with team means ranging from 59.12 to 87.98. For IND-COL, teams on average scored close to five on the nine-point scale for both horizontal individualism (*M* = 4.98) and vertical individualism (*M* = 5.20); relatively neutral responses (see Table 4). However, teams overall scored relatively high on both horizontal collectivism (*M* = 7.76) and vertical collectivism (*M* = 6.96). As shown in Table 5, teams played between four and eight games each, and team performance ranged from 0% of games won for team five, to 85.7% for team one.

Table 3
Collective Efficacy Mean Scores for Overall Scale and Subscales

Team	Overall Collective Efficacy		Attack		Defence		Motivation	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	78.24	6.63	71.52	8.96	67.81	10.64	81.67	15.33
2	76.60	7.97	84.00	8.49	62.50	4.33	75.00	7.93
3	79.35	7.22	79.33	10.37	76.04	5.79	79.39	10.52
4	84.01	10.41	78.67	14.85	77.71	15.83	85.28	10.87
5	59.12	6.73	52.6	13.07	47.75	14.21	53.70	17.36
6	72.49	11.10	78.00	7.12	68.33	12.01	80.71	7.19
7	83.51	7.64	79.64	7.26	75.23	11.80	86.00	9.27
8	73.00	12.18	68.6	8.75	66.75	14.44	71.67	9.72
9	80.91	7.73	78.33	5.38	69.38	14.31	75.00	17.03
10	80.91	7.73	78.19	5.48	71.43	5.18	82.86	7.05
11	87.98	5.39	83.33	8.58	87.08	6.89	87.22	11.27
12	81.64	10.59	77.67	14.67	75.83	12.91	80.00	15.46
13	71.46	7.74	71.86	6.23	72.50	18.71	72.00	14.83
14	60.64	10.16	65.14	11.72	61.43	9.23	53.81	17.15
15	84.88	8.72	85.12	10.50	85.42	13.09	85.76	13.17
16	70.67	13.31	60.63	15.63	59.38	18.65	77.00	7.61
Total	76.59	8.83	74.52	13.49	71.16	15.82	77.51	15.35

Table 3 continued.

Team	Obstacles		Communication		General	
	M	*SD*	*M*	*SD*	*M*	*SD*
1	80.75	9.00	85.63	10.92	87.81	10.56
2	68.00	4.00	80.83	12.83	87.50	10.90
3	76.91	11.33	83.54	8.16	86.36	8.01
4	85.83	10.67	90.63	12.35	89.79	12.13
5	58.44	15.45	65.75	9.28	63.00	14.03
6	71.43	16.15	78.21	15.12	72.50	20.82
7	80.32	11.54	92.95	8.65	95.00	5.59
8	73.00	14.97	79.00	18.90	84.50	10.26
9	83.17	12.81	91.46	7.34	98.41	1.69
10	81.52	8.60	87.86	5.29	88.93	6.90
11	84.17	10.87	90.63	8.73	90.83	7.26
12	78.80	7.56	82.22	13.06	86.25	12.92
13	62.40	6.99	74.50	16.34	69.00	17.73
14	56.86	10.57	62.14	12.86	60.00	20.10
15	82.91	12.50	91.04	10.36	87.50	10.00
16	73.40	9.14	84.10	7.93	76.36	15.46
Total	76.39	14.04	83.82	13.66	83.83	15.49

Table 4
Mean Scores for IND-COL Scale Subscales

Team	Horizontal Individualism		Vertical Individualism		Horizontal Collectivism		Vertical Collectivism	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	5.00	1.27	5.30	0.98	7.22	1.50	6.97	1.25
2	4.71	0.70	5.56	0.66	7.88	1.30	7.44	1.26
3	4.81	1.17	4.94	0.84	7.38	0.78	6.06	0.78
4	4.96	1.15	5.48	1.34	7.98	0.86	6.75	1.42
5	4.82	0.93	4.83	0.98	7.48	1.08	6.54	1.42
6	6.09	1.38	4.46	0.78	8.03	0.66	7.22	0.56
7	5.00	1.63	6.14	0.69	7.66	0.96	6.80	1.09
8	5.63	0.91	5.05	1.20	7.83	1.11	7.33	1.61
9	5.97	1.4	6.04	2.02	8.25	0.74	8.35	0.90
10	5.18	1.4	5.75	0.91	7.86	0.66	7.18	0.79
11	4.46	1.45	5.17	0.88	7.98	0.55	7.25	0.87
12	5.46	0.83	4.92	1.40	7.96	1.28	6.50	2.44
13	4.50	1.27	5.24	1.31	8.09	0.74	6.98	1.31
14	4.36	0.69	4.54	0.93	6.93	1.37	6.61	0.85
15	4.63	1.33	6.05	1.03	7.42	1.46	6.81	1.16
16	4.02	1.23	3.78	1.01	8.21	0.63	6.50	0.96
Total	4.98	1.17	5.20	1.06	7.76	0.98	6.96	1.17

Table 5
Tournament Results for the Participating Teams from The U19 and U23 Age Group Championships and The New Zealand Secondary School Netball Championships

Team	Tournament	No. Games Won	No. Games Lost	No. of Games Drawn	Total No. of Games Played	% of Games Won
1	U19/U23	6	1		7	85.7
2	U19/U23	2	3		5	40.0
3	U19/U23	3	2		5	60.0
4	U19/U23	2	4		6	33.3
5	U19/U23	0	5		5	0
6	U19/U23	4	2		6	66.6
7	U19/U23	4	1		5	80.0
8	U19/U23	4	3		7	57.1
9	NZSS	4	3		7	57.1
10	NZSS	5	1	1	7	71.4
11	NZSS	3	1		4	75.0
12	NZSS	4	2		6	66.6
13	NZSS	4	2		4	66.6
14	NZSS	2	5		7	28.5
15	NZSS	3	3	1	7	42.8
16	NZSS	2	5		7	28.5

Note. U19/U23 = under 19 and under 23 age group; NZSS = New Zealand Secondary School

Confirmatory Factor Analysis

Confirmatory factor analyses were performed on the three measures (IND-COL, GEQ and collective efficacy), shown in Tables 7, 8, and 9. Two items were removed from the IND-COL scale as they had standardised factor loadings of less than 0.20. One item from the GEQ scale was also removed as it had a factor loading of less than 0.20. Goodness-of-fit statistics were reported for all three confirmatory factor analyses, shown in Table 6. These are designed to show how well the data fit the estimated model. The Chi-square (χ^2) represents the Likelihood Ratio Test statistic, and is calculated as "sample size minus 1, multiplied by the minimum fit function" (Byrne, 2010, p. 75). According to a very low probability that the data fits the estimated model, (p<0.001) the fit of the model is not adequate for any of the three scales. However, this test statistic is highly sensitive as it assumes that the model will be a perfect fit with the population. This is unrealistic in many cases of research practice, and without a large sample size in the present study, this result is not surprising (Byrne, 2010). The Comparative Fit Index (CFI) compares the research model with a baseline or null model whilst taking sample size into account, and values of >.95 represent a well-fitting model (Byrne, 2010). The three scales were below this value, but were not low. The root mean square error of approximation (RMSEA) is useful because corrects for sample size and model complexity and also gives a 90% confidence interval to help with assessing model fit (Byrne, 2010; Hair et al., 2009). According to MacCallum et al. (cited in Byrne, 2010), RMSEA values between 0.08 and 0.10 indicate an acceptable fit, with values greater than 0.10 indicating a poor fit. The GEQ had a value less than 0.10 and a confidence interval not containing 0.10, showing acceptable fit. However, the IND-COL and collective efficacy scales had confidence intervals containing 0.10, and collective efficacy in particular was on the cusp of statistically poor fit. On the other hand, the collective efficacy scale had the best Tucker-Lewis Index (TLI) of the three scales. The closer the TLI is to .95, the better the fit (Byrne, 2010). Therefore, results of further analyses should be considered with these fit indices in mind. The reduced versions of both scales were used in all further analysis. Overall, there was justification for using the reduced versions of the GEQ and IND-COL scales, and the collective efficacy scale.

Table 6

Fit Indices for Confirmatory Factor Analyses on the IND-COL Scale, GEQ, and Collective Efficacy Scale

Scale	*df*	χ^2	ρ	CFI	TLI	RMSEA with 90% CI
IND-COL	75	153.70	<.001	.81	.73	.064<.083<.102
GEQ	113	224.24	<.001	.81	.75	.065<.080<.096
Collective Efficacy	260	666.28	<.001	.87	.83	.092<.101<.111

Note. GEQ = Group Environment Questionnaire; IND-COL = individualism and collectivism; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval.

The reduced IND-COL scale, and reduced GEQ had adequate factor loadings overall, and the collective efficacy scale had good factor loadings (see Tables 7, 8, and 9). Some moderate to high correlations were found between factors for both the GEQ and collective efficacy scale. However, these were to be expected between subscales measuring the same construct, and there is still theoretical justification for considering the subscales in further analysis. In the IND-COL scale, the four subscales are not designed to measure the same construct. Rather, there are two types of individualism, and two types of collectivism. Therefore, no overall scale scores were analysed for the individualism and collectivism scale. In the present sample, it appears there was a high positive correlation between HC and VC (0.87), but no significant correlation between VI and HI (0.14).

Table 7

Results of Confirmatory Factor Analysis, Standardised Factor Loadings and Correlations for the Reduced Individualism and Collectivism Scale

Items	HI	VI	HC	VC
HI2	0.65			
HI3	0.79			
HI5	0.44			
VI6		0.45		
VI13		0.45		
VI15		0.54		
HC4			0.56	
HC9			0.51	
HC10			0.74	
HC11			0.79	
VC8				0.20
VC12				0.78
VC14				0.60
VC16				0.42

Factor correlation matrix for individualism and collectivism scale factors

Factor	HI	VI	HC	VC
HI	1.00			
VI	0.14	1.00		
HC			1.00	
VC			0.87	1.00

Note. Correlations are only presented for the covariances between the two individualism variables, and the two collectivism variables as appropriate according to the theory. HI = Horizontal Individualism; VI = Vertical Individualism; HC = Horizontal Collectivism; VC = Vertical Collectivism.

Table 8

Results of Confirmatory Factor Analysis, Showing Standardised Factor Loadings and Correlations for the Reduced GEQ

Items	ATGS	ATGT	GIS	GIT
GEQ9	0.55			
GEQ7	0.52			
GEQ5	0.23			
GEQ3	0.54			
GEQ1	0.30			
GEQ8		0.88		
GEQ6		0.53		
GEQ4		0.82		
GEQ17			0.42	
GEQ15			0.57	
GEQ13			0.41	
GEQ11			0.66	
GEQ18				0.34
GEQ16				0.60
GEQ14				0.35
GEQ12				0.69
GEQ10				0.68

Factor correlation matrix for GEQ factors

Factor	ATGS	ATGT	GIS	GIT
ATGS	1.00			
ATGT	0.78	1.00		
GIS	0.94	0.72	1.00	
GIT	0.58	0.74	0.79	1.00

Note. GEQ = Group Environment Questionnaire; ATGS = individual attractions to the group; ATGT = individual attractions to the group-task; GIS = group integration-social; GIT = group integration-task.

Table 9

Results of Confirmatory Factor Analysis, Standardised Factor Loadings and Correlations for the Collective Efficacy Scale

Items	Attack	Defence	Motivation	Obstacles	Communication	General
A1	0.69					
A2	0.90					
A3	0.84					
A5	0.73					
A7	0.81					
D2		0.68				
D6		0.91				
D7		0.87				
D8		0.86				
M1			0.72			
M2			0.89			
M3			0.85			
O1				0.69		
O8				0.70		
O9				0.90		
O10				0.83		
O13				0.71		
C3					0.81	
C5					0.75	
C6					0.94	
C7					0.89	
G1						0.77
G3						0.79
G4						0.88
G5						0.92

Factor correlation matrix for Collective Efficacy factors

Factor	A	D	M	O	C	G
A	1.00					
D	0.86	1.00				
M	0.76	0.72	1.00			
O	0.65	0.67	0.80	1.00		
C	0.64	0.66	0.82	0.75	1.00	
G	0.66	0.67	0.66	0.73	0.84	1.00

Note. A = Attack; D = Defence; M = Motivation; O = Obstacles; C = Communication; G = General.

Table 10
Internal Consistency Reliabilities for the Three Scales

Scale	Total/Subscale	Number of Items	Cronbach's Alpha α
Individualism and Collectivism (reduced scale)	Horizontal Individualism	3	0.65 (*n* = 148)
	Vertical Individualism	3	0.47(*n* = 144)
	Horizontal Collectivism	4	0.72 (*n* = 150)
	Vertical Collectivism	4	0.58 (*n* = 146)
GEQ (reduced scale)	ATGS	5	0.47
	ATGT	3	0.73
	GIS	4	0.59
	GIT	5	0.61
	Overall scale	18	0.82 (n = 135)
Collective Efficacy	Attack	5	0.89
	Defence	4	0.90
	Motivation	3	0.85
	Obstacles	5	0.88
	Communication	4	0.91
	General	4	0.91
	Overall Scale	25	0.96 (n = 118)

Note. GEQ = Group Environment Questionnaire; ATGS = Individual Attractions to the Group-Social; ATGT = Individual Attractions to the Group-Task; GIS = Group Integration-Social; GIT = Group Integration-Task.

Reliability Analysis

Cronbach's alphas for the scales and subscales are shown in Table 10. The overall GEQ scale had good internal consistency (α = 0.82). However, the GEQ subscales had poor to acceptable Cronbach's alpha values, ranging from 0.47 for the ATGS to 0.73 for the ATGT. The collective efficacy scale had excellent internal consistency for the overall scale (α = 0.96). There were also good Cronbach's alphas for the collective efficacy subscales, ranging from 0.85 to 0.91. From the IND-COL scale, the HC subscale had acceptable internal consistency (α = 0.65). However, the other three scales had questionable internal consistency. In particular, the VI had a

Cronbach's alpha of less than 0.50. All four subscales were still considered for further analysis but were treated with caution.

Table 11
One-Way Analysis of Variance and Intraclass Correlations for the Collective Efficacy Scale

Team-level Variables	Sum of Squares	*df*	Mean Square	*F*	Intraclass Correlation
Overall CE scale					
Between-group	11692.21	15	779.48	8.91**	.45
Within-group	11816.53	135	87.53		
Total	23508.73	150			
Attack					
Between-group	12037.26	15	21433.05	4.67**	.39
Within-group	14704.00	132	4589.63		
Total	26741.26	147			
Defence					
Between-group	15008.00	15	14712.35	5.22**	.35
Within-group	20803.41	128	2817.04		
Total	35811.41	143			
Motivation					
Between-group	13434.61	15	7749.32	5.39**	.33
Within-group	19323.71	124	1437.53		
Total	32758.31	139			
Obstacles					
Between-group	10488.23	15	16996.01	4.65**	.30
Within-group	16916.84	124	3649.62		
Total	27405.07	139			
Communication					
Between-group	10980.42	15	13274.59	3.24**	.34
Within-group	16066.47	130	4092.16		
Total	27046.88	145			
General					
Between-group	16272.10	15	17005.55	6.42**	.41
Within-group	17812.95	127	2650.72		
Total	34085.05	142			

Note. CE = collective efficacy.
***p* <.001

Analysis of Variance and ICCs

As shown in Tables 11 and 12, overall scales and subscales for both the collective efficacy scale and the GEQ had moderate and statistically significant ICCs.

They ranged from 0.30 to 0.45 in the collective efficacy scale, and 0.20 to 0.35 in the GEQ. Therefore, team aggregation of these measures, and treatment as team-level variables was justified. However as shown in Table 13, the IND-COL subscale ICCs were low, ranging from .03 to .12, of which two were not statistically significant. These results confirmed the intended design of the study indicating that the four IND-COL variables were operating at the player-level, and should be analysed at the player-level.

Table 12
One-Way Analysis of Variance and Intraclass Correlations for the GEQ

Team-level Variables	Sum of Squares	*df*	Mean Square	*F*	Intraclass Correlation
Overall GEQ Scale					
Between-group	82.62	15	5.51	7.21**	.25
Within-group	103.97	136	0.76		
Total	186.59	151			
ATGS					
Between-group	85.92	15	5.73	4.23**	.25
Within-group	184.00	136	1.35		
Total	269.92	151			
ATGT					
Between-group	127.29	15	8.49	6.18**	.35
Within-group	186.72	136	1.37		
Total	314.01	151			
GIS					
Between-group	133.54	15	8.90	6.12**	.20
Within-group	195.01	134	1.46		
Total	328.55	149			
GIT					
Between-group	69.43	15	4.63	3.73**	.39
Within-group	183.92	134	1.37		
Total	253.35	149			

Note. GEQ = Group Environment Questionnaire; ATGS = Individual Attractions to the Group-Social; ATGT = Individual Attractions to the Group-Task; GIS = Group Integration-Social; GIT = Group Integration-Task.
**p <.001

Table 13
Analysis of Variance and Intraclass Correlations for the IND-COL Subscales

Team-level Variables	Sum of Squares	*df*	Mean Square	*F*	Intraclass Correlation
HI					
Between-group	58.21	15	3.88	1.73	.07
Within-group	304.85	136	2.24		
Total	363.06	151			
VI					
Between-group	69.61	15	4.64	2.29*	.12
Within-group	275.39	136	2.03		
Total	345.00	151			
HC					
Between-group	18.09	15	1.21	1.30	.03
Within-group	125.75	136	0.93		
Total	143.84	151			
VC					
Between-group	41.75	15	2.78	2.06*	.10
Within-group	183.93	136	1.35		
Total	225.68	151			

Note. HI = Horizontal Individualism; VI = Vertical Individualism; HC = Horizontal Collectivism; VC = Vertical Collectivism.
*p<.05, **p <.001

Statistical Assumptions

Tests for normality, homoscedasticity, and linearity were conducted for all variables. As shown in Figures 2 to 8, the distributions largely resembled normal distributions. Statistical tests for normality were reported for each variable in Table 14. Most of the variables were statistically normal, or approached normality. Horizontal collectivism had a negatively skewed distribution with skewness of -1.12. Also, both statistical tests for normality results for HC suggested it did not follow a normal distribution. However, graphically in the normal probability plot in Figure 6, the majority of the data does follow a normal distribution. Also, when the HC data were inversely transformed, the distribution was not improved. Therefore, the data most closely resembled a normal distribution without transformation, and were left as they were. Furthermore, this skewness could be explained by the trend that the sample tended to rate highly on HC overall.

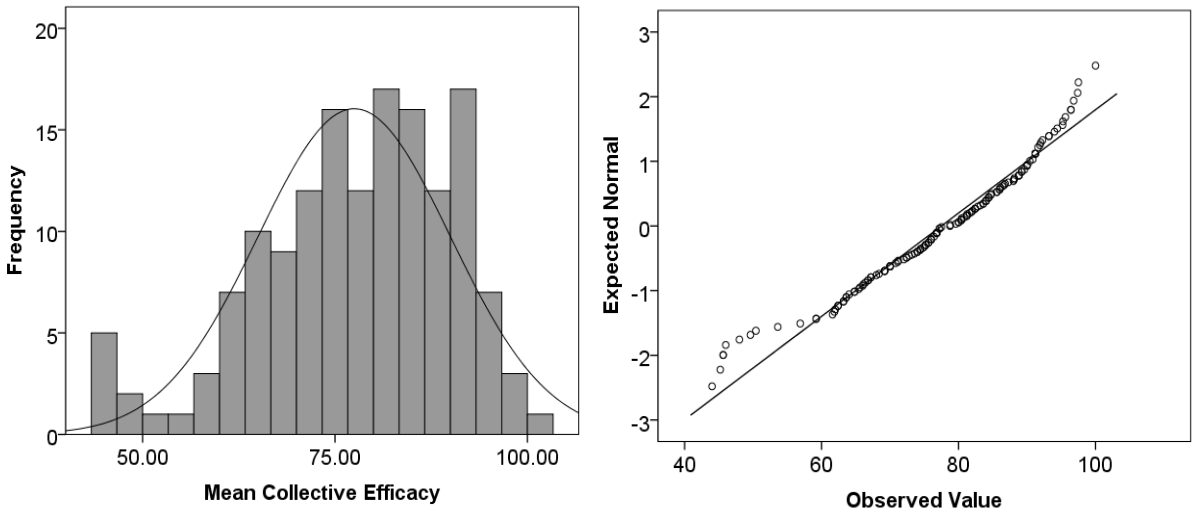

Figure 2. Normal probability plot and corresponding histogram showing the extent to which the collective efficacy data resembles a normal distribution.

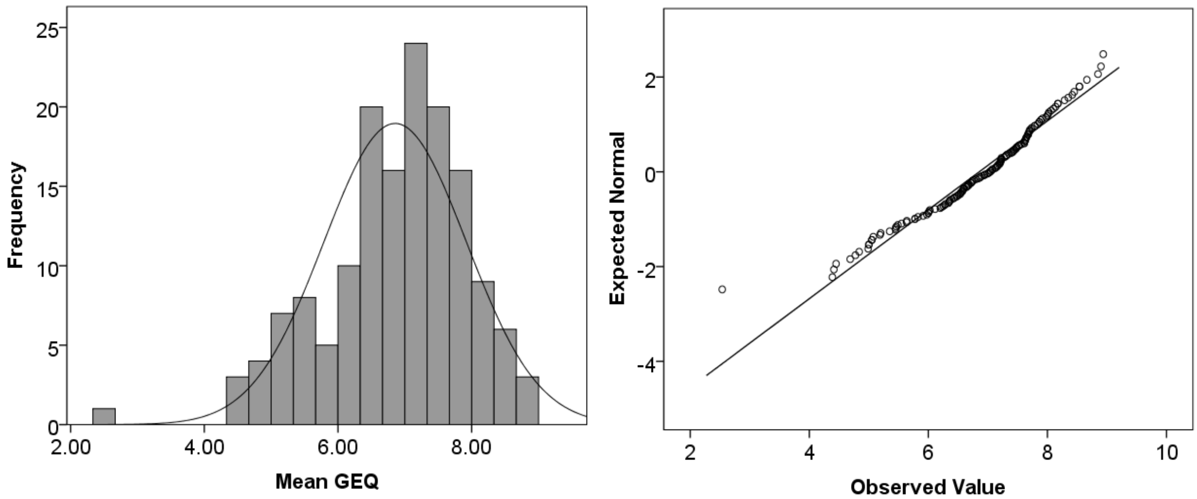

Figure 3. Normal probability plot and corresponding histogram showing the extent to which the GEQ data resembles a normal distribution.

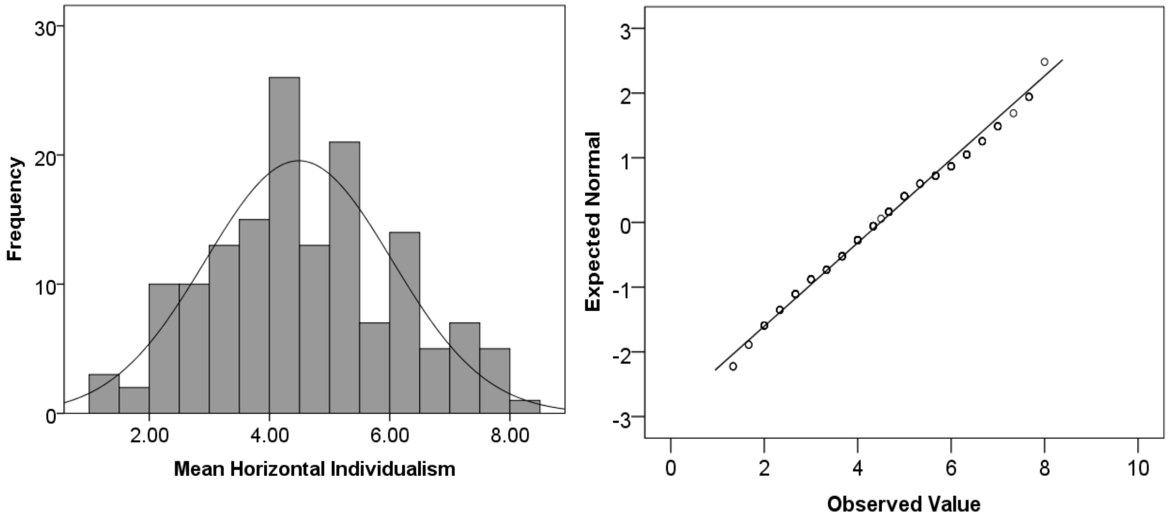

Figure 4. Normal probability plot and corresponding histogram showing the extent to which the horizontal individualism data resembles a normal distribution.

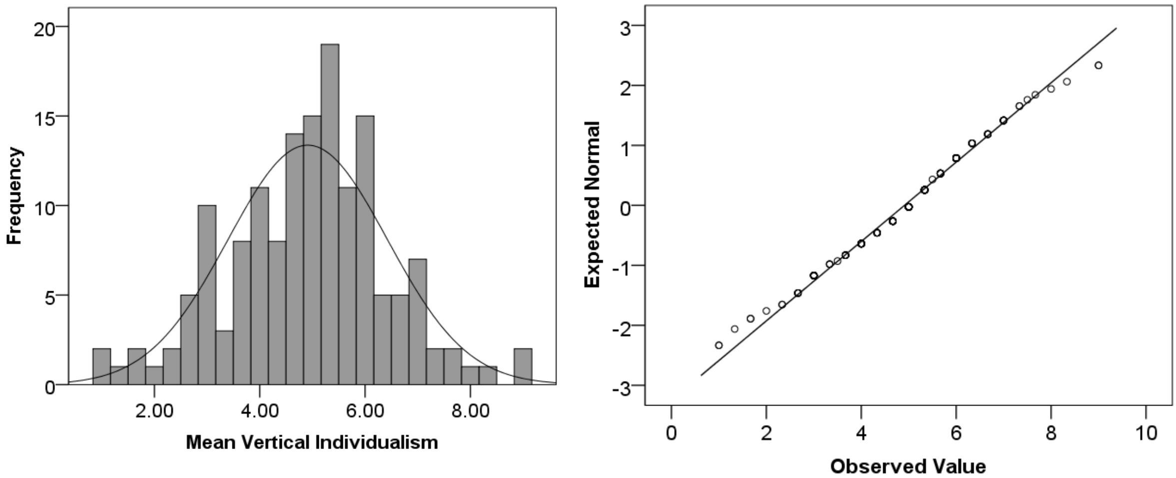

Figure 5. Normal probability plot and corresponding histogram showing the extent to which the vertical individualism data resembles a normal distribution.

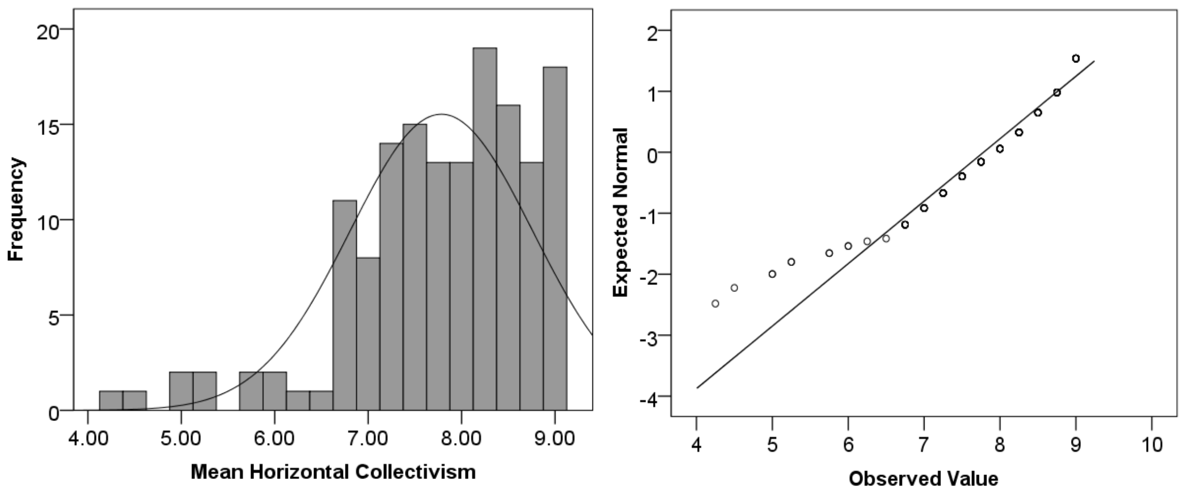

Figure 6. Normal probability plot and corresponding histogram showing the extent to which the horizontal collectivism data resembles a normal distribution.

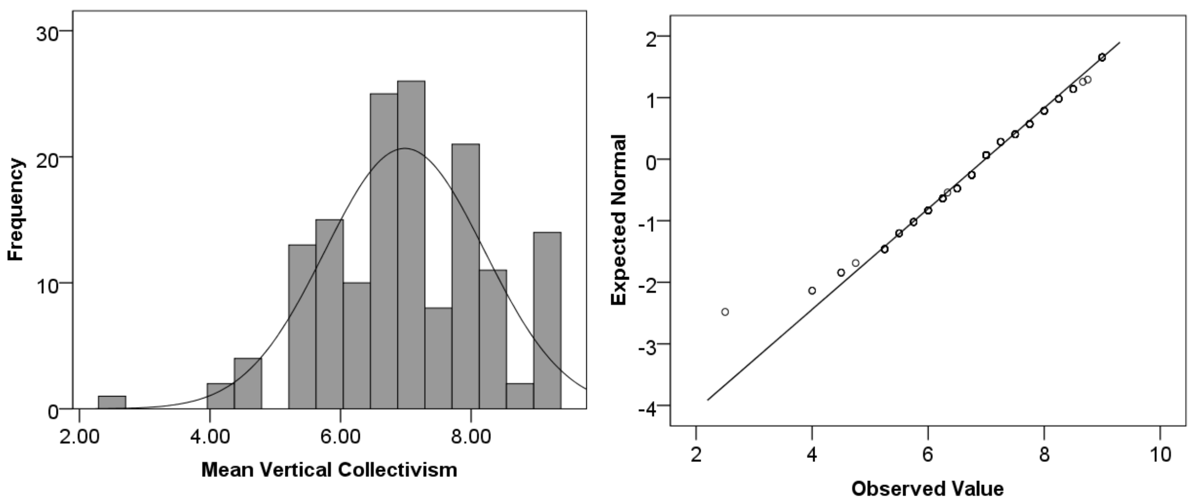

Figure 7. Normal probability plot and corresponding histogram showing the extent to which the vertical collectivism data resembles a normal distribution.

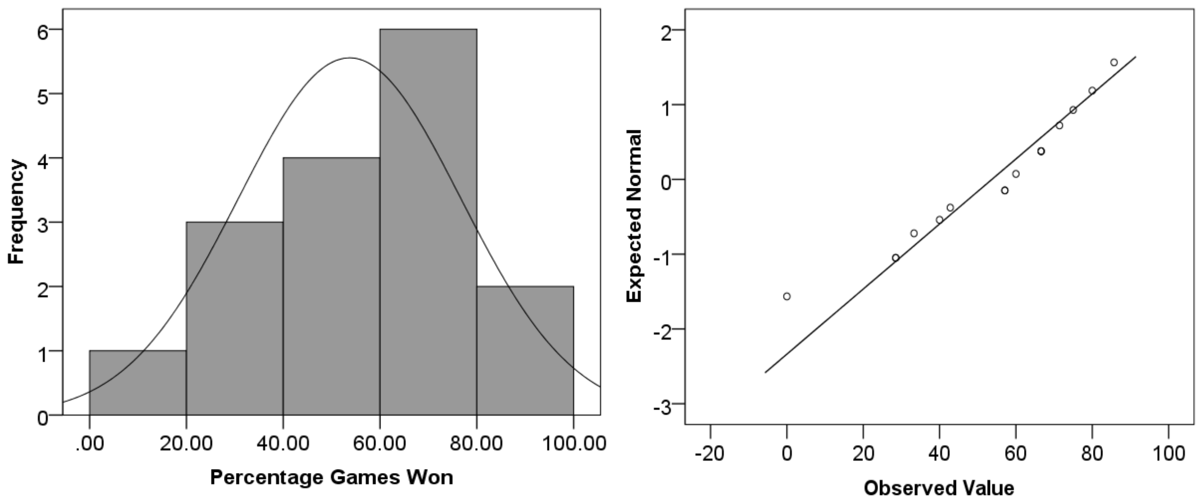

Figure 8. Normal probability plot and corresponding histogram showing the extent to which the team performance data resembles a normal distribution.

Table 14
Statistical Tests for Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
Variables	Statistic	*df*	Significance	Statistic	*df*	Significance
Collective Efficacy	0.063	151	.200	.963	151	.000
GEQ	0.074	152	.042	.965	152	.001
Horizontal Individualism	0.081	152	.016	.982	152	.050
Vertical Individualism	.087	152	.007	.988	152	.194
Horizontal Collectivism	.118	152	.000	.911	152	.000
Vertical Collectivism	.089	152	.005	.970	152	.002
‘percentage games won’	.184	16	.151	.939	16	.337

Note. GEQ = Group Environment Questionnaire.

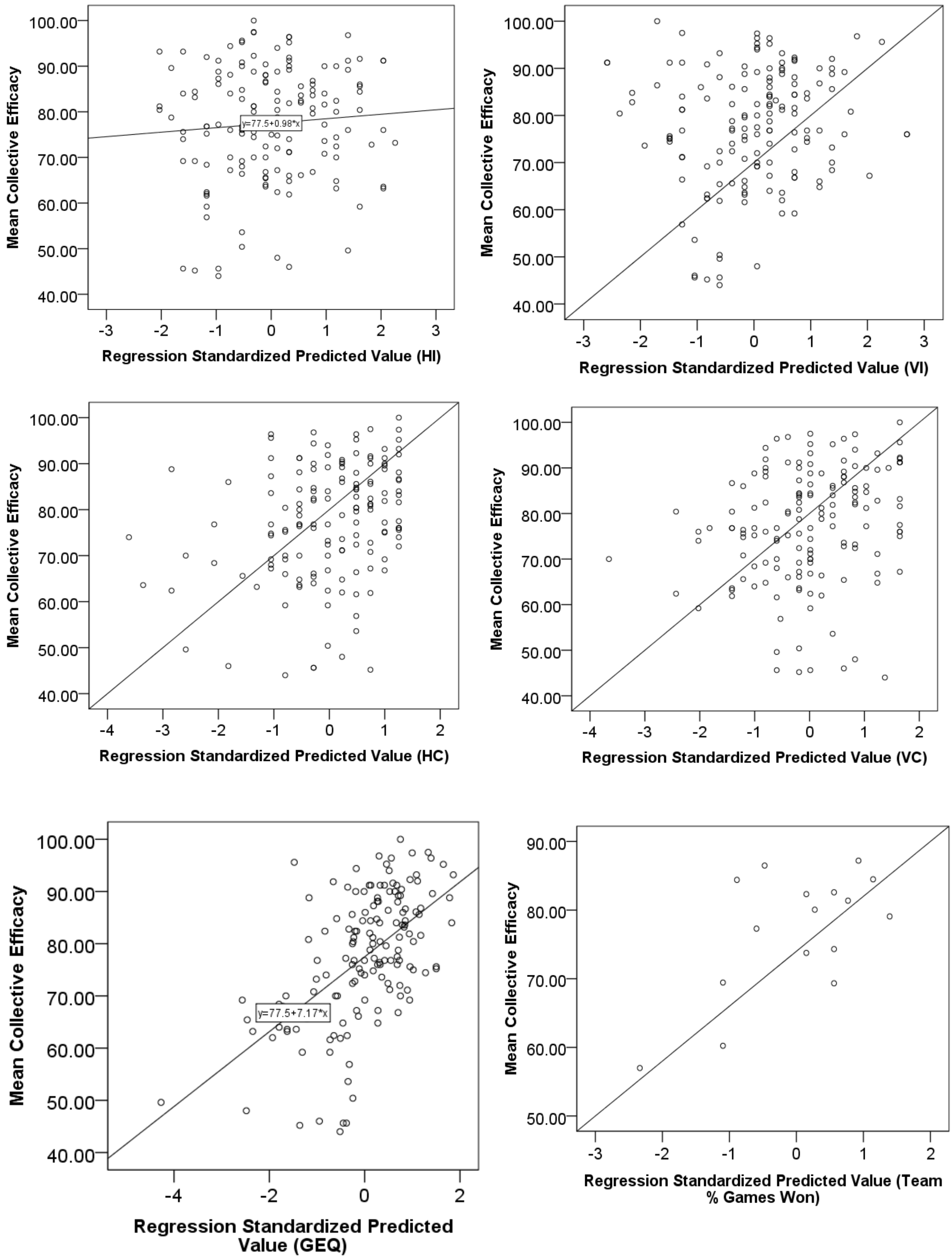

Figure 9. Scatterplots to test for homoscedasticity and linearity between predictor variables and collective efficacy as the outcome variable. HI = horizontal individualism; VI = vertical individualism; HC = horizontal collectivism; VC = vertical collectivism; GEQ = Group Environment Questionnaire.

The predictor variables were plotted against collective efficacy to test for homoscedasticity and linearity (see Figure 9). Although some of the bivariate relationships were stronger than others, none of them appeared to violate either the linearity or homoscedasticity assumptions.

Simple Correlations

Simple correlations were performed between variables at both the player and team-levels, shown in Tables 15 and 16. Both horizontal and vertical collectivism had a significant and positive correlation with mean collective efficacy scores. This indicates that higher ratings of collective efficacy were associated with higher ratings of both types of collectivism in the sample. There were no significant correlations between either horizontal or vertical individualism and collective efficacy. There was a significant positive correlation between horizontal and vertical collectivism, consistent with the results of the confirmatory factor analysis. This indicates a moderate relationship between both collectivism variables. There was also a significant and positive correlation between vertical collectivism and horizontal individualism, although small. As shown in Table 15, team-level variables of mean GEQ and ‘percentage games won’ had positive and significant correlations with mean collective efficacy. These results justify investigating HC and VC in particular as player level predictors of both collective efficacy and GEQ. Also, investigating ‘percentage games won’ and GEQ as team-level predictors of collective efficacy, and collective efficacy as a team-level predictor of GEQ was justified. Also, multicollinearity between predictor variables was less than .70, and therefore the multicollinearity assumption was not violated.

Table 15

Simple Correlations Between Player Level Variables and the Two Outcome Variables of Collective Efficacy and GEQ

	HI	VI	HC	VC	CE	GEQ
HI	1.00					
VI	0.14	1.00				
HC	0.28	-0.08	1.00			
VC	0.17*	0.06	0.50*	1.00		
CE	0.08	0.09	0.28**	0.24**	1.00	
GEQ	-0.14	-0.94	0.42**	0.22**	0.57**	1.00

Note. HI = horizontal individualism; VI = vertical individualism; HC = horizontal collectivism; VC = vertical collectivism; CE = collective efficacy GEQ = Group Environment Questionnaire.
**p*<.05, ***p* <.001

Table 16

Simple Correlations Between Team-level Variables

	Mean GEQ Reduced	% Games Won	Mean Collective Efficacy
Mean GEQ reduced	1.00		
% Games Won	0.38	1.00	
Mean Collective Efficacy	0.80**	0.63**	1.00

Note. GEQ = Group Environment Questionnaire.
**p*<.05, ***p* <.001

HLM Analysis

One-way ANOVA with random effects. HLM was carried out according to recommendations from Raudenbush and Bryk (2002). As shown in Table 17, the estimate of the grand mean of collective efficacy scores across all players and teams was 76.78, with a standard error of 2.25. Also, the estimated variance of the player level residuals was 77.95, and the team-level residual variance was 69.32 for collective efficacy. Furthermore, the variation in team residual variance was statistically significant (p <.001), indicating that there was significant variation in collective efficacy across teams. A 95% confidence interval for the variation in team mean collective efficacy was calculated as

$$76.78 \ \pm 1.96(69.32)^{1/2} = (60.46, 93.10)$$

This result suggests that 95% of the team means in collective efficacy were between 60.25 and 93.55. These results show that there was as significant, and substantial amount of variation in team collective efficacy scores in the sample, and justified using hierarchical linear modelling with collective efficacy as the outcome variable.

An ICC value was calculated from this model for overall collective efficacy as

$$\frac{69.32}{69.32 + 77.95} = 0.47$$

This was consistent with the ICC for collective efficacy in Table 11, and indicates that around 47% of the total variance in mean collective efficacy scores was at the team-level. Also, a reliability estimate was obtained as 0.86, suggesting that sample team means were good indicators of true team means for collective efficacy.

Table 17

Results of One-Way Analysis of Variance with Random Effects for Collective Efficacy

Fixed Effect	Coefficient		*SE*	
Average Team Mean, γ_{00}	76.78		2.25	
Random Effect	Variance Component	*df*	Chi-Square	*p*
Team Mean, u_{0j}	69.32	15	127.60	.000
Player Level Effect, r_{ij}	77.95			

Regression with means-as-outcomes. Team-level variables were added in a stepwise manner, and both GEQ and ‘‘percentage games won’’ were kept in the model. As shown in Table 18, both variables had statistically significant and positive relationships with collective efficacy scores. This was consistent with the results of the simple correlations in Table 16. Also, as indicated by a non-significant *p* value (p >.05) in Table 19, when controlling for both GEQ and ‘percentage games won’, there was not significant variation in collective efficacy across teams remaining to be explained. The team residual variance of 5.57 in Table 19 was considerably smaller than in the one-way ANOVA with random effects (see Table 17). A 95% confidence interval for the range in team means for collective efficacy when controlling for GEQ and ‘percentage games won’ was calculated as

$$77.28 \pm 1.96(5.57)^{1/2} = (72.65, 81.91)$$

This confidence interval was substantially smaller than in the one-way ANOVA with random effects, indicating that when controlling for both GEQ and ‘percentage games won’, the model was greatly improved in that there was a reduction in variance for collective efficacy when these variables were taken into account.

The regression with means-as-outcomes model (with both GEQ and ‘percentage games won’ included) was compared with the null model to estimate how much the model improved when GEQ and ‘percentage games won’ were accounted for. In calculating the amount of variance explained in collective efficacy at the team-level whilst controlling for both mean GEQ and ‘percentage games won’,

$$\frac{69.32 - 5.57}{69.32} = 0.92$$

an estimated 92% of the true between-teams variance in collective efficacy scores was accounted for by mean GEQ scores and ‘percentage games won’. These results indicated that including both team-level variables in further HLM was justified.

A conditional intraclass correlation which is an estimation of the correlation between two players’ mean collective efficacy scores in the same team that have the same mean GEQ scores (and ‘percentage games won’) was calculated as

$$\frac{5.57}{5.57 + 78.06} = 0.07$$

This was smaller than the previous ICC of 0.45, showing that the between-teams variance in mean collective efficacy scores had reduced markedly when the effects of mean GEQ scores and ‘percentage games won’ had been accounted for.

Table 18
Results from the Means-as-Outcomes Model

Fixed Effect	Coefficient	*SE*	*t* Ratio	*p*
Model for Team Means				
INTERCEPT, γ_{00}	77.28	1.00		
Mean GEQ, γ_{01}	8.30	1.46	5.69	.000
% Games Won, γ_{02}	0.13	0.05	2.77	.016
Random Effect	Variance Component	*df*	Chi-square	*p*
Team Mean, u_{0j}	5.57	13	20.26	.089
Player Level Effect, r_{ij}	78.06			

Regression with means-as-outcomes with GEQ subscales as predictors. In order to investigate whether any of the individual GEQ subscales were team-level predictors, a regression with means-as-outcomes model was repeated with the four subscales in a stepwise manner. The only GEQ subscale kept in the model was ATGT, shown in Table 19. Also, ‘‘percentage games won’’ was not kept in the model as it was no longer a significant predictor of collective efficacy when ATGT was included.

A 95% confidence interval for the range in team means for collective efficacy when controlling for ATGT was calculated as

$$77.08 \pm 1.96(11.98)^{1/2} = (70.30, 83.86)$$

This confidence interval was slightly larger than the model where overall GEQ and ‘‘percentage games won’’ were included. However, it was still substantially smaller than in the one-way ANOVA with random effects, indicating that when controlling for ATGT on its own, the model was greatly improved in that there was a reduction in variance for collective efficacy when ATGT was taken into account. To estimate how much the model was improved, the amount of variance explained in collective efficacy at the team-level whilst controlling for ATGT was calculated as

$$\frac{69.32 - 11.98}{69.32} = 0.83$$

Therefore, an estimated 83% of the true between-teams variance in collective efficacy scores was accounted for by ATGT. Therefore, there was justification for taking the model further with only ATGT included as the team-level variable.

A conditional intraclass correlation which is an estimation of the correlation between two players’ mean collective efficacy scores in the same team that have the same ATGT scores was calculated as

$$\frac{11.98}{11.98 + 78.10} = 0.13$$

This was smaller than the previous ICC of 0.45, showing that the between-teams variance in mean collective efficacy scores had reduced markedly when the effects of ATGT scores had been accounted for.

Table 19
Results from the Means-as-Outcomes Model with GEQ subscales as predictors

Fixed Effect	Coefficient	*SE*	*t* Ratio	*p*
Model for Team Means				
INTERCEPT, γ_{00}	77.08	1.19		
Mean ATGT, γ_{01}	8.12	1.28	6.34	.000
Random Effect	Variance Component	*df*	Chi-Square	*p*
Team Mean, u_{0j}	11.98	14	31.34	.005
Player Level Effect, r_{ij}	78.10			

Random-coefficient model. When each IND-COL variable was added to the model in a stepwise manner, mean slopes for HI, VC, and HC all significantly varied among teams, and VI did not. Therefore, as shown in Table 20, these were the three player-level variables justified to be included in the full hierarchical linear model. Although the mean team slopes for the three variables were not statistically significant, they varied among teams. Therefore, the question which could still be answered in a full HLM was whether they varied among teams as a function of either of the team-level variables (GEQ or ‘percentage games won’). The statistically significant estimation of variance of the team mean collective efficacy was consistent with the results of the one-way ANOVA, showing there were significant differences between teams in terms of collective efficacy. Correlations between team effects showed that HC and HI had a relatively strong relationship. However, they both varied enough on their own to justify including them in further analysis as separate variables.

Table 20

Results from the Random-Coefficient Model

Fixed Effect	Coefficient	*SE*	*t* Ratio	*p*
Overall Mean CE score, γ_{00}	76.99	2.23		
Mean HI Slope, γ_{10}	0.18	0.61	0.29	.777
Mean HC Slope, γ_{11}	2.37	1.26	1.89	.078
Mean VC Slope, γ_{12}	0.96	1.10	0.87	.397
Random Effect	Variance Component	*df*	Chi-Square	*p*
Team Mean, u_{0j}	70.18	14	127.21	.000
HI Slope, u_{1j}	2.50	14	24.12	.044
HC Slope, u_{2j}	13.37	14	29.57	.009
VC Slope, u_{3j}	11.95	14	37.96	.001
Player Level Effect, r_{ij}	45.12			
Correlation Among Team Effects	Mean Collective Efficacy	HI	HC	
HI	0.183			
HC	-0.246	-0.820		
VC	0.939	0.503	-0.467	
Reliability of OLS Regression-Coefficient Estimates				
Mean Collective Efficacy	0.749			
HI	0.323			
HC	0.414			
VC	0.479			

Note. CE = collective efficacy; HI = horizontal individualism; HC = horizontal collectivism; VC = vertical collectivism.

The average team mean collective efficacy score given that HC was at its grand mean was 76.99, as shown in Table 19. This was very close to the grand mean shown in Table 18. A 95% confidence interval was calculated for the team means in collective efficacy as

$$76.99 \pm 1.96(70.18)^{1/2} = (60.57, 93.41)$$

This result was similar to the confidence interval for team means in collective efficacy in the one-way ANOVA. A 95% confidence interval was also calculated for the HI slope as

$$0.18 \pm 1.96(2.50)^{1/2} = (-2.92, 3.28)$$

The confidence interval for HC was calculated as

$$2.37 \pm 1.96(13.37)^{1/2} = (-4.80, 9.54)$$

The confidence interval for VC was

$$0.96 \pm 1.96(11.95)^{1/2} = (-5.82, 7.74)$$

Therefore, it is possible that some of the teams' regression slopes for the relationships between the three player level predictors and collective efficacy were negative, and some were positive.

Reliability estimates were also computed for how precise the estimations of the mean collective efficacy for teams, and mean slopes were, shown in Table 20. According to Raudenbush and Bryk (2002), the reliability for the estimation of the teams mean would have been affected by the sample size within each team, and the reliability of the slopes was a function of both the sample size and the variability of the player level variables within each team. The result of 0.749 shows that the player sample size within each team was adequate, as the reliability of estimating the team mean from the sample data was good. Also, there was sufficient power in the data to detect effects of team-level variables on collective efficacy. The reliabilities for the slopes were lower, which could be explained by relatively homogenous scores within teams. As the slopes reliabilities were lower, they had higher risk of type two error.

The variance explained in collective efficacy at the player level when HI, HC, and VC were included in the model was calculated as

$$\frac{77.95 - 45.12}{77.95} = 0.421$$

This result indicated that adding HI, HC, and VC to the model at the player level reduced the within-teams variance by 42.1%. In other words, HI, HC, and VC jointly accounted for approximately 42.1% of the player-level variance in collective efficacy scores. This suggests that there might be other player level factors that were not taken into account in the study which collective efficacy. Alternatively, the residual variance could have been made up of a large proportion of random error. Regardless, there was justification for taking the HLM model further with HI, HC, and VC as the player-level variables.

Intercepts- and slopes-as-outcomes model. This was the full hierarchical model with equation:

$$\begin{aligned} Y_{ij} = {} & \gamma_{00} + \gamma_{01}(\text{MeanGEQ}) + \gamma_{02}(\text{\%GamesWon}) + u_{0j} + \gamma_{10} \\ & + \gamma_{11}(\text{MeanGEQ}) + \gamma_{12}(\text{\%GamesWon}) + u_{1j} + \gamma_{20} + \gamma_{21}(\text{MeanGEQ}) \\ & + \gamma_{22}(\text{\%GamesWon}) + u_{2j} + \gamma_{30} + \gamma_{31}(\text{MeanGEQ}) \\ & + \gamma_{32}(\text{\%GamesWon}) + u_{3j} + r_{ij} \end{aligned}$$

It was performed to investigate why some teams had higher mean collective efficacy than others, and also whether the variation in the slopes were moderated by either GEQ or ‘‘percentage games won’’. Informed by the results from the previous steps in the HLM process, both mean GEQ and ‘percentage games won’ were included in the intercepts- and slopes-as-outcomes model as team-level variables, and HI, HC, and VC were included as player-level variables.

The simpler model where slope variances were removed was compared with the full model which specified them as random. The results were that the more complex model where slope variances were specified as random, had a significantly better fit than the simpler model (χ^2 = 17.65, *df* = 9, *p* = .039). Therefore, the results reported in Table 21 are from the more complex version of the model whereby slope variances have been specified as random. As shown in Table 21, on average, team cohesion was positively associated with collective efficacy. Also, on average, ‘percentage games won’ was positively associated with collective efficacy when controlling for team cohesion. Specifically, on average across teams, for every unit increase in GEQ, collective efficacy increased by 7.67, and for every unit increase in percentage of games won, collective efficacy increased by 0.15. Team cohesion moderated the relationship between vertical collectivism and collective efficacy. This was indicated by a statistically significant interaction effect between VC and GEQ. As the regression coefficient was positive, this indicates that as team cohesion increased, the relationship between VC and collective efficacy tended to become stronger, shown in Figure 10. The regression coefficient for the interaction between HC slope and GEQ was negative, and approached significance (p = .057). Therefore, if there was a true interaction effect between HC and GEQ, it was that as GEQ increased, the relationship between VC and GEQ became weaker, shown graphically in Figure 11.

The random effects section of Table 21 suggests that there was residual variation in team mean collective efficacy left unexplained after controlling for GEQ and ‘percentage games won’. This is indicated by a significant residual variance for team means, u_{0j}. The variance explained in the full model when controlling for mean GEQ and ‘percentage games won’ was 81.6%, shown in Table 22. Therefore, an estimated 81.6% of the variation in collective efficacy was explained by mean GEQ and ‘percentage games won’, and only a small proportion of variance in collective efficacy remained to be explained. Also, 65.8% of the variance in collective efficacy was explained by VC.

Table 21

Results from the Intercepts- and Slopes-as-Outcomes Model

Fixed Effects	Coefficient	*SE*	*t* Ratio	*p*
Model for Team Means				
Intercept, γ_{00}	77.54	1.17		
Mean GEQ, γ_{01}	7.67	1.75	4.38	.001
% Games Won, γ_{02}	0.15	0.06	2.61	.022
Model for HI slopes				
Intercept, γ_{10}	-0.15	0.59	-0.26	.803
Mean GEQ, γ_{11}	1.32	0.88	1.51	.156
% Games Won, γ_{12}	-0.02	0.03	-0.71	.491
Model for HC slopes				
Intercept, γ_{20}	2.00	1.13	1.77	.099
Mean GEQ, γ_{21}	-3.38	1.62	-2.08	.057
% Games Won, γ_{22}	0.08	0.05	1.42	.181
Model for VC slopes				
Intercept, γ_{30}	0.83	0.85	0.97	.350
Mean GEQ, γ_{31}	2.82	1.29	2.17	.049
% Games Won, γ_{32}	0.05	0.04	1.15	.272
Random Effects	Variance Component	*df*	Chi-square	*p*
Team mean, u_{0j}	12.88	12	31.07	.002
HI Slope, u_{1j}	2.03	12	16.50	.169
HC Slope, u_{2j}	9.00	12	23.12	.027
VC Slope, u_{3j}	4.09	12	22.60	.031
Level 1 effect, r_{1j}	46.87			

Note. GEQ = Group Environment Questionnaire; HI = horizontal individualism; HC = horizontal collectivism; VC = vertical collectivism

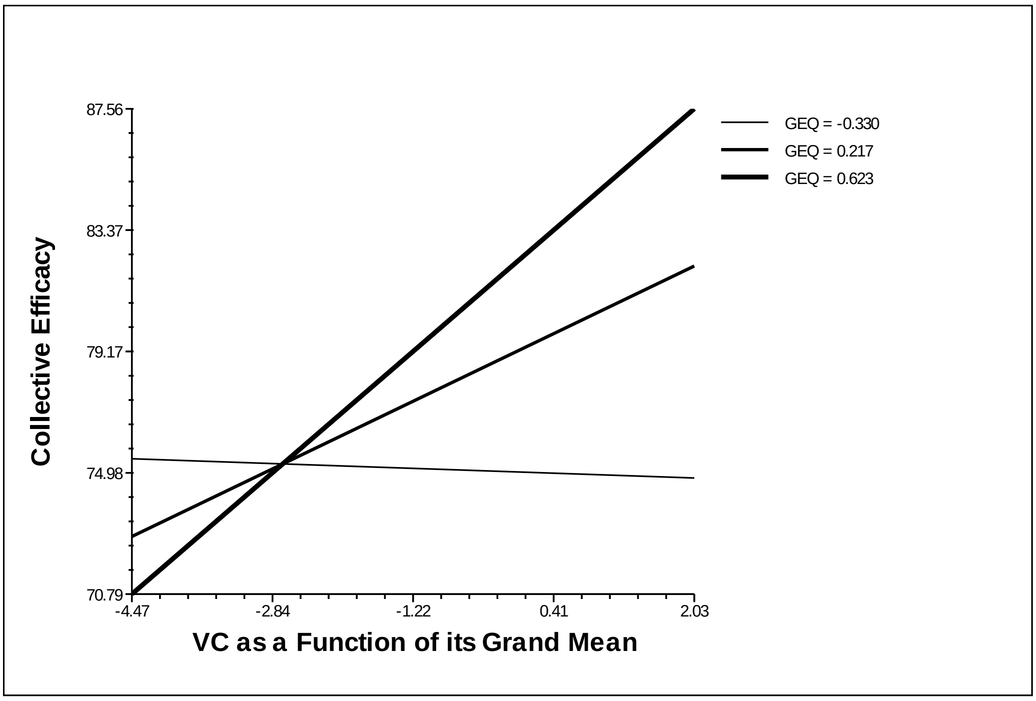

Figure 10. Line graph showing the Group Environment Questionnaire (GEQ) as a moderator of the relationship between vertical collectivism (VC) and collective efficacy. When the x-axis is at zero, this represents the grand mean for vertical collectivism. The vertical collectivism and collective efficacy slope has been graphed where GEQ is at its 25th, 50th, and 75th percentile.

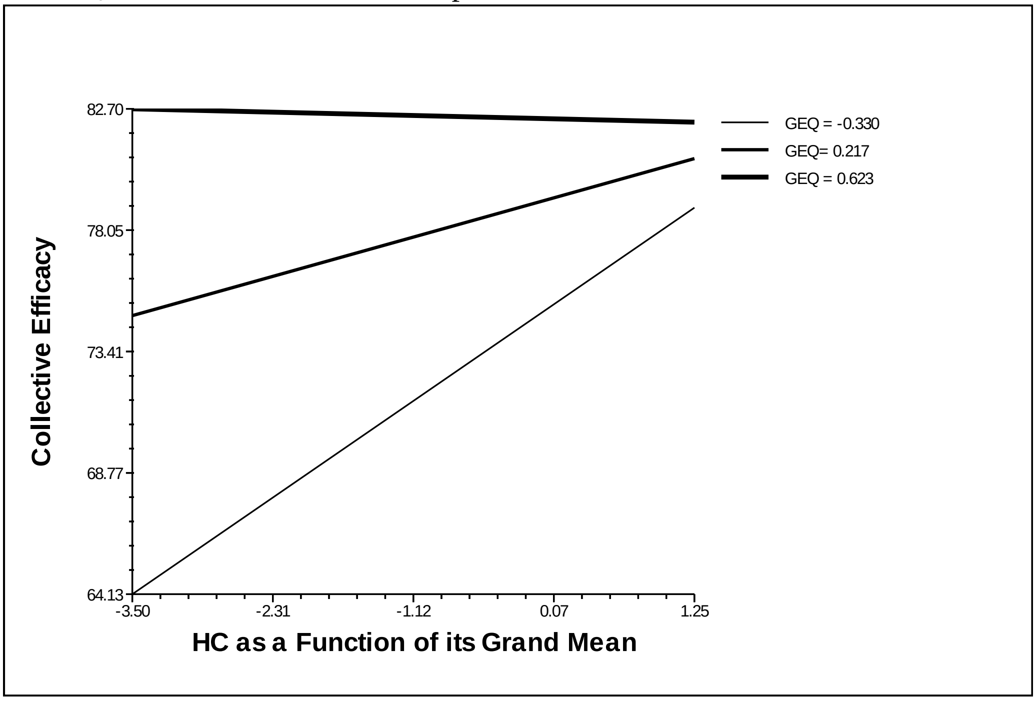

Figure 11. Line graph showing the Group Environment Questionnaire (GEQ) as a moderator of the relationship between horizontal collectivism (HC) and collective efficacy. When the x-axis is at zero, this represents the grand mean for horizontal collectivism. The horizontal collectivism and collective efficacy slope has been graphed where GEQ is at its 25th, 50th, and 75th percentile.

Table 22
Proportion of Variance Explained in the Full Hierarchical Linear Model (as a Percentage)

Model	Mean CE Var (β_{0j})	HI Var (β_{1j})	HC Var (β_{2j})	VC Var (β_{3j})
Random-Coefficient Model	70.18%	2.5	13.37	11.95
Intercepts- and Slopes-as-Outcomes Model	12.88	2.03	9.00	4.09
Percentage of Variance Explained in Intercepts- and Slopes-as-Outcomes Model	81.6	18.8	32.7	65.8

Note. CE = collective efficacy; HI = horizontal individualism; HC = horizontal collectivism; VC = vertical collectivism.

Intercepts- and slopes-as-outcomes model with ATGT as a predictor variable.

Informed by the results of the regression with means-as-outcomes model shown in Table 19, the only GEQ subscale justified for inclusion in the full HLM was ATGT, and ‘‘percentage games won’’ was not kept in the model. The more complex model where slope variances were specified as random, had a significantly better fit than the simpler model (χ^2 = 19.36, *df* = 9, *p* = .022). Therefore, the results reported in Table 23 are from the more complex version of the model whereby slope variances have been specified as random. As shown in Table 23, on average, collective efficacy increased by 8.03 for every unit increase in ‘attraction to the group-task’ cohesion (ATGT). Also, ATGT moderated the relationship between vertical collectivism and collective efficacy. Specifically, as ATGT increased, the relationship between VC and collective efficacy tended to become stronger, depicted in Figure 12.

Table 23

Results from the Intercepts- and Slopes-as-Outcomes Model with AGTG as the Team-Level Predictor

Fixed Effects	Coefficient	*SE*	*t* Ratio	*p*
Model for Team Means				
Intercept, γ_{00}	77.13	1.35		
Mean ATGT, γ_{01}	8.03	1.49	5.39	0.000
Model for HI slopes				
Intercept, γ_{10}	0.05	0.55	0.09	0.931
Mean ATGT, γ_{11}	1.20	0.63	1.91	0.076
Model for HC slopes				
Intercept, γ_{20}	2.48	1.22	2.03	0.061
Mean ATGT, γ_{21}	-1.28	1.28	-1.00	0.336
Model for VC slopes				
Intercept, γ_{30}	0.68	0.85	0.80	0.437
Mean ATGT, γ_{31}	2.96	0.95	3.10	0.008
Random Effects	Variance Component	*df*	Chi-square	*p*
Team mean, u_{0j}	20.43	13	48.62	.000
HI Slope, u_{1j}	1.49	13	17.26	.187
HC Slope, u_{2j}	12.24	13	28.06	.009
VC Slope, u_{3j}	4.18	13	23.30	.038
Level 1 effect, r_{1j}	45.06			

Note. HI = horizontal individualism; HC = horizontal collectivism; VC = vertical collectivism.

The random effects section of Table 23 suggests that there was residual variation in team mean collective efficacy left unexplained after controlling for ATGT. This is indicated by a significant residual variance for team means, u_{0j}. The predicted variance explained in the full model when controlling for ATGT was 70.89%, shown in Table 24. Therefore, around 71% of the variation in collective efficacy was explained by ATGT, and only a small proportion of variance in collective efficacy remained to be explained. However, this was less than when overall GEQ and ‘‘percentage games won’’ were included in the model. However, 65.02% of the variance in collective efficacy was explained by VC, which was very similar to the previous HLM.

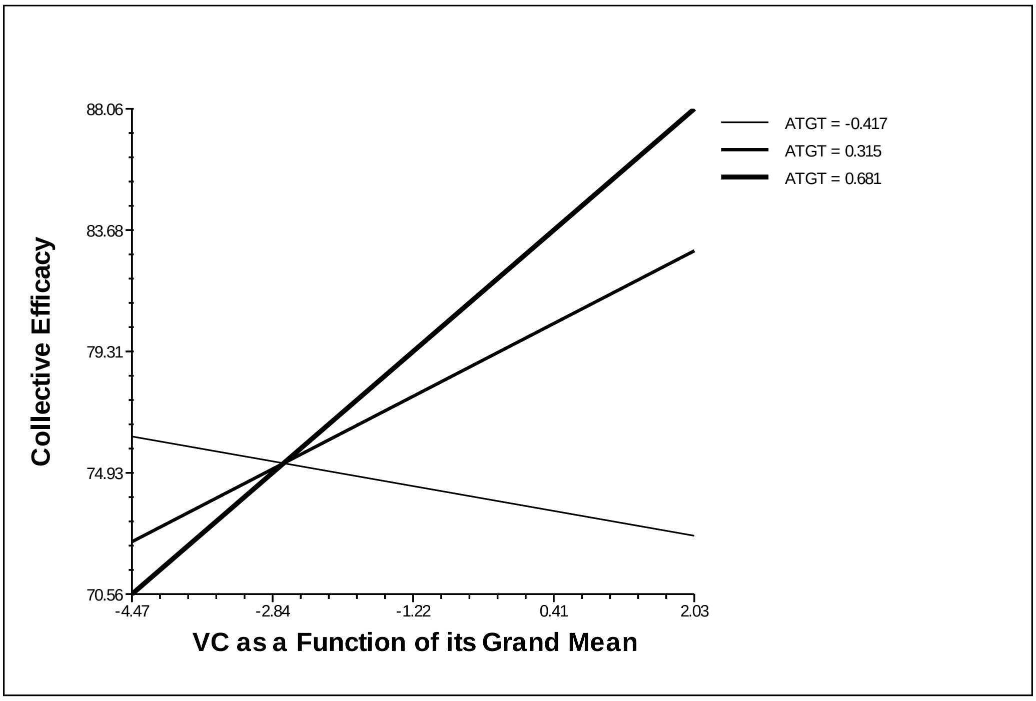

Figure 12. Line graph showing the ‘attraction to the group-task’ cohesion (ATGT) subscale as a moderator of the relationship between vertical collectivism (VC) and collective efficacy. When the x-axis is at zero, this represents the grand mean for vertical collectivism. The vertical collectivism and collective efficacy slope has been graphed where ATGT is at its 25th, 50th, and 75th percentile.

Table 24
Proportion of Variance Explained in the Full Hierarchical Linear Model with ATGT (as a Percentage)

Model	Mean CE Var (β_{0j})	HI Var (β_{1j})	HC Var (β_{2j})	VC Var (β_{3j})
Random-Coefficient Model	70.18	2.50	13.37	11.95
Intercepts- and Slopes-as-Outcomes Model	20.43	1.49	12.24	4.18
Percentage of Variance Explained in Intercepts- and Slopes-as-Outcomes Model	70.89	40.40	8.45	65.02

Note. CE = collective efficacy; HI = horizontal individualism; HC = horizontal collectivism; VC = vertical collectivism.

As a final check, the collective efficacy subscales were investigated as outcome variables one at a time. The models only got as far as the random-coefficient model as none of the player level variables had statistically significant relationships with any of the collective efficacy subscales.

To test whether assumptions in multilevel analysis were met, residuals were inspected for the full hierarchical linear models (see Appendix I). Assumptions of normality and linearity were both met. However, the assumption of homogeneity for player level HC residuals was violated in a chi square test ($\chi^2 = 41.13$, $df = 14$, $p = 0.000$), This could be due to the negative skewedness of the HC distribution shown in Figure 7 (Raudenbush & Bryk, 2002). According to Raudenbush and Bryk (2002), this would not necessarily affect estimation of the team-level coefficients, rather it would affect the specification of the player level model, and could have affected the model's ability to detect cross level interaction effects. Therefore, the main implication of this violation was that it could have lowered the chances of HLM having the power to detect cross level interactions.

Chapter 4: Discussion

The aim of the study was to investigate how vertical and horizontal individualism (VI and HI) and vertical and horizontal collectivism (VC and HC) relate to team performance, team cohesion, and collective efficacy in elite netball teams, using Hierarchical Linear Modelling (HLM). Overall, the 16 teams tended to be more collectivistic than individualistic, relatively high on collective efficacy, and generally cohesive. The average collective efficacy rating was similar to the finding in Allen, Jones, and Sheffield (2009) who found an average score of 7 on an 11 point Likert scale in competitive university sports teams. Also, the average team cohesion score was similar to Jowett and Chaundy (2004). The result that teams were relatively collective is supported by Kernan and Greenfield (2005) who showed that collectivism increased for high school girls when they joined a basketball team. It is possible that collectivists are more attracted to playing elite team sport such as netball, because according to Triandis (1995), collectivists value team goals over personal goals. Another possibility is that in the context of being in an elite netball team, players are more likely to be thinking in a collectivistic way, supported by Kernan and Greenfield (2005). Alternatively, there could be a combination of both, where people who tend to be more collectivistic regardless of context are drawn to team sport, and at the elite level team outcomes become even more important. This would be consistent with Triandis' (1995) proposal that individual-level individualism (IND) and collectivism (COL) have a component which is stable across contexts, and also a context-dependent component. Overall, it is possible that competitive sports teams would tend to be relatively collectivistic, cohesive and have positive collective efficacy beliefs.

Team cohesion and team performance were both positive team-level predictors of collective efficacy, when controlling for each other, consistent with the hypothesis and previous research (Bandura, 1997; Damato et al., 2011; Feltz & Lirgg, 1998; Gully et al., 2002; Heuze et al., 2006; Kozub & McDonnell, 2000; Paskevich et al., 1999; Spink, 1990; Watson et al., 2001; Wilkinson et al., 2011). The more cohesive netball teams were, the more confident they were in their ability to perform key tasks. Also, the larger the percentage of games a team won, the more likely they were to have had confidence in their abilities before the tournament. Team cohesion and performance accounted for an estimated 81.6% of the team-level variance in collective efficacy, indicating that these two variables are the main predictors of collective efficacy. The study could not provide information about causation or processes, but consistent with previous research these results suggest that elite netball teams' confidence in their ability is likely to be greater for teams with stronger cohesion and performance levels.

The finding that team cohesion moderated the relationship between VC and collective efficacy, was the first of its kind. As team cohesion increased, the relationship between VC and collective efficacy became stronger and was positive. At low levels of team cohesion, the relationship between VC collective efficacy was negative. There is not previous research to date which has tested for the same interaction effect. Gibson (1999) found that collectivism moderated the relationship between collective efficacy and performance. In the present study, performance was tested as a moderator of the relationship between collectivism and collective efficacy, but there was no significant interaction found. Most previous research has assessed team performance as an outcome of IND-COL, which was not done in the present study. The lack of an interaction between performance and IND-COL in the present study indicates that the relationship between IND-COL is likely to be more direct.

When the different types of cohesion were specified rather than overall cohesion, the 'attraction to the group-task' (ATGT) type of cohesion positively predicted collective efficacy, and none of the other three types of cohesion had significant relationships with collective efficacy. This finding was consistent with previous research that found task cohesion to be related to collective efficacy more consistently than social cohesion (Damato et al., 2011; Kozub & McDonnell, 2000; Paskevich et al., 1999; Wilkinson et al., 2011). Interestingly, when ATGT was the team level predictor rather than overall cohesion, performance no longer remained a significant predictor of collective efficacy. The variance in team-level collective efficacy explained by ATGT was estimated as 70.9%, which was less than when overall team cohesion and performance were the team-level predictors. The estimated percentage of player-level collective efficacy explained by VC was around 65% (in both HLMs), indicating that VC was an important player-level predictor of collective efficacy. Furthermore, ATGT moderated the relationship between VC and collective efficacy in a similar way to overall team cohesion. None of the other three types of cohesion had a moderating effect. The moderating effect of ATGT appeared to be slightly stronger than for overall team cohesion indicated by a larger coefficient, and graphically there appeared to be stronger relationships between VC and collective efficacy at low and high levels of ATGT (see Figures 10 and 12). These results suggest that ATGT on its own accounted for more variance in collective efficacy to the point that performance no longer accounted for a significant amount of variance, and had a larger effect on the VC-collective efficacy relationship. Therefore, the present study provided evidence to suggest that as the aspect of cohesion pertaining to team members' motivation to remain in the group with an orientation toward working together to achieve team goals (ATGT) moderates the relationship between vertical collectivism and collective efficacy.

The hypothesis that HC and VC would be positive predictors of collective efficacy was not supported. There was a strong correlation between HC and VC, but no significant correlation between VI and HI, consistent with previous research (Singelis et al., 1995; Triandis & Gelfand, 1998). However, although VC tended to positively predict collective efficacy as ATGT increased, there was no evidence of a direct relationship between any of the four IND-COL variables with collective efficacy. These results contradicted Gibson's (2003) finding that collectivism and collective efficacy had a negative relationship. However, the studies cannot be directly compared as the present study conceptualised, measured, and analysed collectivism at the individual-level, whereas Gibson (2003) measured and analysed collectivism at the team level. Results from the present study suggest that unless evaluated at different levels of ATGT cohesion, there was no effect of vertical collectivism on collective efficacy. Whereas, at high levels of ATGT: the more vertical collectivistic players were, the more confident they were in their team's ability. At low levels of ATGT: the more vertical collectivistic players were, the less confident they were in their team's ability. Furthermore, at moderate-to-low levels of ATGT: there was not a significant relationship between VC and collective efficacy. In terms of the direct relationship between ATGT and collective efficacy found, in a team which had members strongly motivated to remaining in the team who were focused on achieving team goals together (ATGT), the more likely they were to be confident in the team's abilities overall. When patterns of HI, HC, VI, and VC were also taken into account, the stronger the team's ATGT cohesion, the more vertically collectivistic players were, the more likely they were to be confident in their team's abilities. On the other hand, the more loose the team was in terms of ATGT, the more vertically collectivistic players were, the less confident they were in their team's ability. The finding that VC predicted collective efficacy as a function of ATGT as opposed to having a direct positive relationship did not support the hypothesis or previous research. However, the relationships between IND-COL, team cohesion, and collective efficacy had never been analysed in a multilevel model as was done in the present study, and the findings suggest that team cohesion is a moderator of the collectivism-collective efficacy relationship.

The finding that the ATGT type of cohesion moderated the relationship between VC and collective efficacy was a new finding. Hypotheses were not made about interactions between variables as there was no previous research to base them on. However, the finding could be supported by a discussion of the theory behind each concept. Vertical collectivists value being part of a team, value their team's goals over personal goals, and are competitive against other teams (Triandis, 1995; Triandis & Gelfand, 1998). In a team high on ATGT, team members are highly motivated to remain in the team with an orientation toward working interdependently with other team members towards team goals (Carron et al., 1985). Therefore, vertical collectivism as a personal value and ATGT as a group attribute are highly compatible with each other, sharing a focus on the desire to be part of the team and work together towards team goals. Furthermore, Triandis and Gelfand (1998) proposed that "The VC pattern can allow the in-group to produce more than the sum of its parts" (Triandis & Gelfand, 1998, p. 126). ATGT is likely to help a team to produce the same effect: achieving more than what the individual team members could achieve alone, as it is a type of task cohesion (Carron et al., 1985). Therefore, it is possible that increased ATGT would increase vertical collectivists' ability to contribute to the achievement of team tasks, and therefore the more confident vertical collectivists could feel about their team's ability. Conversely, if ATGT was low and team members were not motivated to remain in the team in order to work towards team goals, vertical collectivists in particular would feel uneasy because being part of a team and working towards team goals is an important value for them. Therefore, they would likely have low confidence in the team's ability to achieve team goals. Future research could help to substantiate the finding and these ideas, which offers a new idea about how collectivism might relate to collective efficacy as a function of ATGT.

Implications of the Findings

An implication for the findings of the present study is that it could influence team leaders in their prioritisation of interventions such as team building techniques. The level of ATGT type cohesion could affect how confident teams are in their ability, particularly with vertical collectivists in the team. Therefore, if team leaders were to neglect the ATGT aspect of cohesion their team's overall level of collective efficacy could suffer, and if they made sure to integrate team building which enhances ATGT, they could improve collective efficacy. Furthermore, the findings that elite netball teams had a relatively high number of vertical collectivists, and that ATGT moderated the relationship between vertical collectivism and collective efficacy, suggests the importance for building ATGT in elite sports teams. It has been suggested by Ryska, Yip, Cooley, and Ginn (1999) that coaches differ in the techniques they tend to use for team building in sport across different cultures. For example, they found that Australian coaches tended to more frequently use athlete integration team building techniques, and USA coaches more frequently used role development techniques (Ryska et al., 1999). Athlete integration techniques involve the coach learning about and accepting the unique characteristics of team members, helping them to gain their social needs from the team. On the other hand, in role integration techniques, the coach focuses on team members' responsibilities and contributions to achieving team goals (Ryska et al., 1999). Ryska et al. (1999) proposed that athlete integration techniques are more likely to improve social cohesion, and role development is more likely to build task cohesion. They also discussed the possibility that coach team building tendencies could differ according to the cultural dimension of individualism and collectivism (Ryska et al., 1999). However, they did not offer any suggestions of how IND and COL might affect coach styles or at which level of analysis, recommending that research was needed in this area. In the present study, there were 15 teams from New Zealand, and one team from Australia. Due to the geographic proximity to Australia, it is possible that New Zealanders share similar patterns in coaching techniques than the USA. Therefore, if New Zealand coaches had a tendency to more frequently focus on athlete integration team building, they could be tending to focus more on improving social cohesion rather than task cohesion, and missing out on opportunities for improving collective efficacy through increasing ATGT. With the results of the present study, and ideas about team building from Ryska et al. (1999), it could be argued that coaches in New Zealand should carefully consider the team building techniques they tend to focus on. Results from the present study and previous research suggest that building task cohesion could enhance collective efficacy overall (Damato et al., 2011; Kozub & McDonnell, 2000; Paskevich et al., 1999; Wilkinson et al., 2011. Furthermore, if a team has a high prevalence of vertical collectivists, and the effect of vertical collectivists having confidence in the team's ability is increased with greater ATGT, it could be advantageous for a team leader to focus on ATGT-specific team building techniques.

Strengths of the Study

A major strength of the present study was the use of HLM in addressing the unit of analysis issue in research on IND-COL in a team context. The only previous research which provided evidence about the relationship between IND-COL and collective efficacy used single level multiple regression (Gibson, 1999, 2003), aggregating collectivism to the team-level. Gibson's (2003) hypothesis that team-level collectivism would positively predict collective efficacy was not supported by their results, showing a negative relationship instead. It could be argued that it is more appropriate to conceptualise, measure, and analyse IND-COL as individual differences within teams. In the present study, analyses showed that the four IND-COL variables were operating as individual-level variables, having more variability within-teams than between-teams. On the other hand, team cohesion and collective efficacy were analysed at the team-level. This was supported by analyses showing that team cohesion and collective efficacy were operating as team-level variables, with more variability between-teams than within. With IND and COL analysed at the individual-level, collectivism was shown to positively predict collective efficacy as a function of ATGT. Although it did not directly support the hypothesis that collectivism would positively predict collective efficacy, the present study provided evidence that ATGT's effect on the relationship should be studied further. Therefore, the use of HLM to analyse IND-COL as individual-level variables in relation to both team cohesion and collective efficacy as team-level variables, could be the solution to researching what theoretically should be a positive relationship between collectivism and collective efficacy.

Another strength of the present study was that IND-COL, team cohesion, and collective efficacy were measured with scales which were appropriate for their respective levels of conceptualisation and analysis. IND-COL was measured as a four factor structure, with the 16 item scale from Triandis and Gelfand (1998) which has been shown to be superior to other measures of IND-COL (Bearden et al., 2006; Cozma, 2011; Gyorkos et al., 2012; Singelis et al., 1995). The 16 item measure is appropriate for individual-level IND-COL, in accordance with the idea that at the individual-level IND and COL are separate but related constructs, and are influenced by context (Triandis, 1995, 2001; Triandis & Gelfand, 1998). Team cohesion was measured with the GEQ which is appropriate for measuring team cohesion as a team-level variable in sport, encompasses historically disparate ideas about cohesion, and has been grounded in team dynamics theory (Carron & Brawley, 2000). Furthermore, as opposed to an alternative measure such as the Youth Sport Environment Questionnaire (YSEQ), the GEQ was most appropriate for the range of ages of participants (only 18 participants were under the age of 16). The YSEQ was designed for ages 13-17, and only measures task and social cohesion without the 'group integration' and 'individual attractions' components. In the present study, there were differences between the 'group integration' and 'attraction to group' aspects of cohesion, confirming the need to use the GEQ. The collective efficacy scale measured perceptions of a participant's team's belief it its abilities. The collective efficacy scale was given to all participants rather than forcing a single team response, unlike Gibson (1999, 2003) for example, who asked each team to provide a single response on a five item measure of collective efficacy. The issue with forcing a team response is that it more closely resembles a group consensus view of collective efficacy, and contradicts Bandura's (1997) suggestion that collective efficacy should be measured in each team member, and the average team response should be used as team-level collective efficacy. The reasoning behind the suggestion is that a single team response would imply that there is a 'group mind', whereas according to social cognitive theory a group mind does not exist, as collective efficacy is made up of the individual perceptions of team members (Bandura, 2000). Furthermore, the average team response where all team members have completed a measure of collective efficacy, has been shown to be a more predictive measure than the level of group consensus (Goddard, 2001). Therefore, it is not surprising that in a comprehensive meta-analysis conducted by Stajkovic, Lee, and Nyberg (2009), they found that 82% of studies used a measure of collective efficacy which used the average of individual team member responses. Overall, the measures in the present study were the best available, and were good operationalisations for the concepts of individual-level IND-COL, and team-level team cohesion and collective efficacy.

Another major strength of the present study was that it addressed a gap in previous research on individualism and collectivism in teams. It was the first study to analyse IND and COL as individual-level predictors, with team cohesion as a team-level predictor, and team-level collective efficacy as the outcome variable, in a multilevel analysis. The finding that ATGT moderated the relationship between VC and collective efficacy was the first insight into how collectivism, cohesion, and collective efficacy might relate to each other. Furthermore, the theory behind each concept is compatible with there being such an interactive relationship between them. Although further research is needed to confirm the finding, the present study addressed a significant gap in the literature in terms of IND and COL being studied as individual-level variables with team cohesion and collective efficacy in a team context, and offered a new direction for research.

Recommendations for Future Research

Findings from the present study have shown there is justification for further research on how individual-level individualism and collectivism relate to team-level cohesion and collective efficacy. It is recommended that future research should continue to use multilevel analysis, and to continue to ensure that measures are appropriate for the level of analysis and conceptualisation. Also, measures should show good statistical fit in the data with their predicted structures. In the present study, although there was justification for using the scales in HLM, the fit for the IND-COL and collective efficacy scales were only marginally acceptable. Furthermore, it is recommended that larger team sample sizes of 30 or more should be obtained in order to achieve increased statistical power. The most important factor in determining statistical power of a two-level HLM is the sample size at the higher level (Bickel, 2007; Hox, 2002). It has been suggested that for HLM, the team sample size should be at least 20 or 30. Furthermore, it has been suggested that to detect cross level interaction effects, the team-level sample size should be closer to 50 (Hox, 2002). Although there is not a minimum sample size required for justification in doing HLM analysis, the larger the sample size at the higher level, the greater the statistical power, and the less chance there is of type two error (Bickel, 2007; Hox, 2002). Another recommendation is the use of a longitudinal design, because there are conflicting ideas in the literature as to how stable social and task cohesion are over time (Martin, Bruner, Eys, & Spink, 2014). Additionally, a cross-cultural design could be used to assess whether the findings are unique to competitive teams in general, or whether there are cultural differences. Future research on IND and COL, team cohesion, and collective efficacy could build on the findings of the present study, and further develop knowledge about how these variables operate within teams.

Conclusion

Although individualism and collectivism had already been considered important variables in team dynamics, the present study was the first to investigate how at the individual-level they relate to both team cohesion and collective efficacy in a multilevel analysis. The main finding was that at high levels of the type of team cohesion describing team members' motivation to remain in their team orientated toward interdependently achieving team goals (ATGT), the more vertical collectivistic players were, the more confident they were in their team's ability. Conversely, at low levels of ATGT, the more vertical collectivistic players were, the less confident they were in their team's ability. This relationship was discussed according to the theory behind each concept, has face validity, and is worth exploring with further research. Increased knowledge of how individualism and collectivism relate to team cohesion and collective efficacy could contribute to the prioritisation of interventions such as team building, and improve our understanding of where IND and COL fit into team dynamics theory.

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Appendix A

MASSEY UNIVERSITY
COLLEGE OF HUMANITIES
AND SOCIAL SCIENCES
TE KURA PŪKENGA TANGATA

Team-level Cohesion in Elite Netball Players

INFORMATION SHEET FOR PARTICIPANTS

Hi there, my name is Lydia Edwards. I am a post-graduate student in the School of Psychology at Massey University. I am undertaking this research project as a requirement of my Master of Science degree. My supervisors are Dr Richard Fletcher, and Prof Stuart Carr. Both are lecturers and experienced researchers in the School of Psychology at Massey University.

In this research project, I am looking at three aspects of teams. The first is team cohesion, which can be described as the bond that ties team members to one another, and with their team. The second is the belief team members have that their team will be successful. The third is about different ways team members view and relate to others in their team.

In cooperation with Netball New Zealand, I would like to invite all players competing in the New Zealand Age Group Championships U19 and U23 in Dunedin (July 2014), and the New Zealand Secondary School Netball Championships in Palmerston North (October 2014) to participate in this research. The findings will contribute to sports psychology research and knowledge, and could benefit netball in New Zealand.
There are no risks to participants for taking part in this research.

Project Procedures

If interested in participating, I will arrange a time with coaches or team managers to meet with each team the day before your tournament. Those who would like to take part will be asked to sign a consent form which states that you have read this information sheet and agree to participate under the conditions on this information sheet. Any under 16 year olds will be asked to have a parent sign a consent form. I will meet with your team on the day, and will leave once questionnaires are distributed. Alternatively I can arrange to send the materials via post. What is involved will take approximately 20 minutes.

Participants will be asked to fill out a questionnaire containing multi-choice questions about the three team aspects being researched. I will ask that the questionnaires be placed into a sealed envelope, for me to collect, or to be posted back to me.

Data Management

All responses will remain highly confidential. Participants will not be identified on their questionnaire, and consent forms will be stored separately to questionnaires. In any publications or communication of the results, participants will remain anonymous. No individual or team will be identified. Once questionnaires have been completed, the answers will be scored for the purposes of analysis, and they will be stored in a locked filing cabinet only accessible by myself (the researcher) and my two supervisors. The questionnaires will be stored securely during the project before being destroyed. At completion of the project, all participants will have access to a written summary of the findings. I will also be available to explain the findings further over the phone if requested.

Participant's Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- decline to answer any particular question;
- withdraw from the study at any time during, or up to two weeks after completion of the questionnaire;
- ask any questions about the study at any time during participation;
- provide information on the understanding that your name will not be used unless you give permission to the researcher;
- be given access to a summary of the project findings when it is concluded.

Should you have any questions about this research, please do not hesitate to contact myself, Lydia Edwards on 027 4271606. Thank you very much for your time.

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application 14/022. If you have any concerns about the conduct of this research, please contact Dr Lily George, Acting Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 43279 email humanethicsnorth@massey.ac.nz.

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Appendix B

MASSEY UNIVERSITY
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AND SOCIAL SCIENCES
TE KURA PŪKENGA TANGATA

Team-level Cohesion in Elite Netball Players

PARTICIPANT CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I agree to participate in this study under the conditions set out in the Information Sheet.

Signature: .... **Date:** ....

Full Name - printed ....

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application 14/022. If you have any concerns about the conduct of this research, please contact Dr Lily George, Acting Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 43279 email humanethicsnorth@massey.ac.nz.

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Appendix C

MASSEY UNIVERSITY
COLLEGE OF HUMANITIES
AND SOCIAL SCIENCES
TE KURA PŪKENGA TANGATA

Team-level Cohesion in Elite Netball Players

INFORMATION SHEET FOR PARENTS/GUARDIANS

Hi there, my name is Lydia Edwards. I am a post-graduate student in the School of Psychology at Massey University. I am undertaking this research project as a requirement of my Master of Science degree. My supervisors are Dr Richard Fletcher, and Prof Stuart Carr. Both are lecturers and experienced researchers in the School of Psychology at Massey University.

In this research project, I am looking at three aspects of teams. The first is team cohesion, which can be described as the bond that ties team members to one another, and with their team. The second is the belief team members have that their team will be successful. The third is about different ways team members view and relate to others in their team.

In cooperation with Netball New Zealand, I would like to invite all players competing in the New Zealand Age Group Championships U19 and U23 in Dunedin (July 2014), and the New Zealand Secondary School Netball Championships in Palmerston North (October 2014) to participate in this research. The findings will contribute to sports psychology research and knowledge, and could benefit netball in New Zealand.
There are no risks to participants for taking part in this research.

Project Procedures

Signed consent forms from a parent or guardian of players under the age of 16 are required. This states that you have read this information sheet and agree for your son or daughter to participate under the conditions on this information sheet. I will arrange a time with coaches to meet the teams the day before their tournament. Alternatively I will arrange to send the materials via post. What is involved will take approximately 20 minutes. Participants will be asked to fill out a questionnaire containing multi-choice questions about the three team aspects being researched. I will ask that the questionnaires be placed into a sealed envelope, for me to collect, or to be posted back to me.

Data Management

All responses will remain highly confidential. Participants will not be identified on their questionnaire, and consent forms will be stored separately to questionnaires. In any publications or communication of the results, participants will remain anonymous. No individual or team will be identified. Once questionnaires have been completed, the answers will be scored for the purposes of analysis, and they will be stored in a locked filing cabinet only accessible by myself (the researcher) and my two supervisors. The questionnaires will be stored securely during the project before being destroyed. At completion of the project, all participants will have access to a written summary of the findings. I will also be available to explain the findings further over the phone if requested.

Participant's Rights

Participants are under no obligation to accept this invitation. Anybody who decides to participate has the right to:

- decline to answer any particular question;
- withdraw from the study at any time during, or up to two weeks after completion of the questionnaire;
- ask any questions about the study at any time during participation;
- provide information on the understanding that their name will not be used unless permission is given to the researcher;
- be given access to a summary of the project findings when it is concluded.

Should you have any questions about this research, please do not hesitate to contact myself, Lydia Edwards on 027 4271606. Thank you very much for your time.

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application 14/022. If you have any concerns about the conduct of this research, please contact Dr Lily George, Acting Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 43279 email humanethicsnorth@massey.ac.nz.

Appendix D

MASSEY UNIVERSITY
COLLEGE OF HUMANITIES
AND SOCIAL SCIENCES
TE KURA PŪKENGA TANGATA

Team-level Cohesion in Elite Netball Players

CONSENT FORM FOR UNDER 16 YEAR OLDS

Under 16 year olds who agree to participate in this research are required to have a parent or guardian sign this form, as well as sign themselves.

I have read the Information Sheet and have had the details of the study explained to me. My questions have been answered to my satisfaction, and I understand that I may ask further questions at any time.

Participant Signature: .... **Date:** ....

Full Name - printed ....

I agree for my son/daughter to participate in this study under the conditions set out in the Information Sheet.

Signature: .... **Date:** ....

Full Name - printed ....

Full Name of son/daughter- printed ....

This project has been reviewed and approved by the Massey University Human Ethics Committee: Northern, Application 14/022. If you have any concerns about the conduct of this research, please contact Dr Lily George, Acting Chair, Massey University Human Ethics Committee: Northern, telephone 09 414 0800 x 43279 email humanethicsnorth@massey.ac.nz.

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Appendix E

Team-level Cohesion in Elite Netball Players

What is the name of your team? ___________________

Playing status (please circle): Starter / Reserve

Age: _______ Years

1. How many years have you been playing netball? _____________ Year(s)
2. How many years have you been playing at this level? _____________ Year(s)
3. How long have you been part of this team? ___Months___ Years
4. How much competitive playing time do you usually get? _______Minutes per game
5. How much time does your team spend in practice/training? _______Hours per week
6. What percentage of time is spent during practice on team skills (e.g. strategies, ball skills)?

(Please circle one of the below options.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

7. What percentage of time is spent during practice on individual skills?

(Please circle one of the below options.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

8. How much time do you spend socialising with your teammates? ________Hours per week

9. How much time does your team spend in team meetings (other than practices) each week?

(Please circle one of the below options.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

10. What percentage of time is spent during practice on team building skills (e.g. working together)?

(Please circle one of the below options.)

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

Appendix F

Source: Widmeyer, W. N., Brawley, L. R., & Carron, A. V. (1985). *The measurement of cohesion in sport teams: The Group Environment Questionnaire*. London, Ontario: Sports Dynamics.

Appendix G

For the following items, please indicate your preference by CIRCLING ONE NUMBER from 1 to 9.

1. Competition is the law of nature.

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

2. I'd rather depend on myself than others.

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

3. I rely on myself most of the time; I rarely rely on others.

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

4. The well-being of my team members is important to me.

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

5. I often do "my own thing."

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

6. When another person does better than I do, I get tense.

1 2 3 4 5 6 7 8 9

Strongly Disagree — Strongly Agree

7. My personal identity, independent of others, is very important to me.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

8. Parents and children must stay together as much as possible.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

9. To me, pleasure is spending time with others.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

10. I feel good when I cooperate with others.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

11. If a team member gets a prize, I would feel proud.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

12. It is important to me that I respect the decisions made by my groups.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

13. It is important that I do my job better than others.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

14. It is my duty to take care of my family, even when I have to sacrifice what I want.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

15. Winning is everything.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

16. Family members should stick together, no matter what sacrifices are required.

1	2	3	4	5	6	7	8	9
Strongly Disagree								Strongly Agree

Appendix H

The following questions are designed to assess your feelings about YOUR TEAM'S CONFIDENCE in the team's skills and abilities with respect to the following questions. Use the scale below to rate your team's confidence in its ability to complete each skill. Please answer in **intervals of 10%** (e.g. 30% or 40%, **not** 35%). Please write your answer in the space to the right of each question. Remember, we want you to rate how you think the team feels as a whole.

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Confidence										Completely Confident

<u>ATTACK</u>

Our team's confidence that we can…

1. clear the centre pass successfully is ………………………………………………………………_________
2. work the ball into our goal third is……………………………………………………………… _________
3. feed the goal circle effectively is…………………………………………………………………_________
4. retain the ball from an offensive rebound……………………………………………………_________
5. convert turnover possession into a successful goal is…………………………………_________
6. play to our stated game plan is…………………………………………………………………_________
7. execute attacking play under pressure is……………………………………………………_________
8. balance the court is…………………………………………………………………………………_________
9. control our footwork is……………………………………………………………………………_________
10. avoid ball handling error is………………………………………………………………………________
11. handle and pass the ball accurately…………………………………………………………… _________
12. be successful in our goals is……………………………………………………………………_________
13. have a successful back line throw in (attack end) is……………………………………_________
14. have a successful back line throw in (defence end) is………………………………… _________
15. win the ball in toss up situations is……………………………………………………………_________
16. evade the defence of our opposition is………………………………………………………. _________

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Confidence										Completely Confident

DEFENSIVE

Our team's confidence that we can…

1. win an opposition centre pass is…………………………………………………………………… _________
2. play to our stated defensive game plan is……………………………………………………_________
3. obtain possession by clean interception is…………………………………………………._________
4. obtain possession by forcing a turnover (held ball etc.) is……………………………_________
5. contest for the ball fairly (avoid contact) is………………………………………………… _________
6. control the pace of the opposition's game is……………………………………………… _________
7. control the style of the opposition's game is……………………………………………….._________
8. execute our defensive plays under pressure is……………………………………………._________
9. obtain defensive rebounds is………………………………………………………………………._________
10. force the opposition to change their game plan…………………………………………._________
11. work as an effective defence unit is……………………………………………………………._________
12. avoid obstruction is……………………………………………………………………………………._________
13. react quickly after a turnover is…………………………………………………………………._________
14. play varied styles of defence………………………………………………………………………._________

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Confidence										Completely Confident

MOTIVATION

Our team's confidence that we can…

1. remain motivated after losing the previous game is……………………………………._________
2. remain motivated when behind in a game is………………………………………………… _________
3. outwork other teams during games is……………………………………………………………._________
4. keep our reserve players motivated during games/competition…………………… _________
5. remain motivated when not enjoying the game…………………………………………….. _________
6. remain motivated when not receiving back up from team players…………………_________
7. remain motivated when game strategies are failing to be successful……………. _________

8. receive recognition for our good efforts is…………………………………………………….________
9. receive significant coach time being dedicated to our team is……………………… ________
10. gain motivation from being a team player is………………………………………………. ________
11. gain motivation from being part of an elite sports team is………………………….. ________
12. gain pleasure from discovering new training techniques……………………………. ________
13. experience satisfaction when we perfect our abilities is………………………………________
14. be well regarded by people we know is………………………………………………………________
15. stay in shape by being part of an elite sports team………………………………………________
16. gain satisfaction from working really hard……………………………………………………________
17. feel successful in sport when we are the best………………………………………………________

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Confidence										Completely Confident

OBSTACLES

Our team's confidence that we can…

1. play at the same level even when our best shooter is injured is……………………..________
2. play at the same level even when our captain is injured is……………………………..________
3. play at the same level even when our best defender is injured is………………… ________
4. play at the same level even when a team-mate is injured during a game is……________
5. overcome dissatisfaction with progress in practice is…………………………………..________
6. overcome dissatisfaction with a game loss is………………………………………………. ________
7. overcome dissatisfaction with a competition loss is……………………………………..________
8. overcome dissatisfaction with a poor defence/offence during a game is………________
9. play at the same level when our team is behind in a game is………………………..________
10. play at the same level when mistakes have been made (e.g. Inaccurate passing)……………………………………………………………………………………………………..________
11. rethink/change goal feeding strategy when opposition's goal defence is strong is……..________
12. change/adapt game strategy when original plan is unsuccessful is………………..________
13. play at the same level even when players are changed/replaced is……………….________
14. use negative feedback from coach productively to increase next performance is… …… ________

15. come from behind and win is……………………………………………………………………….________
16. not allow foul play by opposing team affect our performance is…………………….________
17. remain positive even when someone (e.g. Coach/other players/media) gives us negative feedback is……………………………………………………………………………………..________

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Confidence										Completely Confident

COMMUNICATION

Our team's confidence that we can…

1. successfully signal game strategies to each other during a game is……………….________
2. successfully signal centre pass strategies during a game is…………………………..________
3. effectively discuss game strategies during practice or before a competition is.________
4. productively discuss the team's performance (success/failure) after a game/competition is……………………………………………………………………………………________
5. encourage each other during a game is………………………………………………………..________
6. .use feedback from the coach productively to increase our performance is……________
7. use information from others (e.g. Coach, other players) to our advantage is….________
8. receive clear coach communication of team goals is……………………………………________

0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
No Confidence										Completely Confident

GENERAL

Our team's confidence that we can…

1. win is………________
2. set realistic performance goals is………………………………………………………………________
3. have regular and productive practices is…………………………………………………….________
4. plan game strategies (offensive/defensive strategies) together is…………………._________
5. discuss game strategies with the coach effectively is…………………………………….________

6. use our practices effectively (e.g. Learn and practice new skills/plays) is……….________

7. warm up effectively before each game is……………………………………………………….________

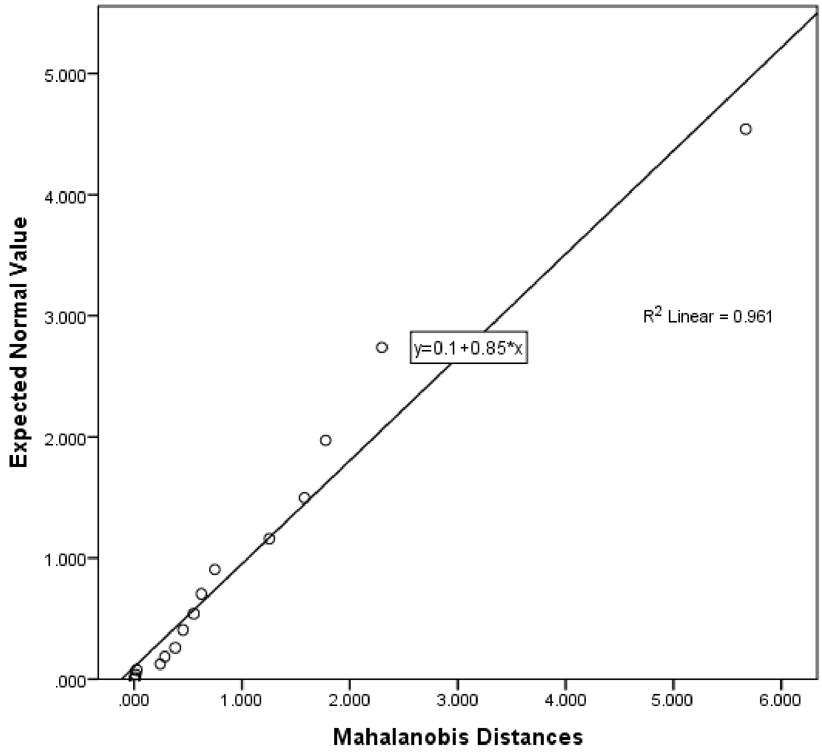
8. have regular and productive team meetings is……………………………………………….________

9. rely on one another to be on time for practices/meetings/games is……………..________

10. learn set plays (e.g. Throw ins, centre pass) during practice is………………………. ________

11. use set plays successfully during games is………………………………………………………________

Appendix I



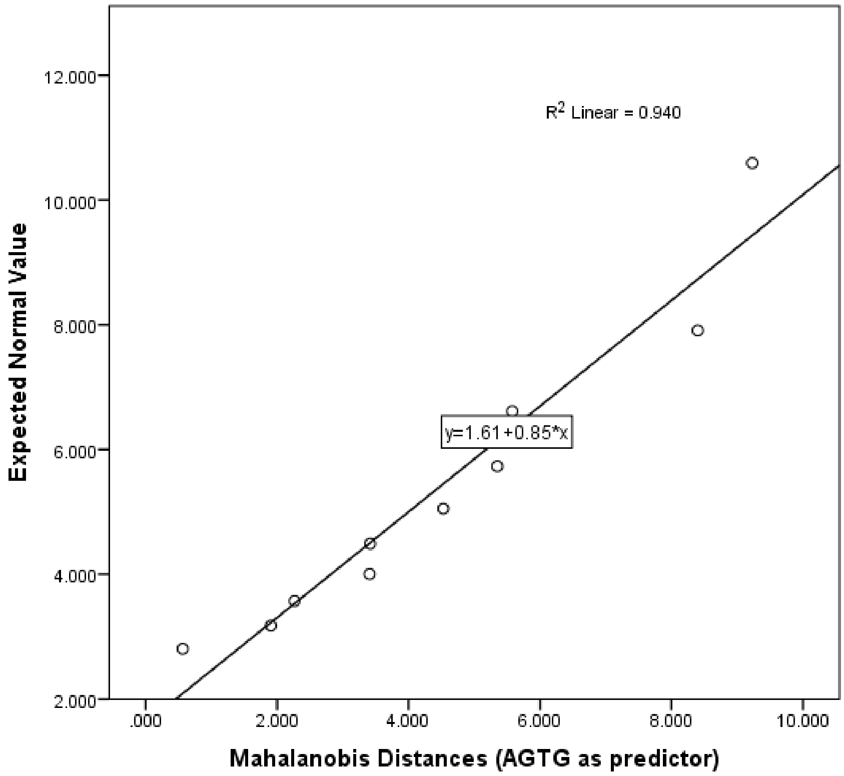
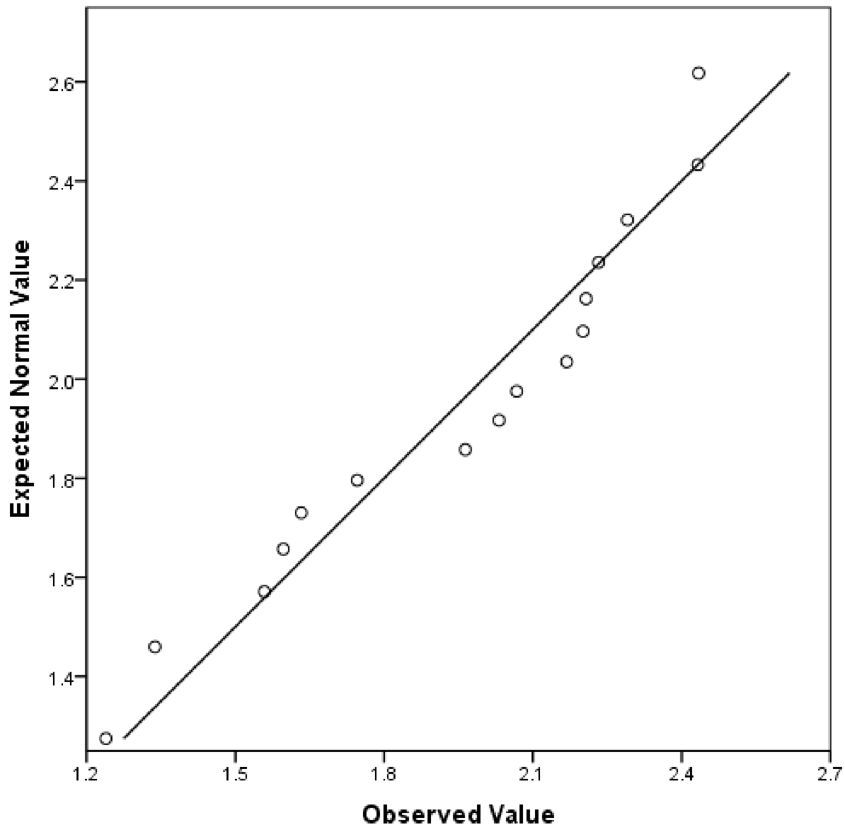


Figure 13. Scatterplots showing the Mahalanobis Distances to test for the assumption of normality in the residuals for the 16 teams in the final fitted models with collective efficacy as the outcome variable. The top graph shows residuals when GEQ and ‘‘percentage games won’’ as team-level predictors. The bottom graph shows residuals when ATGT was the team-level predictor.



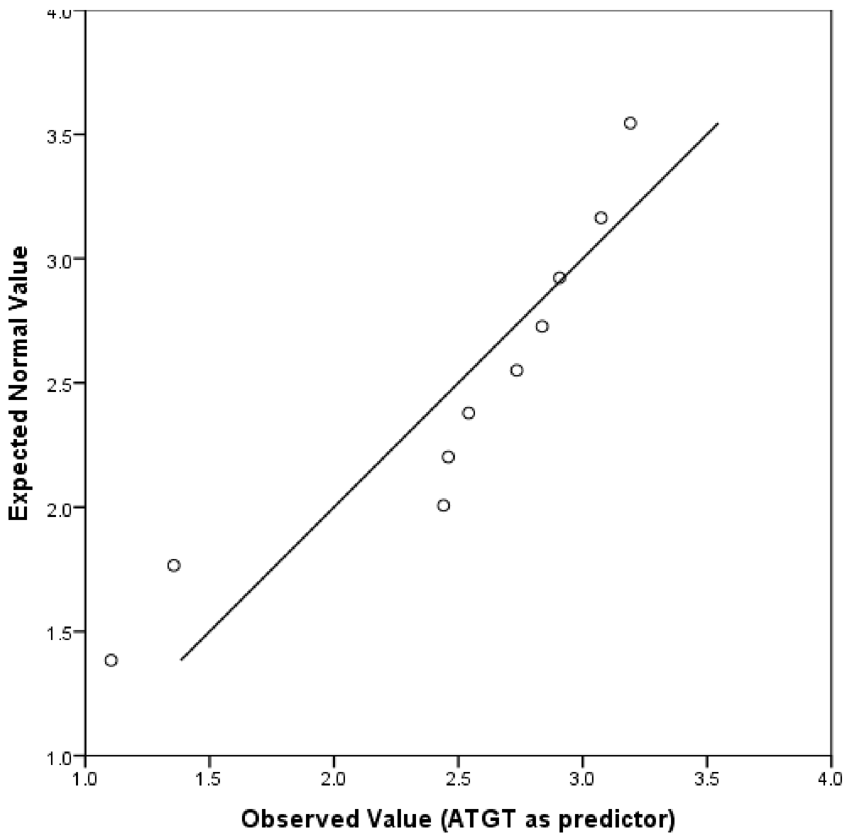
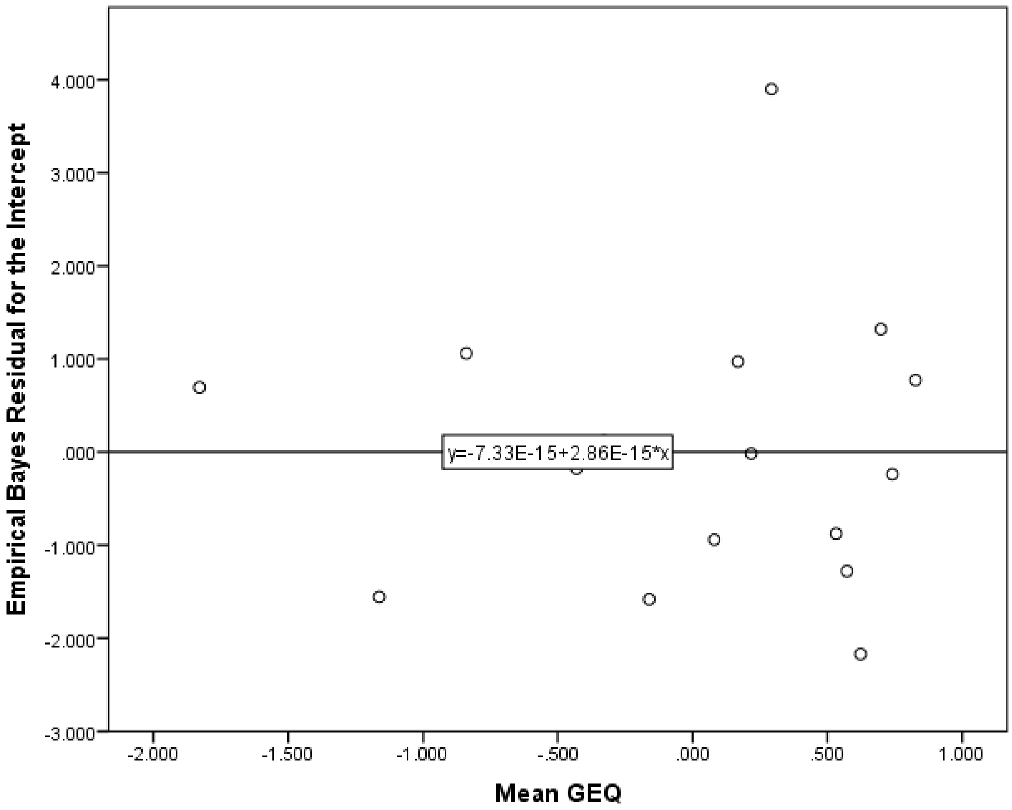


Figure 14. Normal Q-Q plots of the log of the residual within-team standard deviation for the 16 teams, from the final fitted fixed effect model where collective efficacy is the outcome variable. The top graph is when GEQ and ‘‘percentage games won’’ were team-level predictors. The bottom graph is when ATGT was the team-level predictor.



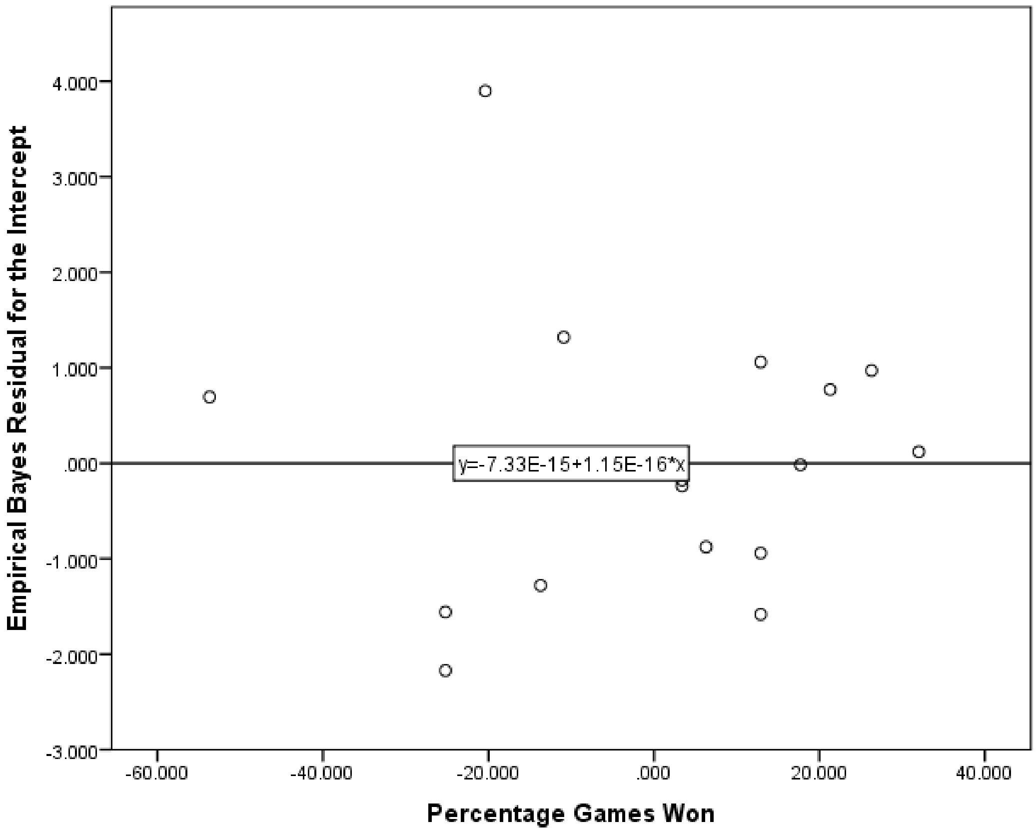


Figure 15. Scatterplots to test for linearity, between residuals for mean GEQ and the intercepts in the top graph, and between residuals for ‘‘percentage games won’’ and the intercepts in the bottom graph.

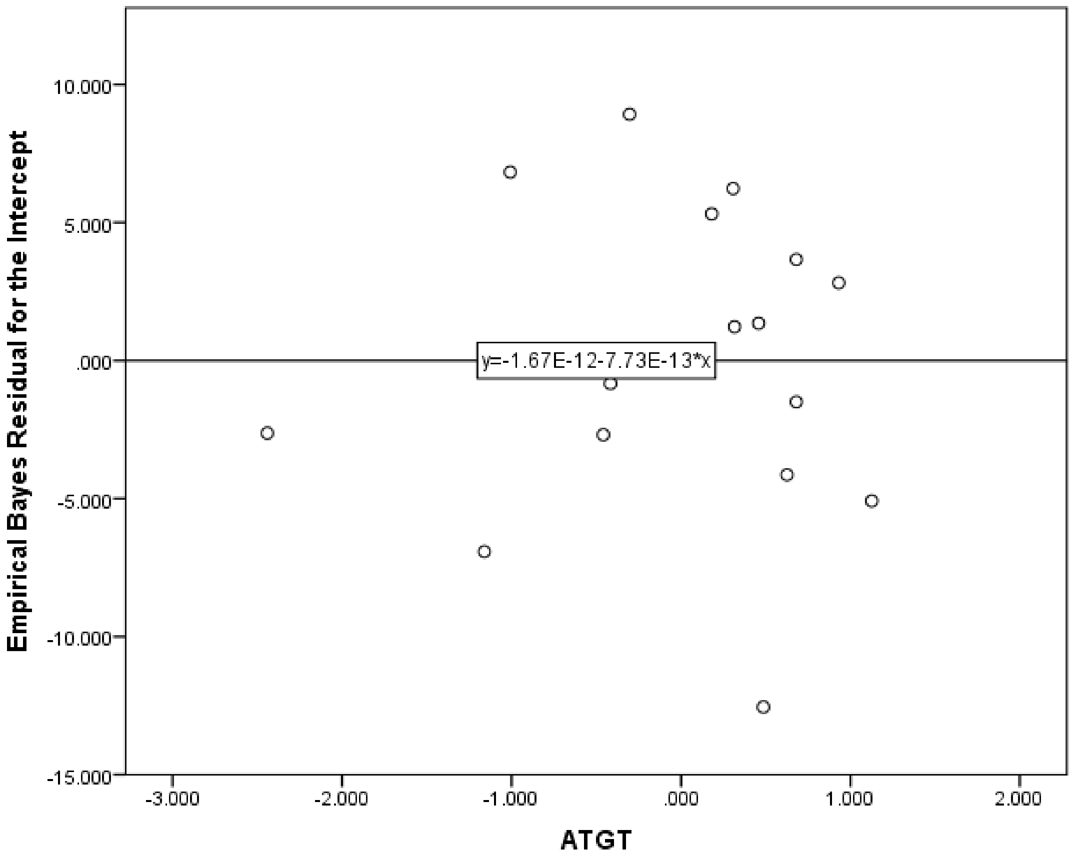


Figure 16. Scatterplot to test for linearity, between residuals for ATGT and the intercepts.