What helps team learning?
Egalitarianism, hardship, and leadership in Australian Army teams

Christina F. Stothard

1 June 2021

This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in the Faculty of Health Sciences, School of Psychology, at The University of Adelaide

Declaration

I, Christina F. Stothard, certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name, in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

In addition, I certify that no part of this work will, in the future, be used in a submission in my name, for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint-award of this degree.

I acknowledge that copyright of published works contained within this thesis resides with the copyright holder(s) of those works.

I also give permission for the digital version of my thesis to be made available on the web, via the University's digital research repository, the Library Search and also through web search engines, unless permission has been granted by the University to restrict access for a period of time.

This thesis was professionally proofread by Tina Morganella. Tina provided feedback only on the use of Language and Illustrations (Standard D) and Completeness and Consistency (Standard E) (as per the Australian Standard of Editing Practice and University of Adelaide Graduate Centre guidelines).

C.F. Stothard Date: 1/6/2021

TABLE OF CONTENTS

Abstract

While the Australian Army's ability to generate military force relies on team learning, little attention has been paid to understanding when, where and why Australian Army teams learn. To answer this research question, chapter 1 reviews the research into military team learning in the Australian Army. The primary research into the Australian Army's learning organisation capabilities (which includes team learning) was the Australian Army Learning Organisation (AALO) research project. Next, chapter 2 takes a critical look at the AALO construct; I identify three fundamental conceptual flaws which have remained unaddressed. Chapter 2 concludes with a reconceptualisation of the AALO as an empirically grounded, multilevel and multidimensional taxonomy.

Chapter 3 empirically evaluates (i) if the AALO/DLOQ model was multilevel, (ii) assumptions of nomological isomorphism of the AALO/DLOQ construct, and finally (iii) proposes and tests a mediation model (where learning-oriented leadership mediates the direct effect of rank on the other learning organisation dimensions). The results show that learning-oriented leadership plays an important role in mediating the effect of rank on other learning organisation dimensions and that the effect was isomorphic, that is, found at the individual and team levels. Finally, I conclude chapter 3 by identifying and selecting a target variable which clarifies the outcome of the AALO model, namely, team learning.

Chapter 4 reviews the team learning literature, with particular focus on the contingencies which shape the effect of team power disparity on team outcomes. These include team context (e.g., teams in extreme environments), team leadership, and team climate. Finally, I review the literature on team-level effects of deployment within military. This chapter presents the rationale for the development of the team-level moderated mediation model (chapter 5, Papers 2 and 3) and individual-level multiple mediation model (chapter 6, Paper 4).

In chapter 5, I introduce a new team context or moderator, hardship (operationalised as deployment), which is expected to shift team-level effort of power disparity to a positive. I introduce a new team mediator, egalitarianism, which mediates a positive effect on team learning. Paper 2 details the theoretical development of a proposed moderated mediation model. Paper 3 reports on the quantitative evaluation of the team-level moderated mediation model.

Next, in chapter 6, I take an individual-level perspective to identify specific leadership styles or practices which can be included into military practice to improve team learning. Chapter 6 presents Paper 4, which evaluates an individual-level multiple mediation model, which establishes the effect of learning-oriented leadership, transformational and transactional leadership on, first, mediating

between individual rank and psychological equality (individual-level egalitarianism) and, then, team learning.

The discussion chapter (chapter 7) is a narrative, discursive paper (Paper 5), which synthesises and integrates the results of all papers and discusses the policy and practical implications of the findings. Paper 5 presents these findings to a non-academic, practitioner audience (namely, the Australian Army). Finally, in chapter 8, I conclude the thesis by drawing out important aspects of my results, identifying key questions for future researchers and limitations of my research, and recommending further investigations.

Acknowledgements

I've been looking forward to writing these acknowledgements. I want to properly thank all my crew (supervisors, colleagues, friends and family) who have supported me to finish this thesis. First, I would like to first thank my supervisors: Dr. Rebecca Heyer (Adelaide University, School of Psychology), Dr Ruchi Sinha (University of South Australia, School of Management/Centre for Workplace Excellence, CeWX) and A/Prof. Carolyn Semmler (Adelaide University, School of Psychology). Rebecca, I (literally and figuratively) would not have finished this thesis without your help, support and guidance. You are an absolute champion. Ruchi, your guidance and efforts in teaching me the joys of the multilevel approach has been invaluable. My research would have been all the poorer without your help and expertise. Carolyn, thank you for your late entry into the supervisory role.

Thank you to my Defence Science and Technology colleagues, and in particular, Maya Drobnjak. Maya, thank you so much for your faith in me and my research. I could not have done it without you or your support. Thanks to the original DSTG/AALO crew: Paul Lancaster, Steve Talbot, Denise McDowall, Tiffany Fischer, Mirela Stjela, Veneta MacLeod, Natalie Kuester, and Kendy Hau. Also, honourable mentions to Robin Nicholson, George Galanis, and Steve Quinn for their help and support over the life of the research project.

In the Australian Army, I'd like to thank the many, many soldiers who provided their time and effort to research. In particular, from Forces Command: Lieutenant Colonel Max McIntyre (Retd), from Training Command: Lieutenant Colonel Anita Rhyne, from Special Operations Command: Major General Jeff Sengelman (Retd) and Brigadier Ian Langford, from Army Headquarters and Defence: Major General Stuart Smith (Retd), Lieutenant General Ash Power (Retd), Colonel Mal Rerden and Major General Craig Orme (Retd) for sponsoring and supporting the Army Learning Organisation research project. Also, thanks to Geoff Cooper, Army Knowledge Centre, for your help during the AALO project.

My family and friends: I'd like to thank my father, Tony Ryan, for his unfailing support and belief in the benefits of PhDs, and Ruth Ryan for the years of support and love. To my sisters, Sarah and Alison, thanks for your years of love and support! To my dearest friends, old and new, near and far: I promise now this thesis is finished and submitted, we will catch up soon! I haven't forgotten what you look like, honest.

To my husband, Mark. I am so grateful for your love, support, belief, and willingness to take on the extra household burdens so I can get this thesis finished. To my sons, James, Oliver and Toby, I

know you will—one day—appreciate the ‘life-skills learning opportunity’ you have had in becoming competent housekeepers/cleaners in the last five years. Thanks also for constantly reminding me that life goes on, regardless of whatever I was trying to complete in my PhD on that day. I love you all, and I promise that I will now listen when you start talking to me. Finally, to my dog, for whom I can truly say that if it wasn’t for you, this thesis would have been written in half the time.

List of Tables

List of Figures

List of Publications

Publications are listed in order of appearance in thesis

Stothard, C. (2020), "Is the DLOQ learning-oriented leadership isomorphic? Learning-oriented leadership mediates hierarchical teams' learning dimensions", *The Learning Organisation*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/TLO-02-2020-0027

Sinha, R. and Stothard, C. (2020), "Power asymmetry, egalitarianism and team learning – Part 1: conceptualizing the moderating role of environmental hardship", *The Learning Organisation*, Vol. 27 No. 5, pp. 389-401. https://doi.org/10.1108/TLO-01-2020-0018

Sinha, R. and Stothard, C. (2020), "Power asymmetry, egalitarianism and team learning – part II: empirical examination of the moderating role of environmental hardship", *The Learning Organisation*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/TLO-06-2020-0115

Stothard, C. and Drobnjak, M. (2021), "Improving team learning in military teams: learning-oriented leadership and psychological equality", *The Learning Organisation*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/TLO-12-2019-0174

Stothard, C. (submitted/in review), "Accelerating Army team learning". *Australian Army Journal.*

List of Conference Presentations and Papers

Stothard, C.F. & Sinha, R. (2019). "Team power, egalitarianism and team learning: The moderating role of environmental hardship". *Defence Human Sciences Symposium*. Canberra, Aust.

Sinha, R. & Stothard, C.F. (2018) "Team Power Asymmetry, Egalitarianism, and Learning: The Moderating Effect of Experienced Hardships". *Academy of Managemen*t, Atlanta, 2018. Doi: 10.5465/AMBPP.2018.10393abstract

Stothard, C.F., & Sinha R. (2017). "When can hierarchy in teams help team learning? The moderating effect of a shared threat" *APS Industrial and Organisational Psychologists Conference,* Sydney, 2017. Awarded best individual research paper.

Stothard, C.F., Le Couteur, A. & Heyer, R. (2015). *Modelling Army's organisational capacity to learn: "one size does not fit all"*. Poster presented at Defence Human Science Symposium, Melbourne. November.

Stothard, C.F., Le Couteur, A. & Heyer, R. (2015) *Modelling Army's organisational capacity to learn: "one size does not fit all"*. Poster presented at Florey International Post-graduate Conference, Adelaide. September.

Abbreviations

AALO	Australian Army Learning Organisation model
CeWX	Center for Workplace Excellence
CL	Continuous learning
DI	Dialogue and inquiry
DLOQ	Dimensions of a Learning Organisation Questionnaire
DSTG	Defence Science and Technology Group
DSTO	Defence Science and Technology Organisation
GLM	General linear model
ICC	Interclass Correlation Coefficient
LL	Learning-orientated leadership
LO	Learning organisation
RGR	Random group resampling
SV	Shared vision
TADMUS	Tactical Decision-Making Under Stress
TL	Team learning
TMS	Team Memory System
TW	Teamwork
VIF	Variance inflation factor
WABA	Within And Between Analysis

Preface

'Any fool can know. The point is to understand'. Albert Einstein (1879–1955)

As a full-time researcher within the Australian Department of Defence, I was tasked with the Australian Army Learning Organisation (AALO) research project in 2008. I developed the AALO questionnaire and managed the small team who administered, collected, cleaned and analysed the AALO data. In 2015, I started thinking about doing a PhD based on the AALO. I remember thinking that my research thesis would be straightforward; after all, I was just planning to extend the research that I was already doing, wasn't I? However, during my PhD, I ended up following Konrad Lorenz's (1903–1989) suggestion that "it is a good thing for a research scientist to discard a pet hypothesis every day before breakfast". I rethought the AALO model in response to several flaws that I had identified. In doing so, I discarded much of my initial thinking to improve AALO. During the literature review and critique, I found there was little nuanced research which seemed to capture the complexity of Army teams' experiences that they had been describing, and certainly no research on the Australian Army. From my qualitative experience, soldiers often spoke about how rank (directly and indirectly) shaped their working life. Yet I could see little direct attention had been paid to understanding this issue, and what contingencies might help Australian Army soldiers overcome the typically negative impact of hierarchy.

Around 2017, I had an opportunity for a secondment at the University of South Australia's Centre for Workplace Excellence (CeWX). During this time, I learnt about the multilevel perspective from CeWX academics including Prof Cheri Ostroff, Prof Carol Kulik, and Dr Ruchi Sinha. This secondment gave me the tools and techniques that let me rethink the AALO models and methods. In particular, I started to apply the multilevel approach to my PhD research. This led to my asking, exactly when and where do Australian Army teams (and organisation) learn? So, summing up, I started my PhD research thinking this would be a straightforward process. I was wrong. Instead, my PhD took me into new ideas, jobs, tools, techniques, colleagues and concepts (for which I am very thankful!). Finally, I hope my research efforts help the Australian Army to improve their experiences of working within Army teams.

1 INTRODUCTION

This thesis has both a practical and a scholarly aim[1]; ultimately, this thesis helps to answer an applied research question within a specific policy area (i.e., the Australian Army) by conducting a sound scholarly research. In practical terms, the thesis aims to help identify when and where Australian Army teams learn, and in doing so, to provide the Army with evidence-based, actionable recommendations. For scholars, this thesis also aims to extend our knowledge of the contingencies which shape when and where power disparity affects hierarchical teams, and team learning in particular. This research question is not new; the effects of power in social groups has generated scholarly thought for around 2,500 years. For example, in 375BC, Plato's thinking about power and politics was captured in his work in *The Republic*. Scholarly interest in understanding social and political power has continued over the centuries. In 1513, Niccolò Machiavelli identified how to best wield power in *The Prince*. In the 1970s, contemporary scholars argued for a more nuanced understanding of the interactions of power; for example, Foucault explored how knowledge is used by the powerful to maintain the status quo (Lynch, 2011). Yet even with the sustained scholarly interest over centuries, many questions still remain about our understanding of how power affects groups, and in particular, teams (Greer, 2014; Greer & Chu, 2020; Greer et al., 2018; Greer et al., 2017).

For example, there have been calls to examine the effect of power within the learning organisation construct using a multilevel perspective (Watkins & Kim, 2017), evaluate the effect of power disparity or hierarchy on learning organisations and organisational learning (Koeslag-Kreunen et al., 2018), and identify team and individual level factors that can shift the typically negative effect of power disparity on teams and team learning (Greer et al., 2020). This thesis identified a gap in the scholarly research focusing on military teams, namely, understanding what helps military teams to learn. This thesis aims to contribute both practically and scholarly by offering a more nuanced understanding of when and where power disparity helps or hinders hierarchical teams. In doing so, the research and analysis will extend current theory and move our knowledge forward by identifying specific factors that help team power help Australian Army teams to learn.

Next, this thesis briefly reviews how military team learning is understood by military professionals. The scant research into Australian Army team learning is reviewed; there is little research directly focusing on Australian Army team learning (Drobnjak et al., 2013; Stothard et al., 2013; Talbot et al., 2014). The review also identifies several fundamental, conceptual flaws in the

[1] Note that I am not suggesting that the scholarly cannot be practical, or vice versa. Instead, I argue that the research questions within this thesis emerged to answer a specific, applied research problem.

Australian Army Learning Organisational (AALO) model as it was first specified. To address and mitigate the conceptual flaws, I reconceptualise the AALO model as an (empirically grounded) taxonomy. Framing the AALO as a taxonomy addresses the definitional confusion and helps clarify the construct for empirical evaluation as a multilevel construct (Paper 1).

Next, the thesis considers the contingencies which shape when and where Australian Army teams learn and, in particular, what factors can shift the typically negative effect of hierarchical power differences on team learning. This thesis details the series of investigations conducted to identify and test the team and individual-level factors that support team learning and, in doing so, provides evidence-based recommendations to improve Australian Army team learning (Papers 2, 3 and 4). This work draws on the multilevel perspective or approach (Bliese et al., 2007; Chen et al., 2005; Klein & Kozlowski, 2000; Mathieu & Chen, 2011). I use the multilevel perspective to situate team learning within the broader learning organisation construct and then focus on the contingencies which shape team learning. Finally, these findings are summarised to help guide Australian Army policy (Paper 5).

This introduction begins by establishing the importance of individual, team and organisational learning in generating a warfighting advantage for a military organisation. Next, I draw on a recent reflective article by a military professional (Thorburn, 2021), which illustrates many of this thesis' key arguments. I then turn back to the scholarly literature and differentiate between the traditional perspectives used *by* the military (namely, pedagogy to improve the individual learner, and military historical analysis of military actions) to the analysis *of* the military (using a scholarly organisational behaviour and management lens). Social and organisational psychology have been used to investigate teams (both military and other teams) since World War 2 and has generated important insights within team research (Goodwin et al., 2018; Salas et al., 2009). While these insights are often overlooked by military professional thinking, efforts have been made to include learning organisation and team learning into more recent military scholarly research (e.g., DiBella, 2010; Dyson, 2019, 2020). The gap highlights the differences between how military professionals typically understand military learning, and how learning is characterised within the organisational psychological and management literature. Drawing on the organisational psychological literature within this research will help answer the military profession's call for greater attention to be paid to improving collective (or team) learning.

To situate the Australian Army's investigation of its learning capabilities within the broader organisational behaviour and management literature, I briefly outline two key concepts (namely, a learning organisation and organisational learning). Learning organisations and organisational learning are used regularly by military professionals and practitioners and have a wide variety of definitions circulating within the scholarly literature. I flag that the diversity of definitions creates difficulties (in fact, fundamental flaws) in implementing these constructs as causal models. Finally, I explain that my

research question first emerged from an Australian Defence-sponsored research project, which aimed to apply the learning organisation construct to the Australian Army.

1.1 Australian Army's current situation: Learning imperative

In 2020, the Australian Defence Department recognised that the Indo-Pacific region is facing a new era of regional uncertainty and volatility, with the rise of China as a regional superpower. In the Defence (2020, p. 1) Strategic Update, the Australian Government has now pinpointed that 'the drivers of change … have accelerated faster than anticipated. Australia now faces an environment of increasing strategic competition' so that 'our environment is now more complex, with Australian interests being more directly challenged than in the past'. Similarly, scholarly commentators also acknowledge that 'Australia is face[ing] its most "consequential strategic realignment" since the 1970s' (Carr in Hurst, 2020, p. 1) or 'since the Second World War' (Shoebridge, 2020, p. 1). Overall, there is a growing awareness that Australia, and the Australian Army, now more than ever, need to build on our technical and capability advantages to remain competitive in the highly unstable and volatile Indo-Pacific region.

The demands are not only emerging from the international context; the Australian Army is a crucial part of the Government's response to natural disasters and pandemics. There is an increasing range of functions and situations that Army personnel are expected to respond to, from peacekeeping to nation-building, providing natural disaster relief, national emergency support and warfighting. However, the Australian Army (similar to other militaries) has historically struggled to identify and anticipate the unexpected forms of new or emerging warfare. For example, Churchill (1948) quipped that 'it is a joke in Britain to say that the War Office is always preparing for the last war. But this is probably true of other departments and of other countries, and it was certainly true of the French Army'. While there is great value in understanding the lessons from experience (Dyson, 2019; Hasselbladh & Ydén, 2020; Marcus, 2015), the Australian Army also recognises that new thinking is needed to develop initiatives that help the Army to respond to the increasingly volatile and competitive Indo-Pacific region, as well as responding optimally to emerging national needs (e.g., natural disasters).

The Australian Army's response to the increasingly competitive environment has been outlined in their Future Warfighting concept (termed 'Accelerated Warfighting'). The Australian Army's Chief of Army (2018) identified the Army's need to extract every advantage by generating new and unexpected uses of our current equipment and materiel and developing new technological capabilities. This approach underpinned the 'acceleration of Army's warfighting', described by Langford (2019) as innovating processes and practices which drive the Australian Army's capability development. For example:

> *when people think about military innovation, they often think of equipment or materiel. Or, as I like to call it, "stuff". Yet innovation … in a more profound way, is to be found in [developing] methods or concepts that are new or not easily anticipated (Langford, 2019, speech audio recording).*

The rationale of this thesis is that team learning processes underpin the Army's ability to generate improvements, both small and large, which will ultimately optimise the Australian Army's warfighting capabilities. Australia, as a medium-sized nation with a small volunteer Army and characterised as 'a humble organisation' should:

> *always seek to learn... being curious and inquisitive… and not ever reach a point where we think that through technology delivery that we cannot be surprised or compromised because that will be fatal (Langford, 2019, speech audio recording).*

Specifically, to address the emerging threats, the Australian Army needs a continuing and sustained focus on learning at all levels. I argue that, ultimately, this attention will generate a sustainable competitive advantage.

While the changing geopolitical landscape has recently heightened the attention paid to the Army's learning capabilities, there has been an effort to do so since the 2000s. Over the last two decades, Army decision-makers have recognised that our environment is consistently changing. Therefore, Army decision-makers have started to pay attention to understanding how the Australian Army adapts and responds to change[2]. In the early 2010s, the Australian Army initiated a research project to 'diagnosis' the Australian Army's learning capabilities by drawing on Senge (1990) Learning Organisation. Similar to other military organisations (Buchanan, 2011; Dhananjaya Dahanayake & Gamlath, 2013; DiBella, 2010; Dyson, 2020; Gerras, 2002; Meredith, 2017; Snyder, 2016; Williams, 2007), the Australian Army also aspires to become a learning organisation (Basan, 2020; Army KnowledgeCentre, 2019; O'Toole & Talbot, 2011; Omarova et al., 2018).

1.2 MILITARY PERSPECTIVES ON LEARNING

Within the military (i.e., in the study of the profession of arms), the phrase 'military learning' is typically used to refer to primarily two broad approaches: individual, institutional or organisational, and – to a much lesser extent – collective (or team) learning. At its simplest, military learning is typically used to denote individuals' learning within militaries. For example, the *Journal of Military Learning* (a publication produced by the US Army) aims to support education and training for the

[2] Recognition that our environment is consistently changing is not a recent phenomenon, with Heraclitus observing that 'change is the only constant' in 500 BCE; the need to respond to the consistent changes also continues.

profession of arms by calling for papers relevant to 'military learners' addressing the 'issues and challenges of adult education and training, such as education technology, adult learning models and theory, distance learning, training development, and other subjects relevant to the field'. While there is a wealth of research and disciplines that can be drawn on to improve the military's pedagogical efforts to improve individual learning (e.g. Williams, 2020), the individual-level, pedagogical (or educational) approach does not address the issues of workplace-based teams or organisational-level issues that are the focus of this thesis.

Military learning is also often viewed through a historical lens within the military history discipline (i.e., using a case study or historiographical approach to analyse and understand military conflicts or actions, both ancient and contemporary (e.g. Dyson, 2019, 2020; Hasselbladh & Ydén, 2020; Nagl, 2005). Analysing military history generates insights from case studies which helps to explain either success or failure of military actions or conflict, and the phrase 'military learning' is used to describe the process when militaries change (usually successfully) in response to their opponents and achieve their ends (Dyson, 2020). Within the military studies discipline, military learning is often (but not exclusively) marked by the straightforward Lessons Learnt Process (e.g., Dyson, 2019). For example, Nagl (2005) analysed the UK and USA counterinsurgency efforts in two different theatres of war (Malaysian/Burma[3], and Vietnam). Nagl (2005) concluded that one of the main contributing factors for the different outcomes to the two conflicts was organisational culture; the British military was able to learn as the nature of the conflict changed by paying attention to lessons learning (in part), while the American military was slower to learn. In Nagl's (2005) approach, military learning is (implicitly) defined as changing responses to suit the environment and to achieve the desired outcome (e.g., successful suppression of the insurgency in Malaysia/Burma), and reflects the differing values and attributes within each military[4]. In this sense, the recent focus on military learning is understood not in terms of individual-level learning, instead, it is viewed at an institutional or organisational level and often operationalised as lessons learnt (Dyson, 2020).

The military professionals' primarily dual view of military learning reflects the traditional compartmentalisation found within the organisational behaviour and management scholarly literature before the turn of the 21st century; that is, the separation between the micro-level (individual focus) and the macro-level (institutional focus) theoretical and analytic approaches[5] (Klein & Kozlowski,

[3] Burma is now known as Myanmar. Nagl (2005) uses the original name, Burma.

[4] It is interesting to note that the *Journal of Military Learning* does not call for historical analyses of organisational-level military learning. Its remit is to improve the education and training of military learners. So neither Nagl's (2005) analysis nor Dyson's (2019, 2020) would appear in the *Journal of Military Learning*. Instead, Nagl's and Dyson's work sits within military history or studying the profession of arms.

[5] Within management and organisational behaviour fields, Matthieu and Chen (2011, pg. 611) identified the individual level (primarily made up of those in psychological and educational disciplines) and

2000; Mathieu & Chen, 2011; Rousseau, 1985). Together, the dual focus on the macro (e.g., institutional, sociological or organisation) and the micro (e.g., the individual) means that the meso (or middle level between individual and institutional) is often overlooked. Australian military practitioners argue about the relative (little) amount of attention paid to either collective military learning, compared to either individual or organisational level learning. For example, Ryan (2016), in reviewing the Australian Army's training cycle, identified that greater attention had been paid to the collective training phase in the Army training cycle since 2009. However, others (Basan, 2020) have argued that, relative to the resourcing and effort paid to individual-level training, the Australian Army's collective training remains at a very low base since the 2010s. Basan (2020, pg. 4) pointed out:

> *In practice collective training in Army is poorly regulated and vaguely described … and isn't really checked by anyone…In many places and headquarters in particular, we now spend more time producing and checking "administrative paperwork" than we do training … Not surprisingly, no formal training is required for practitioners of collective training…Additionally, there are no "masters of collective training" or "guardians", so during discussions [i.e., lessons learnt process] the "loudest voice - most rank wins".*

It is interesting to note that Basan (2020) and others (Ryan, 2016) typically define Army's collective learning solely in terms of Army training processes or continuums. Collective learning, in this sense, is primarily seen as a step in the process from aggregating individuals as learners into teams and then into larger blocks (e.g., joint warfare exercises).

There is also an apparent gap between Australian Army rhetoric and the implementation of collective training. In terms of institutional rhetoric, the Army Fundamental Land Warfare Doctrine: Training and Education 7-0 now includes the Army's learning organisation principles for collective learning:[6]

> *Army learning organisation principles. The following principles guide Army learning:*
> - *inculcate leadership behaviours, at all levels, that reinforce learning*
> - *establish robust learning processes and practices*
> - *generate and reflect upon a shared vision and understanding*

institutional/organisation (primarily made up of systems, economic or sociological disciplines) often worked "in parallel" with each perspective offering a (limited) set of unique insights. However, anomalies accumulated when attempting to examine the middle (team) level. In response, an integrative approach to understanding the 'meso' level is emerging in the organisational behaviour and management field (House et al., 1995; Matthieu and Chen, 2011). The meso, or team level, will be the focus of the thesis from chapter 4 onwards.

[6] The section ('Army as a learning organisation', pg. 25) was introduced into the LWD Doctrine 7-0 2015 in response to the AALO research project results and championed and implemented by the Australian Army Knowledge Centre.

- *encourage collaboration and team learning*
- *develop an appreciation of the broader implications of decisions and actions by applying a systems approach*
- *establish and sustain the free flow of knowledge*
- *foster professional mastery*
- *embrace evaluation and measurement*
- *exploit informal and formal networks*
- *influence joint and interagency learning (Army Knowledge Centre, 2019, pp. 25-26).*

The Army's training doctrine now pays attention to learning organisational principles and dimensions within training processes and practices to improve collective or team training. However, there appears to be relatively little attention given to implementing such processes or practices in practice, according to Basan (2020) and others (Thorburn, 2020). Chapter 2 aims to identify the fundamental logical and theoretical flaws in the AALO concept which make it challenging to implement.

Another essential point to make is that team training is not necessarily synonymous with team learning processes. For example, teams (and individuals) can and do learn in situations beyond training scenarios. As such, this leads to a disconnect between how collective or team-level learning is described within the aspirational Australian Army documentation (e.g., within Accelerated Warfare, Australian Army, 2019, or within LWD 7-0) and the implementation of collective training (Basan, 2020). This disconnect between the aspirations of the Army and its implementation of collective learning is a significant gap in the Australian Army's understanding and implementation of collective-level learning[7].

1.2.1 An Australian Army officer's experience: Learning and leading through collaboration

The disconnect between the Army's aspirations and its implementation of collective learning can be demonstrated by drawing on Thorburn (2021, p. 1) reflections. Captain Thorburn's (2021) reflections also illustrate many of this thesis' key arguments. In particular, Thorburn's (2021) lived

[7] In contrast, the USA in particular, has a long history of militaries sponsoring team research. For example, the US Navy sponsored the Tactical Decision Making under Stress (TADMUS) research program (Cannon-Bowes et al., 1998). TADMUS research focused on understanding team cognition and communication. Similarly, from WW2 the US Army has supported team research. For example, McGarth's team research in the 1960s leading to the input-process-outcome model of team processes (in Goodwin et al., 2018). However, it is helpful to note that sponsoring research does not necessarily imply that the US militaries take up the evidence-based recommendations to create a learning culture or organisation (for example, DiBella, 2010; Meredith et al., 2017 discussed this issue).

experience shows how his first learning experiences as part of the Army shaped his assumptions, which then influenced how he led his teams. In his reflections, Thorburn discusses how the effects of rank (disparity and competitive awarding of rank), learning-oriented leadership, a shared sense of team equality or egalitarianism (or lack of it) has shaped his experiences. In turn, Thorburn has learnt the importance of taking a collaborative, team learning approach to solving problems (which, ultimately, improves operational team performance).

1.2.1.1 MULTILEVEL CONTEXT: THE EFFECT OF ARMY CULTURE ON INDIVIDUAL ASSUMPTIONS

Captain Thorburn (2021) describes how his experience of broader Army culture and context (i.e., officer training at the Royal Military College (RMC)–Duntroon) shaped his initial assumptions about how he was supposed to lead, learn and problem solve. These then informed how Thorburn first led his teams:

> *In many ways the College's culture was defined by competition and individualism. The College compelled me to plan in isolation and to compete with my peers for the corps of my choice; it also built barriers between peers through the awarding of rank. We learned collaboration in theory, but in practice we were conditioned by our environment to compete* (2021, pg.1).

Thorburn's experience shaped his assumptions as he worked leading his teams, as he noted, 'In the beginning I was a poor leader. Aloof and distant, I mistook stoicism, desire, and unwavering self-belief for leadership… my focus had become so inward-looking that I forgot what leadership was all about: the team' (2020, pg.1).

Recognising and reflecting on his expectations from RMC–Duntroon, Captain Thorburn points to several key factors that are further explored in this thesis. In particular, he names the competitive process of awarding rank as a primary barrier to taking a collaborative approach to his peers.

1.2.1.2 TEAM LEARNING AND TEAM PERFORMANCE

One of Thorburn's (2021) key messages is the importance of instilling a team climate where learning and collaboration are standard operating procedures, which, ultimately, improves the team's performance. In arguing for Army leaders to collaborate with their teams to plan, solve problems, and execute plans, Thorburn (2021) does not negate the leader's authority. Instead, Thorburn argues that:

> *the more the team owned the problem, the better the outcome would be. Yes, the commander is responsible for the success or failure of the mission, but that doesn't mean that the commander alone "owns" the problem: the team does. All soldiers are self-motivated individuals who want to be part of the solution and own the problem. They cared about the result as much as I did,*

> *because ultimately it would be them who would be seeking out, closing with, and killing the enemy* (2021, pg.2).

In recognising and respecting his subordinates' roles in implementing the team's purpose and plans, Thorburn (2021) identifies benefits in generating a shared sense of respect for roles and tasks, regardless of rank, within the team, and calls for greater levels of team engagement.

1.2.1.3 Hierarchical power/rank differences on team learning and performance

Rank disparity (or hierarchical differences) is also typically identified within team power literature as hindering team performance, and team learning in particular (Bunderson & Reagans, 2011; Greer & Chu, 2020). Moreover, Captain Thorburn (2021) reflects on the effect of power disparity or hierarchical differences and describes how the cumulative effect of treating subordinates as 'recipients' rather than active, engaged team members produces a disengaged and disenfranchised team. For example:

> *Unfortunately, in my experience Army rarely treats enlisted soldiers like invested participants. Soldiers are often seen as recipients of a superior's will, feedback, and counsel, rather than active participants who care about their own, and the team's development, survival, and success* (2021, p 2).

Again, Thorburn (2021) characterises how, in his experience, Army typically expects enlisted soldiers to be treated as passive subordinates with little say and no agency in how they complete their orders or execute the plans. However, Thorburn (2021) also recognises the gap between typical Army expectations, and his rethinking of team collaboration, leading and learning.

1.2.1.4 Key points: Thorburn's lived experiences and reflections on the Australian Army

Thorburn's (2021) reflections on his own lived experience of leading in the Australian Army illustrate the critical arguments within this thesis: (i) that rank has a direct (negative) effect on collective/team learning (see chapters 4 and 5), (ii) that learning-oriented leadership plays a critical role in generating a shared sense of respect (regardless of rank) and team learning (see chapter 6), and finally (iii) that team learning helps to generate improved team performance within the Australian Army (see chapter 7). While these arguments will be expanded throughout the thesis, Captain Thorburn's (2021) experiences and reflections provide a clear overview of how important these factors are in generating a more positive learning environment for Australian Army teams. More importantly, Thorburn's own experiences and reflection show that, by challenging his assumptions, he changed his leadership practice and, therefore, his team's performance. In doing so, Thorburn

generated a shared sense of team egalitarianism and ownership of team problems, leading to a more supportive and productive team. This section aimed to demonstrate that while the concepts of the learning organisation, organisational learning and team learning can appear to be overly abstract, nevertheless when applied to a specific example of lived experience, these abstract concepts can and do make a difference to the lives of Australian Army soldiers and leaders.

1.3 KEY CONCEPTS: LEARNING ORGANISATION AND ORGANISATIONAL LEARNING.

1.3.1 A LEARNING ORGANISATION

Senge's (1990) writings on the learning organisation generated substantial interest in the construct, with *Harvard Business Review* naming '*The Fifth Discipline* as "one of the seminal management ideas of the last 75 years" (Reese, 2020a, p. 75). While Senge (1990) does not directly reference any theoretical influences in his book *The Fifth Discipline*, Senge later explained (Reese, 2020b) that his notions of a learning organisation emerged from his understanding of learning systems and processes (Argyris & Schon, 1974) together with systems thinking (from MIT Systems Dynamics group) (Checkland, 2000).

It is widely recognised that there has been little consensus about the definition of a learning organisation (Örtenblad et al., 2013; Reese, 2020b; Talbot et al., 2014; Watkins & Kim, 2018). The many definitions have been categorised as: (i) an aspirational archetype, (ii) a set of processes or practices, or (iii) a type of organisation. For example, Senge (1990, pg. 3) defined a learning organisation where 'people continually expand their capacity to create results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together'. Typically, Senge's (1990) definition is classed as aspirational. Others define a learning organisation as a set of processes marked by specific behaviours or attitudes. For example, DiBella (1995, p. 287) defined the learning organisation as 'a particular type or form of organisation in and of itself'. Similarly, Watkins and Marsick (1996, p. 4) defined a learning organisation as one which 'must capture, share, and use knowledge so its members can work together to change the way the organisation responds to challenges'. Likewise, Garvin (1993, p. 80) defined a learning organisation as 'an organisation skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights'. Finally, other scholars eschew a specific definition of a learning organisation, instead placing a learning organisation construct within the broader organisational learning literature; for example, Edmondson and Moingeon (1998, p. 5) characterised a learning organisation as 'an explicitly normative subset of [organisational learning] literature', and others highlight the applied focus for practitioners (Easterby-Smith et al., 2000).

While there is a diversity of definitions of a learning organisation within the literature, there are also commonalities; Hsu and Lamb (2020, p. 33) suggest a 'metatheory' in the definitions of the learning organisation. Namely, a learning organisation implies that 'when an adequate organisational structure is built, learning will automatically take place' (Hsu & Lamb, 2020, p. 33). Similarly, Talbot et al. (2014) identified that learning (within the learning organisation construct) is typically seen as unproblematic and normative. However, there are exceptions, with Ellinger et al. (2002) and Gerras (2002) paying attention to *how* a learning organisation might be constructed. Altogether, the common theme or definitions used within the learning organisation literature can be summarised as:

(i) a specific type of organisational structure(s) or process(es) which
(ii) determines individual behaviour (specifically, individual learning), and
(iii) the resultant individual learning will have an undifferentiated positive effect on organisations.

In summary, a learning organisation is typically described as a normative set of organisational-level processes or structures that result in individual-level learning, which improves organisational-level performance.

Overall, there is some (albeit incomplete) consensus among learning organisation scholars that a learning organisation is a type of organisation that typically demonstrates some degree of capability to learn. However, how likely it is for organisations to display some or any capabilities is also disputed. At one extreme, DiBella (2011, p.189) claims that all organisations have the 'innate' capacity to learn, and contends that a learning organisation is a redundant phrase (e.g., 'since all organisations learn'). Others, such as Argyris and Schon (1974), point to the lack of learning within organisations and examine the barriers which prevent learning. Other scholarly literature argues for the rigidity of organisations, by drawing on notions such as organisational inertia to explain when or why organisational change (including learning) may fail (Hannan & Freeman, 1984; Kelly & Amburgey, 1991). While DiBella (2011) makes an important point, namely that organisations are complex and made up of multiple (with possibly conflicting learning processes), there is also considerable evidence that not all organisations learn or learn positively (Hasselbladh & Ydén, 2020; Nagl, 2005; Rosen, 1991; Talbot et al., 2014).

1.3.2 Organisational learning

Organisational learning concepts (similar to learning organisation literature) have been critiqued as 'notably fragmented' (Edmondson & Moingeon, 1998, p. 6), 'diffuse' (Kozlowski et al., 2010, p. 364) and 'elusive' (Friedman et al., 2005, p. 19). In part, this was attributed to the range of disciplines researching organisational learning, with little 'cross fertilisation' between the disciplines (Edmondson & Moingeon, 1998, p. 6). A decade later, a similar argument continued with Kozlowski

et al. (2010, p. 364), who characterised organisational learning as being conceptualised in different ways by different disciplines, each of which is 'insular', resulting in a 'very broad, fuzzy, and multifaceted concept'. Sun (2003) analysed the definitions of organisational learning used within the scholarly literature and found that most of the definitions focused on learning as a process and at the specific level (organisational or institutional, not surprisingly).

1.3.3 'A LEARNING ORGANISATION' OR 'ORGANISATIONAL LEARNING'?

The conceptual relationship between a learning organisation and organisational learning has been debated since the popularisation of a learning organisation (Easterby-Smith et al., 2000), with more recent discussions echoing distinctions found in earlier works (Tsang, 2017). Easterby-Smith et al. (2000, p.787) commented that the two scholarly communities are 'largely … independent'. Typically, distinctions are made between the two communities (Easterby-Smith et al., 2000), with learning organisation characterised as more normative, prescriptive and practitioner-oriented, and organisational learning as more descriptive, academic and empirically-oriented (DiBella, 2011; Örtenblad, 2001; Tsang, 1997). Typically, organisational behaviour scholars frame a learning organisation as a prescriptive and normative ideal or type of organisation (Easterby-Smith et al., 2000; Edmondson & Moingeon, 1998; Popper & Lipshitz, 2000; Senge, 1990), while others (learning organisation scholars) see organisational learning as a specific process found within a learning organisation (Örtenblad, 2001, 2002; Watkins & Kim, 2018).

There is now a growing appreciation of the difficulties in applying a binary approach within the learning organisation literature. For example, Örtenblad (2019) now recommends a more nuanced contextual approach when judging if an organisation is a 'learning organisation' or not, recognising that learning will vary by industries, sectors or geography – instead of simply understanding when an organisation displays any specific process(es) or not. Similarly, DiBella (2011, p. 187) notes that the label of a learning organisation 'effectively bifurcates' organisations into either those which learn while others do not. DiBella (2011, p. 188) draws attention to the fact that organisations can 'simultaneously support multiple and diverse learning activities' where individual learners work within multiple learning environments. DiBella (2011) and Edmondson (2012) argued that learning in (or by) organisations is not a unitary, monolithic whole; instead, when considering learning in or by organisations, a more nuanced approach is needed than simply a binary approach to learning (or not).

Current thinking within the learning organisation literature shows a movement towards greater recognition of the specific organisational context and complexity when applying a prescriptive and normative learning organisation categorisation. Acknowledging that there are many prescriptive and advocacy works within the learning organisation literature, Watkins and Dirani (2013) have also

argued that the field draws on empirical evidence to identify factors that help organisations learn instead of purely setting out simple prescriptive steps.

1.4 Learning organisations in military professional and military scholarly literature

Even with its definitional ambiguity and the diversity identified within the organisational learning and learning organisation scholarly community, the learning organisation concept remains attractive to military practitioners and scholars. For example, Dyson (2019) argued for greater engagement between military practitioners and organisational learning scholars to improve NATO's learning organisation capabilities and the lessons learnt process. Similarly, given the military's need for continuous improvement of its performance within the competitive domain, military learning scholars (from the historical, sociological lens of military learning such as Catignani (2014), Dyson (2019, 2020), Foley et al. (211), Marcus (2015, 2019), Serena (2011)) have all argued that lessons learnt processes (and explicit organisational learning processes) provide a mechanism for improving military learning. Learning which, ultimately, improves military performance. While some military learning scholars appear to pay less attention to the definitional issues within the learning organisation construct (such as Dyson, 2019), others (Talbot, 2013; Talbot et al., 2014) have argued for a more nuanced approach to applying a learning organisation construct to militaries and other organisations. Consequently, I build on the more critical view of the learning organisation construct to help explain the issues emerging from applying the AALO construct to the Australian Army.

1.5 Australian Army as a learning organisation?

In the early 2010s, the Australian Army sponsored the AALO research project, which was conducted by the Australian Defence Science and Technology Group[8] (DSTG). The project aimed to measure and monitor the learning capabilities of the Australian Army using Senge's (1990) construct of a learning organisation, which Senge popularised in his book *The Fifth Discipline: The Art and Practice of the Learning Organisation* (and interest peaked over the next few decades). Other militaries have also applied Senge's (1990) idea of a learning organisation to understand their learning functioning better, for example, US (DiBella, 2010; Snyder, 2016; Williams, 2007), UK (Catignani, 2014; Dyson, 2019, 2020; Nagl, 2005), Canada (Buchanan, 2011), European (Antonacopoulou et al., 2019; Hasselbladh & Ydén, 2020), and Asian militaries (Dhananjaya Dahanayake & Gamlath, 2013).

[8] Previously called Australian Defence Science and Technology Organisation (DSTO) at the time of the AALO project.

Yet, there remains little consistency or coherence in the application and assessment of the learning organisation model within militaries[9].

The AALO research objective was to provide evidence-based guidance to improve Army practices (Drobnjak et al., 2013; Stothard et al., 2014). I led the team to develop and implement the quantitative survey to measure the Army's learning organisation capabilities. As such, I reviewed the learning organisation literature (Talbot et al., 2014), developed and administered the Australian Army-specific questionnaire (primarily based on the Dimensions of a Learning Organisation Questionnaire, DLOQ) (Watkins & Marsick, 1996). The Australian Army Learning Organisation Questionnaire (AALOQ) was made up of several questionnaires after evaluating the range of scholarly learning organisation questionaries (Stothard, 2014).

The AALO aimed to 'diagnose' the Australian Army's relative strengths and weaknesses across all the dimensions within the learning organisation construct. As such, the project had a very applied focus, aiming to inform senior Army decision-makers and recommend actions, rather than any scholarly ambition to evaluate the learning organisation theory or evidence. Nevertheless, while the aim of the AALO research project was not to evaluate the theory or logic of the learning organisation construct, in chapter 2, I argue that the fundamental theoretical and logical flaws of the AALO prevented the aspirations of the research project being fulfilled, despite providing a practical measure of the Australian Army's learning dimensions.

1.6 RESEARCH PROBLEM

The research problem encompasses several issues:

1. There is a continuing need for the Australian Army to adapt, innovate and continuously improve its warfighting capability, to optimise the technical and organisational advantages we have within our increasingly volatile local region (i.e., the Indo-Pacific).
2. Military practitioners and military learning scholars widely use the learning organisation construct as a mechanism for improving military organisations' capabilities.
3. However, the definition, theory and empirical operationalisation of the learning organisation construct is ill-defined and vague within the learning organisation and organisational learning literature.

[9] This pattern reflects the broader scholarly and practitioner literature surround learning organisation and organisational learning, as many have noted (DiBella, 2011; Talbot et al., 2014).

1.7 RESEARCH AIM

The Australian Army, similar to many other nations' militaries, aims to improve its capacity to innovate and win on the next battlefield; to do this, senior Army leaders have outlined the Army's goals to support and improve its learning processes, and learning organisation principles are now included in Army training doctrine. The overall research aims to identify and evaluate the contingencies under which the Australian Army learns best, and next, to provide evidence-based recommendations that improve its capacity to learn. The current state of our knowledge on the Australian Army's learning organisation capability is limited and primarily drawn from my research undertaken as part of the AALO research project. As implemented in the original AALO, the learning organisation construct suffers from the same definitional and empirical diversity reflected in the scholarly literature. The vague and diverse definitions and theorising have led to significant gaps in both military scholarly knowledge and also in the provision of practical, evidence-based recommendations. In particular, there are significant gaps in understanding and evaluating contingencies that support collective learning in the Army.

1.7.1 THESIS OVERVIEW

This thesis will, first (in chapter 2) critique the AALO and identify three fundamental flaws in confounding definitions and misspecification. In response, I draw on the multidimensional and multilevel approach (from the management and organisational behaviour literature) to, first, identify the consequences of the flaws and misspecifications, and then reconceptualise the AALO as an empirically grounded, multilevel, multidimensional taxonomy.

Next (in chapter 3), I theorise and test if the AALO construct is, first, measurable as an individual- and team-level phenomenon and, second, if it is the team-level, whether it is a real team property or a statistical artefact, and finally, if the individual- and team-level DLOQ construct are nomologically isomorphic. Chapter 3 is made up of (i) my published research article and (ii) my reflections on the utility of reconceptualising the AALO as a multilevel taxonomy to draw on multilevel theory and methods. Drawing on the military learning and practitioner literature and identifying the need for a research focal level from the AALO taxonomy, I identify that the most problematic level of learning within the Australian Army (and other militaries) is the team (or collective) level. Then, team learning becomes the focus of the thesis; I identify the contingencies that affect Australian Army team learning and provide evidence-based recommendations.

Focusing on team learning, chapter 4 presents a literature review of the effect of hierarchy (team power disparity and teams in extreme environments) on team learning. Moreover, I review the known team-level contingencies which shift the typically negative effect of team power disparity on team learning. Team level contingencies situate the current understanding of how team power

disparity (i.e., hierarchy) affects team learning and the factors known to shift the effect positively or negatively.

Chapter 5 presents two published papers; the first theorises and the second tests a team-level moderated mediation model and introduces two new contingencies. I introduce a new team climate (or mediator)—team egalitarianism—to help explain when Australian Army teams learn. Next, I theorise that (and test whether) hierarchical teams with a greater shared sense of egalitarianism (even in the face of clear rank differences) are more likely to have a greater degree of team learning behaviours. Also, I introduce a new team context (moderator)—environmental hardship (operationalised as deployment)—which explains the shifting relationship between hierarchy, team egalitarianism, and team learning. I theorise that greater exposure to shared environmental hardship in hierarchical teams triggers rethinking or re-evaluating the expected or stereotyped team relationships and reduces the typically adverse effects of hierarchy in such teams. These papers aim to identify when and where Australian Army teams learn.

Chapter 6 focuses on examining the individual-level multiple mediation model, which proposes and tests the effect of specific leadership styles on, first, psychological equality (the individual level construct of egalitarianism) and, finally, on team learning. This paper aims to provide evidence-based recommendations for Army by evaluating which leadership style improves, first, psychological equality and ultimately team learning. Again, the analysis aims to identify the parameters which shape how team members learn within the Australian Army teams.

Overall, my research demonstrates that team egalitarianism, team context (e.g., shared, environmental hardship as deployment) and leadership styles all play significant roles in shaping how Australian Army teams learn. Chapter 7 is a discursive paper that brings together the findings from my thesis and presents it to military practitioners. The paper (the discussion, chapter 7) has been submitted to the *Australian Army Journal*, a military practitioner scholarly publication aimed to inform Australian military professionals. Chapter 8, the final chapter, is a short, reflective piece that outlines the shortcomings of my thesis and asks, where to from here?

2 CRITICAL REVIEW OF AUSTRALIAN ARMY LEARNING ORGANISATION RESEARCH

'The only sure weapon against bad ideas is better ideas.' Alfred Whitney Griswold, 1954

The chapter offers a critical review of the AALO construct by identifying theoretical and logical flaws; these flaws emerged from (i) a confounding definition of the AALO, (ii) a misapplication of systems thinking, and (iii) lack of clarity around inclusions or exclusions within the AALO multidimensional construct. I then examine the multidimensional concerns by first exploring the logical consequences of specifying AALO as either a unidimensional or multidimensional construct using illustrative mediation and moderation examples. Next, I examine multilevel concerns and briefly review how recent multilevel methods and theory can be applied to reconcile historical debates about the multilevel nature of a learning organisation (e.g., anthropomorphism and reification). Finally, I bring together the multidimensional and multilevel concerns and reconceptualise the AALO as an empirically grounded, multilevel and multidimensional taxonomy. By the end of chapter 2, the logical and theoretical flaws in the AALO model have been identified and addressed by proposing an alternate reconceptualisation. Treating the multilevel, multidimensional learning organisation model as an empirically grounded taxonomy offers a more defensible scholarly terrain from which to propose and test specific hypotheses.

2.1 OVERVIEW: AUSTRALIAN ARMY LEARNING ORGANISATION RESEARCH PROJECT

To address additional demands for greater responsiveness to changing warfighting contexts, the Australian Army sponsored a research project (the AALO research project) which had two main components: a quantitative study (i.e., a questionnaire) and a qualitative study (i.e., focus groups). Together, the questionnaire and the focus groups were designed to triangulate the learning organisation capabilities of the Australian Army and aimed to measure and monitor the Australian Army's range of organisational processes. The main research question guiding the DSTO project was to understand the extent to which the Australian Army is a learning organisation, and consequently, to understand how to improve the Australian Army's learning capabilities.

2.1.1 MY ROLE IN THE AUSTRALIAN ARMY LEARNING ORGANISATION RESEARCH PROJECT

I was the team lead in the AALO quantitative study, and I constructed, administered and analysed the questionnaire as part of my work at Land Division in the DSTO. The development of the questionnaire is described in Stothard (2014) (see Appendix A) and was primarily (but not solely) based on Watkins and Marsick's (1996) DLOQ. In the second wave, we added the Multifactor

Leadership Questionnaire (MLQ) (Avolio, 1999) to understand the effect of leadership on the various organisational dimensions. The questionnaire was distributed in two waves and sampled over 10% of the Australian Army in each wave. The survey design strategy was stratified by geography and team function. Units (teams) were selected from across Australia, and all the team members were approached by civilian researchers (including myself) to complete the questionnaires. While the primary collection method was in person using paper-based questionnaires, the later waves were supplemented by using an online version of the questionnaire. Finally, we reported each unit's aggregated profile back to each unit's senior leadership. I, together with my team, reported on the study's outcomes in the scholarly journals and corporate reporting in Defence (Drobnjak et al., 2013; O'Toole & Talbot, 2011; Stothard et al., 2013).

2.1.2 Rethinking the Australian Army Learning Organisation construct

The trigger for the AALO research project was a practical question: what and how can the Australian Army senior leaders improve their organisation's capacity to learn? Given the popularity of Senge's (1990) learning organisation construct at the time, it is not surprising that this question was framed in terms of such a construct. Similar to many other institutions at the time, the Australian Army senior leaders drew on the learning organisation construct as an explanatory mechanism (Pedler & Burgoyne, 2017). In response, we understood the learning organisation as a type of organisation within which multiple learning processes occur (including organisational learning) (Talbot, 2013; Talbot et al., 2014). However, as I struggled to statistically and analytically specify the learning organisation construct using rigorous statistical modelling techniques (such as structural equation modelling), I came to rethink the utility of conceptualising the AALO as an *a priori* contingent model. In particular, I appreciated that the lack of definitional clarity made it increasingly difficult for the model to explain when, how or why one factor might (preferentially) affect another.

In response, I draw on the broader organisational behaviour and learning literature and the system dynamics literature to review how the AALO was theorised critically and then implemented the learning organisation construct. In this, I followed Easterby Easterby-Smith et al. (2000, p. 787) observation that learning organisation practitioners 'often draw on more academic literature [organisational learning and behaviour] in order to help them understand the challenges they face'. In my rethinking, I am also answering Grant (2021) call for us to stop and rethink our ideas. First, in my rethinking of the AALO construct, I turned to the fundamental construct underlying learning organisation, namely, learning as a nested phenomenon (e.g., learning by individuals, within teams, within organisations).

2.2 The Australian Army Learning Organisation

When first considering the AALO in early 2010s, we reviewed the learning organisation as a theoretical construct and highlighted the evolution of a learning organisation to situate its current use within the Australian Army (Talbot et al., 2014). In this thesis, I further scrutinised Senge's (1990) learning organisation which necessitates five disciplines (or individual practices):

- Personal mastery: continual self-improvement (e.g., 'personification of the LO [learning organisation]' Talbot et al., 2014, p. 21).
    - Army's notion of professional mastery aligns with Senge's mastery; for example, De Somer and Schmidtchen (1999, p. 3) define professional military mastery as an 'ability to perform given competencies, the awareness of why they are being performed, the flexibility to perform them in a range of circumstances, and the self-confidence to apply them in conditions of risk and ambiguity'.
- Mental models: a widely used construct within team research, mental models are the ingrained assumptions of how the world works which inform action (Senge, 1990, p. 8). They are particularly prevalent within military team research (Goodwin et al., 2018).
- Building a shared vision: this involves leaders facilitating the collaborative setting, owning and implementing a joint vision, rather than merely imposing their vision upon organisational members (Watkins & Marsick, 1993, 1996), and Senge (1990, p. 9) claimed, to evoke 'commitment rather than compliance' within a learning organisation.
- Team learning: Senge (1990, p. 10) contended that 'teams, not individuals, are the fundamental learning unit in modern organisations… unless teams can learn, the organisation cannot learn'. Senge's (1990) construction of team learning relies on the idea of dialogue (and is contrasted against discussion). In this sense, Senge (1990) defined dialogue as a form of shared meaning-making that gains new insights and contrasts against discussion (which he sees as a more formal debate so that one can 'win' within a discussion).
- Systems thinking[10]: the personal practice of an individual's ability to see the relationships between the parts, providing a contextual awareness within which an individual can make decisions and learn.

[10] Senge (1990) applies systems thinking in two different ways within his book; first as an individual-level discipline (as described here), and also as an explanatory mechanism at an organisational level when he appeals to systems thinking/dynamics as the 'why' and 'how' the five disciplines and organisational systems interact to create a learning organisation. The critique focuses on the organisational-level application of systems thinking to explain how, why or when multilevel components.

Together, these five individual disciplines are the foundation for developing Senge's (1990) learning organisation. The AALO literature review then synthesised the dominant themes from the broader learning organisation literature into the following:

- Specific leadership practices and actions support individual and team learning.
- Organisational structures, processes and practices (e.g., lessons learnt, information distribution) support organisational learning.
- Team climates and practices impact learning within teams.
- Knowledge management systems (formal and informal) are a necessary but not sufficient condition for supporting a learning organisation.
- At an individual, cognitive level, a learning organisation also requires shared mental models and a 'sense of connectivity derived through systems thinking' (Talbot et al., 2015, p. 76).

The fragmented nature of the theoretical literature around a learning organisation makes it difficult to achieve theoretical consensus (Dimovski & Škerlavaj, 2005; Ellinger et al., 2002; Goh & Richards, 1997; Lähteenmäki et al., 2002). One consequence of the definitional diversity is that lack of a consistent measure of the construct (Dimovski & Škerlavaj, 2005; Lähteenmäki et al., 2002; Tsang, 1997), with the literature generally unclear about how to move from the diversity of theory to systematic measurements of the learning organisation characteristics or concepts (Talbot et al., 2014).

2.2.1 Systems thinking as an explanatory mechanism within Senge's Learning Organisation: Brief critique

Obscure mechanisms of action or imprecise implementation within the learning organisation construct can be attributed to Senge's (1990) original use of systems thinking (and systems dynamics) as the explanatory mechanism of his learning organisation construct. In particular, criticisms emerge from the systems thinking and systems dynamics literature (Cabrera, 2006; Cabrera et al., 2015; Merali & Allen, 2011). Many organisational scholars have criticised Senge's (1990) descriptions and mechanisms within the learning organisation as 'maddeningly vague' (Peters, 1992, p. 385), obscure, mystical, and utopian (Burgoyne, 1999; Finger & Burgin Brand, 1999; Friedman et al., 2005; Grieves, 2008; Ortenblad, 2007). For example, Senge (1990) uses Bohm's (1988) 'New Physics' and Checkland (2000) soft systems thinking as metaphors without ever attempting to identify any concrete or specific mechanisms. While the organisational scholarly critiques have helped to identify the emerging problems with Senge's (1990) construction of a learning organisation, the critiques emerging from systems thinking literature (e.g., Cabrera, 2006; Cabrera et al., 2015; Caldwell, 2012; Merali & Allen, 2011) better identify the theoretical flaws in Senge's (1990) application of systems

thinking as an organisational mechanism in his learning organisation construct. The systems thinking critiques will be further explored later in this chapter.

Overall, the lack of clarity around the relationships within the elements that make up Senge's (1990) learning organisation model poses significant theoretical, empirical and practical difficulties. In particular, the obscure nature of Senge's elements, dimensions, and practices directly affects practitioners and leaves us without a solid evidence base for recommendations. The unclear contingencies within Senge's (1990) models mean that we cannot identify specific points of intervention. Thus, obscuring or mystifying the definition and construction of a learning organisation has implications beyond the scholarly or academic literature; it directly impacts the utility and effectiveness of practical interventions within organisations. Given that the learning organisation literature is, typically, focused on providing practitioners with an empirical evidence base (Örtenblad, 2019), this gap has elicited calls for more attention to be paid to identifying contingencies within the learning organisation construct.

2.2.2 AALO: Dimensions of Learning Organisation Questionnaire

In the absence of a consistent or coherent approach to measuring learning organisations across the whole literature, I evaluated a range of different learning organisation models and measures (Stothard, 2014). After evaluating the available learning organisation measures, I drew on Marsick and Watkin's (1996) Dimensions of a Learning Organisation to operationalise the nebulous construct of a learning organisation. The AALO was primarily (but not solely) measured using Marsick and Watkin's (1996) DLOQ. The DLOQ is made up of seven dimensions:

- create continuous learning opportunities
- promote dialogue and inquiry
- promote collaboration and team learning
- establish systems to capture and share learning
- empower people to create a collective vision
- connect the organisation to its environment
- provide strategic leadership for learning.

Other components were included to improve the measurement of a range of Army-specific organisational characteristics thought to shape individual and organisation performances, including organisational trust and specific leadership styles (e.g., transformational and transactional leadership were measured using the Multifactor Leadership Questionnaire, MLQ (Avolio, 1999; Bass et al., 2003). The AALO nomological network was built on the DLOQ nomological network (Yang et al., 2004) and adapted to suit the Australian Army context. I added several dimensions (such as organisational trust) and, after piloting and testing, removed the DLOQ outcome indicators (e.g.,

financial performance and knowledge performance). In the pilot questionnaire, it was discovered that respondents were unable to answer the financial outcome and knowledge performance questions meaningfully (Stothard, 2014). The resulting AALO model was a multilevel construct that focused on the individual, team and organisation levels (see Fig 1).

FIGURE 1: CONCEPTUAL MULTILEVEL CONSTRUCTION OF AALO

Although there were no specific systems thinking dimension or measure within the AALO, nevertheless, the AALO was developed within the tradition of systems thinking/dynamics via Senge's (1990) learning organisation model use of systems thinking. Much of Australia's Defence research and thinking is situated within systems thinking, and similar operational research approaches emerging from soft systems methods (e.g., Chen & Unewisse, 2016; Cook, 2004; Cook et al., 1999; Omarova et al., 2018; Wilson et al., 2020). Given that Senge's (1990) learning organisation explicitly draws on systems thinking as an explanatory mechanism within his learning organisation model, the uncritical acceptance of such an explanatory approach within the AALO, on reflection, is not a surprise.

Conceptualised as a multilevel hierarchy (see Fig 1), the different AALO levels become clearer. However, what is still not clear in Fig 1 is the expected nature of the interactions between the dimensions or levels. To better conceptualise the AALO multilevel interactions or causal relationships, I constructed a conceptual nomological network by drawing on Yang et al.'s (2004) DLOQ nomological network (see Fig 2). Yang et al. (2004) grouped the individual and team DLOQ dimensions into a 'people' category, and leadership, systems and connection to the environment into the 'system' category, and finally, the 'outcomes' into their category. The aim was to replicate the

approach of Yang et al. (2004) and use structural equation modelling to evaluate the nomological network to establish the causal relationships within the AALO. Again, the nature of the mechanisms or specific relationships between the dimensions or levels were not made explicit within the nomological network (see Fig 2). Instead, the AALO follows Senge's (1990) assumption that the learning organisation can be viewed as a system within the systems dynamics paradigm. In this, the AALO was situated firmly within the systems thinking paradigm, which dominates Australian Defence organisational research (e.g.,Omarova et al., 2018).

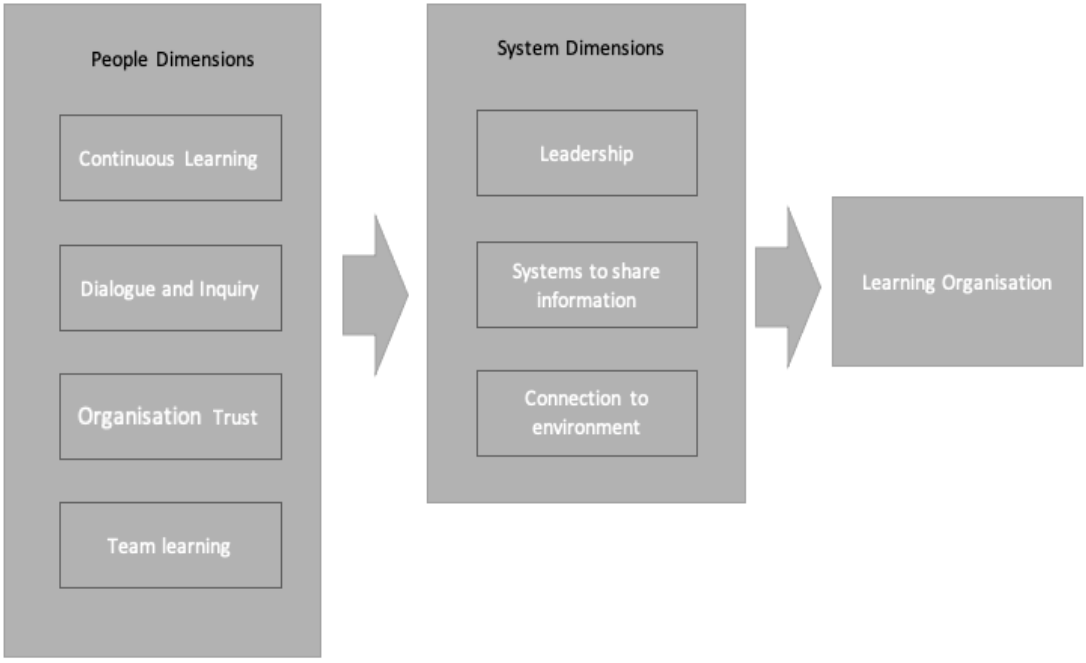

FIGURE 2: AALO NOMOLOGICAL NETWORK (ADAPTED FROM YANG ET AL., 2002)

2.2.3 MISSPECIFIED ORGANISATIONAL SYSTEMS THINKING IN AALO: THEORETICAL IMPLICATIONS

The critical assessment of the AALO model draws on recent criticism emerging from systems thinking and organisational behaviour literature (Cabrera, 2006; Cabrera et al., 2015; Caldwell, 2012; Grieves, 2008). Namely, the critique identifies that systems thinking (by itself) provides no explanatory mechanisms of how actions, knowledge or behaviour might propagate throughout a human system (such as an organisation) (Cabrera et al., 2015; Caldwell, 2012). While recognising that systems thinking has a broad appeal (particularly in Australian Defence research), the recent critique of systems thinking identifies that many applications of systems thinking and reasoning to organisations (including Senge's (1990)) are based on metaphor and analogy, rather than an examination of specific cross-level mechanisms (Cabrera, 2006; Cabrera et al., 2015; Caldwell, 2012). Further, systems thinking's claims of holism (i.e., the whole is more than the parts) 'is meaningless' because it fails to define any boundaries and, therefore, does not limit the embeddedness

of any systems components (Cabrera, 2006, p. 62). Critics recognise that systems thinking by itself provides no explanation or guidance for understanding how exactly a multilevel and multidimensional organisational phenomenon (such as AALO) may occur.

Senge's (1990) popularisation of systems thinking as an explanatory mechanism within the learning organisation construct continues to influence the learning organisation field and AALO in particular. In critiquing Senge's (1990) application of systems thinking to describe a learning organisation, I am not intending to extend my critique to all applications of systems thinking to organisations. For example, organisations are rightly characterised as complex systems made up of discrete elements such as teams (Klien & Kozlowski, 2000; Mathieu & Chen, 2011). In particular, systems thinking has been the foundational theory of the multilevel paradigms emerging from management and organisational behaviour literature (Bliese et al., 2007; Eckardt et al., 2020; Klein & Kozlowski, 2000; Mathieu & Chen, 2011). Taking a systems approach has an appeal within organisational behaviour and management literature since it 'allows us to deal with the idea that the component parts of a system can best be understood in the context of relationships with each other and with other systems, rather than in isolation' (Merali & Allen, 2011, p.55). For example, the multilevel paradigm draws on systems thinking while also drawing on a range of organisational behaviours and theories to explain the specific mechanisms of action with organisational systems (Eckardt et al., 2020; House et al., 1995; Klein & Kozlowski, 2000; Rousseau, 1985, 2011). However, in Senge's (1990) application of systems thinking within his conceptualisation of a learning organisation, there are significant flaws in systems thinking as an explanation or untheorised mechanism of action (Cabrera, 2006; Caldwell, 2012).

The three fundamental, logical problems emerging from Senge's (1990, p. 223) 'holistic view' of a learning organisation (Cabrera, 2006; Caldwell, 2012) and from the proliferation of learning organisation definitions within the learning organisation literature more broadly (Örtenblad et al., 2013; Reese, 2020a, 2020b; Talbot et al., 2014) are as follows:

1. Confounding definitions: A learning organisation is defined by both its effects and causes (i.e., team learning is both an input and outcome within the model).
2. Defining learning organisation boundaries:
    a. System boundaries: it is not clear what is or is not included within the learning organisation as a system.
    b. Embeddedness: learning organisation models fail to identify each dimension's or level's distinct influence or mediating processes and outcomes.

These logical flaws are also present in the AALO model and have confounded attempts to disentangle the conceptual and theoretical flaws within the learning organisation model applied to the Australian Army.

In summary, measuring the AALO primarily used the DLOQ (Marsick & Watkins, 1996; Yang et al., 2004) adapted to the specific Australian Army context. As a measure of specific organisational, team and individual characteristics, the outcomes of the AALO provided the Australian Army's senior leaders with insights into critical organisational processes and practices which were otherwise invisible. In this sense, the outcomes of the AALO were successful in providing the means of measuring the Australian Army's learning organisation dimensions (Drobnjak et al., 2013; Stothard et al., unpublished, 2014). However, questions remain concerning the AALO logic and conceptualisation.

2.2.3.1 Confounding definitions: Learning organisation as cause and effect

One logical flaw in the AALO model (in Fig 2) is that it is defined in terms of its effects; the problem this creates for the study of learning organisations should be evident. If we understand learning organisation effectiveness in terms of desirable effects on organisations (e.g., Watkins & Dirani, 2013; Watkins & Kim, 2018), defining a learning organisation in terms of its outcomes is problematic. In this sense, a learning organisation model *must* be valid since if it is not learning, then by definition it is not a learning organisation. The problem is that the inclusion of perceptions of learning organisation is both a predictor (e.g., continuous learning) *and* an outcome (e.g., a learning organisation).

In response to the confounding effect of including desired outcomes into the predictors or inputs, the obvious move is to separate the expected causes from its effects. For this, we need to understand the directionality of the relationships between the factors or dimensions and the expected strength of the relationships.

2.2.3.2 System boundaries: Learning Organisation as single or multidimensional?

For any construct to be meaningful, it should clarify why (or how) some dimensions/factors are included and others are not (e.g., following Van Knippenberg and Sitkin (2013)'s argument). The answer to the question, 'Why is this a dimension/factor?' cannot be that all factors effectively support learning in organisations. It is a logical flaw to define a concept in terms of its effects, and such definitions would disqualify the concept from studying its effects; defining the learning organisation model by its effect (e.g., in Fig 2) does nothing to clarify why other organisational characteristics are included in the learning organisation concept. There is general agreement about the range of characteristics that determine an organisation's capability to learn (at the individual, team and

organisational levels) (Örtenblad, 2002, 2018, 2019; Talbot et al., 2014; Watkins & Dirani, 2013; Watkins & Kim, 2018). Yet relatively little attention has been paid to the contingencies or relationships between these characteristics (Örtenblad, 2018; Örtenblad et al., 2013; Watkins & Dirani, 2013; Watkins & Kim, 2018) within the learning organisation literature[11]

These are not just problems in principle but also in practice. For example, several scholars have critiqued the DLOQ for multi-collinearity and discriminant validity, arguing that due to DLOQ dimensions loading to a single latent variable, that the learning organisation model should be considered a unitary or single dimensional construct (Kim, Egan & Tolson, 2015; Pokareal & Choi, 2013). However, high correlations are not problematic if the constructs are expected to be highly related and explained theoretically (Knippenberg & Sitkin, 2013). Similarly, highly correlated dimensions or factors loading to a single latent factor do not imply that the underlying construct must be understood as a single dimension (Knippenberg & Sitkin, 2013). The empirical evidence (e.g., high correlations and unidimensionality) does not discount the multidimensional nature of the learning organisation model in the presence of a strong theoretical argument. Any theoretical model can then be tested using appropriate quantitative modelling.

However, in the absence of theoretically clear boundaries or contingencies, empirical evidence showing highly correlated constructs fuel existing doubts about the conceptual distinctiveness of the learning organisation construct. The lack of clear theoretical or conceptual boundary makes it challenging to identify if or when the dimension or factor is vital to the underlying construct. Without sufficient evidence or theoretical reason, selecting factors that are not to be included remains obscure and arbitrary.

2.2.3.3 System boundaries: Embeddedness of systems and sub-systems?

Another logical flaw, also emerging from poorly specified (or misspecified) system boundaries, is one of embeddedness (Cabrera, 2006). Specifically, Senge (1990) claimed that the learning organisation is a unitary whole, so all components are considered part of the system. However, ‘claims of holism in systems thinking are meaningless because of the embeddedness problem—every whole is a part of a larger whole, ad infinitum’ (Cabrera, 2006, p. 63). Without a defined boundary around a system, the focal levels become all-encompassing. Applying a systems approach needs a clear definition of what is or is not included within any specific system (Cabrera, 2006; Cabrera et al., 2015). System thinking scholars caution against using systems thinking without explicitly specifying system boundaries (Cabrera, 2006; Caldwell, 2012).

[11] In other scholarly literature fields (e.g., team learning), more effort has been put into understanding when and where learning occurs (e.g., contingent factors) (e.g. Bell et al., 2004).

In response to the theoretical and empirical needs for a clearer understanding of multilevel organisation systems, multilevel scholars have called for greater attention to be paid to boundaries and mechanisms (Bliese et al., 2007; Eckardt et al., 2020; Hoffman et al., 2019; Humphrey & LeBreton, 2019). Multilevel methods and theories have emerged from the same theoretical schools as soft systems thinking (i.e., from General System Theory) (Checkland, 2000; Von Bertalanffy, 1967, 1968). However, the multilevel perspective/paradigm (in the organisational behaviour and management fields) does not typically suffer from similar flawed application of systems thinking. Instead, scholars within the multilevel paradigm directly address the misapplication of systems thinking evidenced by Senge (1990). Within the organisational multilevel paradigm, much effort has been applied to identifying boundaries and mechanisms, including emergence and other bottom-up mechanisms together with top-down mechanisms, together with other complex interactions (AIken et al., 2019; Lange & Bliese, 2019; Mathieu & Luciano, 2019; Polyhart & Hendricks, 2019).

The importance of specifying an organisational systems' boundaries is a consistent refrain found within multilevel paradigms (e.g., Klien & Kozlowski, 2000; Rousseau, 1985). Applying the multilevel perspective to the AALO will help to clarify the boundaries of the organisational system. A conceptual boundary does act as a barrier; however, drawing a boundary does not prevent others from choosing different boundaries to reflect their research question and focal level better. Drawing on a multilevel paradigm from management literature helps to clarify the level of embeddedness within an organisational system, and in doing so, avoids the obscuration that misaligned system boundaries can produce, and follows the recommendations by current systems thinking scholars focusing on psycho-social systems proposed by Cabrera et al. (2015).

2.2.4 Misspecified organisational systems thinking in AALO: Practical implications

This section identifies the empirical consequences of a misspecified theory or model by reviewing contingent models (i.e., mediating and moderating models) and then identifying the implications of a misspecified model by working through an illustrative example. Significantly, building a theoretical model moves our understanding beyond 'if' there is a relationship between two or more variables (Cortina, 2016; Haveman et al., 2019; Johns, 2006; van de Ven & Poole, 1995). Instead, identifying the contingencies within a theory or model helps explain 'when' and 'how' variables interact (Cortina, 2016; Hayes, 2015; Hayes, 2017; Johns, 2006). In doing so, the conditional relationship between variables can be understood, thus contributing to the theoretical and conceptual knowledge of the field.

2.2.4.1 Overview: Mediation and Moderation in developing theory

A mediating factor (or mediator) triggers the dependent variable when the independent variable is engaged (Hayes, 2015). Identifying mediating factors helps identify the *why* by testing which elements/factors are essential for the theorised relationships (Cortina, 2016; Hayes, 2015; Hayes, 2017; Johns, 2006). A moderating factor identifies *when* or *where* a theorised relationship may occur (Cortina, 2016; Hayes, 2017; Johns, 1996). Understanding moderating factors (or moderators) helps to better understand the limits of generalising a theorised relationship, thus creating a more precise understanding of a theoretical relationships' boundaries. Moderator variables typically shift the relationship between the independent and the dependent variables, thus providing crucial contextual information. Together, understanding the mediating and moderating factors (i.e., contingencies) help clarify precisely when and where expected, or theorised, effects will (or will not) occur. It is for this reason that there have been recent calls, within both the learning organisation and organisational learning literature, for attention to be paid to the contingencies within the construct, namely, a learning organisation (Örtenblad et al., 2013; Schilling & Kluge, 2009; Watkins & Kim, 2018).

2.2.5 AALO: Conceptually mapping AALO as a multidimensional, multilevel model

The AALO is primarily based on the DLOQ (Watkins & Marsick, 1996) and is a multidimensional construct that aims to diagnose a range of organisational characteristics associated with improved organisational performance (Ellinger et al., 2002; Watkins & Dirani, 2013; Watkins & Kim, 2018). While there is consensus that the DLOQ is made up of seven dimensions examining individual, team and organisational characteristics, there is less consensus about exactly which dimensions are focused on what levels. For example, the nomological map of the DLOQ (Yang et al., 2004) argued that the dimensions could be grouped into either 'people' or 'structural' levels, while the AALO has grouped the DLOQ dimensions into the individual, team or organisational levels (Stothard, 2014). However, other scholars (Egan et al., 2004; Kim et al., 2015; Pokharel & Choi, 2015; Weldy & Gillis, 2010) have argued that the DLOQ is better as a single dimension (or unified) construct, where all seven dimensions load onto a single dimension (without specifying what organisational level any of the dimensions might be focused on). Within the DLOQ literature, there is little theory that argues for the primacy of one relationship between dimensions over the others, and consequently, mediation studies are few and far between (Örtenblad et al., 2013; Watkins & Kim, 2017).

To better understand how the theory and measurement of the AALO differ, the original nomological network of AALO (from Fig 2) is mapped against a multilevel and multidimensional matrix. It shows the expected conceptual relationships between AALO dimensions and levels (see Fig

2). In terms of theory, the AALO dimension of leadership, embedded systems to share learning, connection to the environment, and shared vision are deemed to be organisational; team learning/teamwork at the team level; and finally, dialogue and inquiry, continuous learning and organisational trust at individual levels. However, all AALO dimensions were measured at the individual level (Stothard, 2014). This gap or mismatch between focal theory and measurement is commonly found within multilevel organisational studies from the early 2000s (Mathieu & Chen, 2011).

This section focuses on exploring the practical and empirical implications of misspecified *multidimensional* AALO (the horizontal axis in Fig 3). This section primarily draws from Marsick and Watkins (1996) and others (Stothard, 2014; Stothard et al., 2014; Yang et al., 2003) to theorise the contingencies between the dimensions. The following section focuses on the theoretical and empirical implications of the misspecified *multilevel* AALO (the vertical axis in Fig 3). Finally, I bring these two sections together.

2.2.5.1 AALO AS A MULTIDIMENSIONAL MODEL

This section is modelled on Van Knippenberg and Sitkin's (2013) approach to evaluating the theoretical and practical implications of whether a phenomenon is either a single or multidimensional construct. In doing so, I show that the AALO is, logically, a multidimensional construct. However, while the AALO is better understood as a multidimensional construct, it is not yet clear what the expected relationships between the dimensions are since there is little consensus about the contingencies within the learning organisation literature (Örtenblad et al., 2013; Watkins & Kim, 2018).

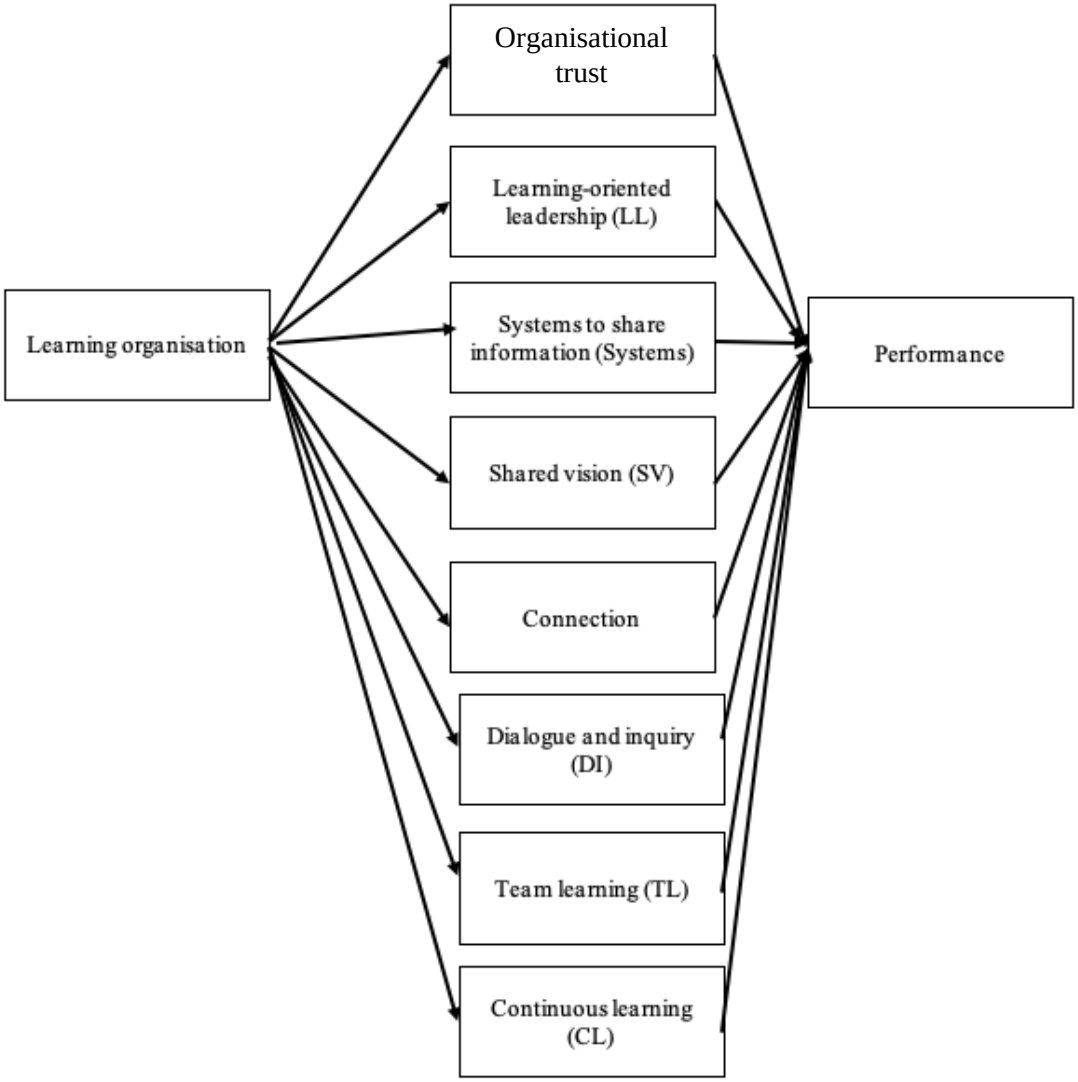

FIGURE 3: HYPOTHETICAL AALO - UNIDIMENSIONAL MEDIATION MODEL

All dimensions within a unidimensional construct are expected to have the exact causes and effects; this is a necessary (but not sufficient) condition for a unitary dimensional construct. The conceptual mediation model of a unidimensional AALO is illustrated in Fig 3; the underlying learning organisation construct influences all other dimensions, which mediates performance. Logically, a construct cannot be considered unidimensional unless all mediating factors also work through the exact causal mechanism(s) (van Knipperberg and Sitkin, 2013). If AALO is indeed a unidimensional construct, then, logically, all the dimensions should be affected by a proposed mediator or moderator in the same way. Such a conceptual case should then be made explicit, yet this is not seen in the literature (and certainly not the case for AALO). However, it is an important theoretical and conceptual point to make, given that there are repeated calls to define the learning organisation as a

single-dimensional construct. If a moderator was expected to influence the learning organisation's performance, and the learning organisation was a unidimensional construct,

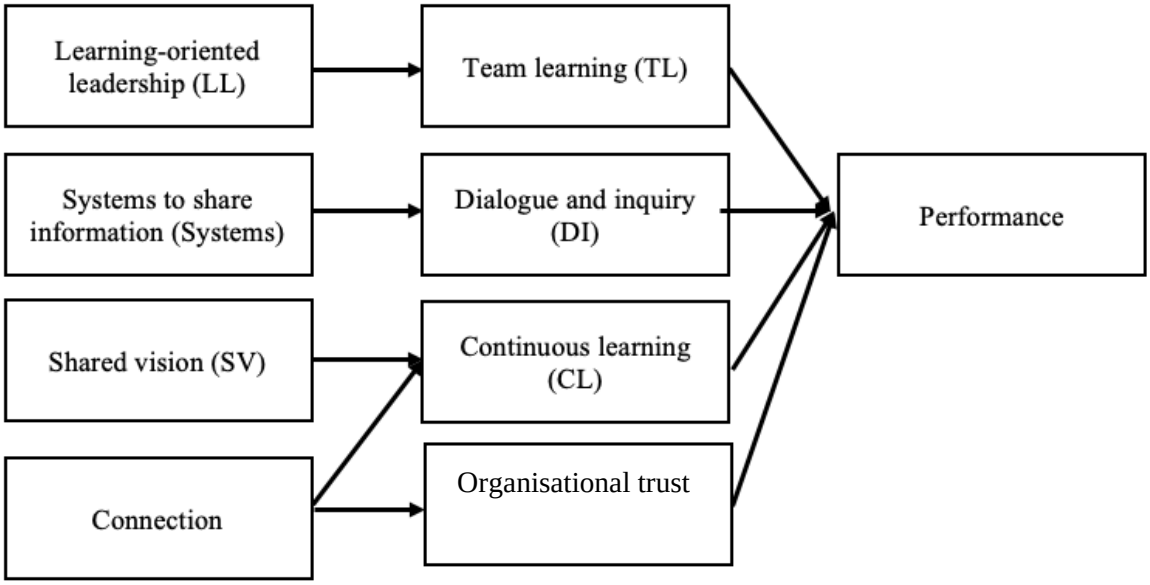

FIGURE 4: HYPOTHETICAL AALO - MULTIDIMENSIONAL MEDIATION MODEL

then the moderator should affect all mediators equally in Fig 4. Consequently, I argue that AALO (and the learning organisation more broadly) is, indeed, a multidimensional construct. In contrast, an illustrative example of a hypothetical mediation modelling is presented in Fig 5. It adapts Yang et al.'s (2003) DLOQ model as a full mediation model, where each of the 'people level' dimensions mediates the effect of the 'structural' level factors on organisational performance. This model can be contrasted against Fig 4, which shows the AALO as a single dimension (i.e., all dimensions equally mediate between the single 'learning organisation' dimension and organisational performance).

The theoretical and practical implications of a single-dimensional AALO (in Fig 4) show that, if the learning organisation is indeed a single, unitary dimension (as argued by Egan et al., 2015; Pokharel & Choi, 2015; Weldy & Gillis, 2010), then any proposed mediator or moderator should affect all the 'sub'-dimensions. However, if a moderator or mediator affects only a specific 'sub'-dimension(s) and not others, then the argument for the learning organisation construct to be a unitary whole is logically untenable.

2.2.5.1.1 MEDIATING MODELS: ASSESSING COMPETING LEARNING ORGANISATION MEDIATION MODELS

Comparing the hypothetical learning organisation models presented in Figs 4 and 5 illustrates the theoretical and practical implications of conceptualising mediation pathways. Fig. 5 shows an illustrative model (with unique mediation pathways between structural and people dimensions) compared to Fig. 4, which shows a fully mediated, unidimensional learning organisation. Both models

(Fig. 4 and 5) are derived from within DLOQ model literature; for example, Fig. 4 represents the single/unitary model proposed by Kim et al. (2015) and others (Pokharel & Choi, 2015; Weldy & Gillis, 2010), while Fig. 5 (adapted from Yang et al. 2004) represents a hypothetical/illustrative model showing unique mediation pathways.

This is not to suggest that the models in Figs 4 or 5 could or should not be tested – all are perfectly justifiable models from within the DLOQ literature. The point here is not whether there is a good conceptual case for either model. Instead, the point is that a mediation theory about learning organisation as a multidimensional or unidimensional construct requires each dimension and relationship path to be identified. This reasoning works both ways; a case for the mediating effect of a single learning organisation construct on another cannot be generalised to a case for a mediating role of learning organisation as a whole (because it would imply that the single dimension also mediates all learning organisation dimensions separately - a case that has not been made). Similarly, a generalised statement about a mediator of the learning organisation cannot be particularised to a mediating role – Dialogue and Inquiry for each dimension of a learning organisation (without a compelling case).

The problem with the mediation model for a learning organisation lies in the learning organisation-mediators relationship and the relationship with outcomes. There is some irony that even though the learning organisation is defined in terms of its effects, there is no clear conceptual statement of what these effects include, exclude, or why (Örtenblad et al., 2013; Watkins & Kim, 2017). Moreover, in studying the mediation models within the learning organisation literature, research has travelled across different levels of analysis: the individual, the group, team or business unit, and the organisation. What is missing from theory development in learning organisations is a contingent model which specifies the outcome and level of analysis under consideration - or a model that makes a direct and compelling case for the universal nature of the mediating processes identified.

2.2.5.1.2 Moderating models: Assessing competing moderation learning organisation models

The understanding of moderating influences on the relationship between the learning organisation and outcomes suffers from essentially the same problems identified for the mediation models (described above). There is no coherent conceptual statement of a moderation model (or why these would be universal main effects without any contingencies) within the learning organisation literature (Örtenblad, 2018; Örtenblad et al., 2013; Watkins & Kim, 2018). Following the analysis and recommendations of mediation research in the above section, the moderation model research leaves similar questions unanswered.

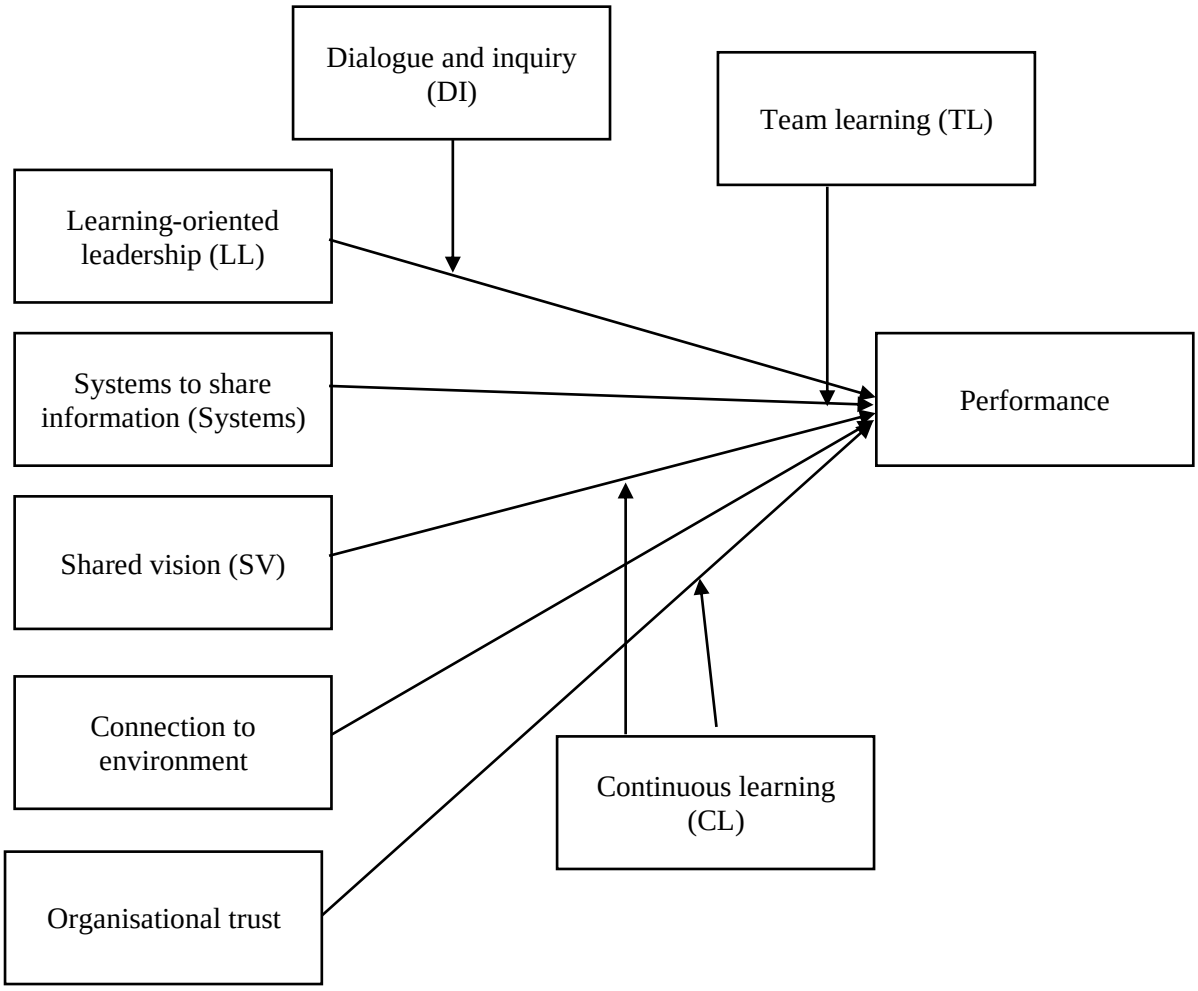

FIGURE 5: HYPOTHETICAL AALO - MODERATION MODEL

First, revisiting the now-familiar argument: for the learning organisation to be a unitary construct, the moderators should apply to each dimension of the learning organisation construct. A case for different moderators for different dimensions of the learning organisation can also be made (and may be more acceptable), but this would violate the principle of a unitary construct. If, as in Fig. 5, leadership's influence is moderated by Dialogue and Inquiry, Systems is moderated by Team Learning, and so on, we might have a sensible model. It cannot translate to the model in Fig. 7, in which the four structural dimensions are combined under the umbrella of the learning organisation. Alternatively, we might have the model displayed in Fig. 8, in which all three 'people' moderators influence all four 'structural' dimensions (and in this case, this is conceptually equivalent to the model presented in Fig. 7 because there is no violation of the notion of the learning organisation as a unitary construct).

Based on the notion that the learning organisation is a unitary/single-dimensional concept as argued by Kim et al. (2015), when developing a learning organisation model it must also be assumed that the moderation holds for all dimensions of the learning organisation, and presumably, in the prediction of all the outcomes. Similar to the mediation model logic, if the learning organisation was a single-dimensional construct, a moderating factor should affect all sub-dimensions. There is little theory within the learning organisation literature to guide such efforts and clarify how to make sense of any moderating variables. It is simply not clear how the diversity of idiosyncratic micro-theories and findings should be seen in relationship to each other (a recent review found there was little integration within the micro-theories and empirical papers, Örtenblad et al., 2013). The implication also seems to be that the moderation evidence should be merged with the mediators present to come to an integrated causal model of the learning organisation. At the least, such a model would not be very parsimonious.

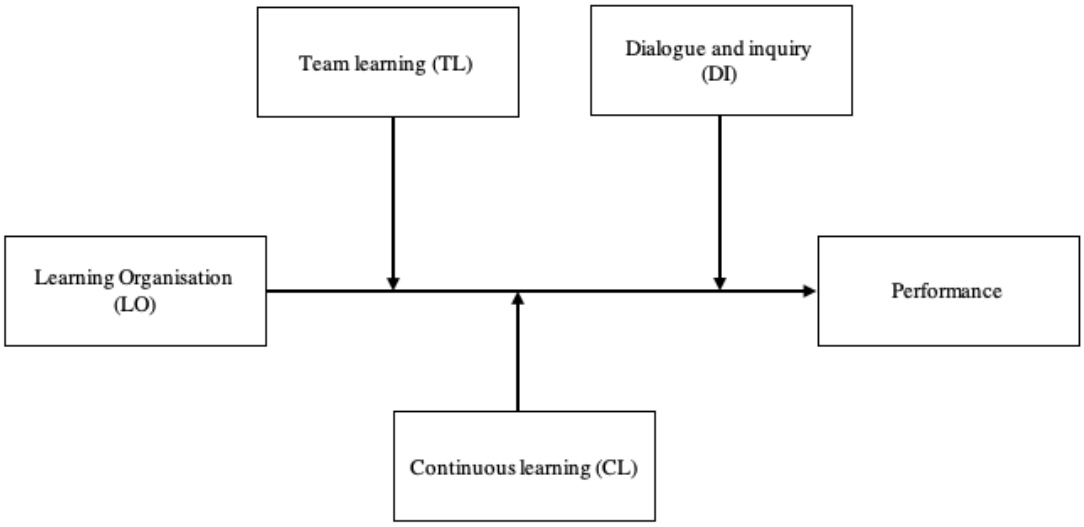

FIGURE 6: HYPOTHETICAL AALO - UNITARY MODERATION MODEL

Mediators can also be proposed and tested as moderators. While common in practice, this raises the question of how learning organisation mediation models and moderation models might be related. As before, the root cause of the problem lies in the ambiguity within the learning organisation concept itself. This ambiguity makes it difficult, if not impossible, to generate high-quality, integrated theory either deductively or inductively. In the absence of a well-theorised model of a learning organisation, a review of empirical evidence will be an insufficient basis for the more inductive derivation of theory.

These sections aimed to logically evaluate the claims that the learning organisation is a unidimensional construct and identifies the need for explicit theorising and conceptualisation to map the contingencies across the AALO dimensions. In particular, I demonstrated logically that the learning organisation should only be considered a multidimensional construct rather than basing the argument on empirical evidence alone. In summary, Kim et al. (2015) and others (Pokharel & Choi,

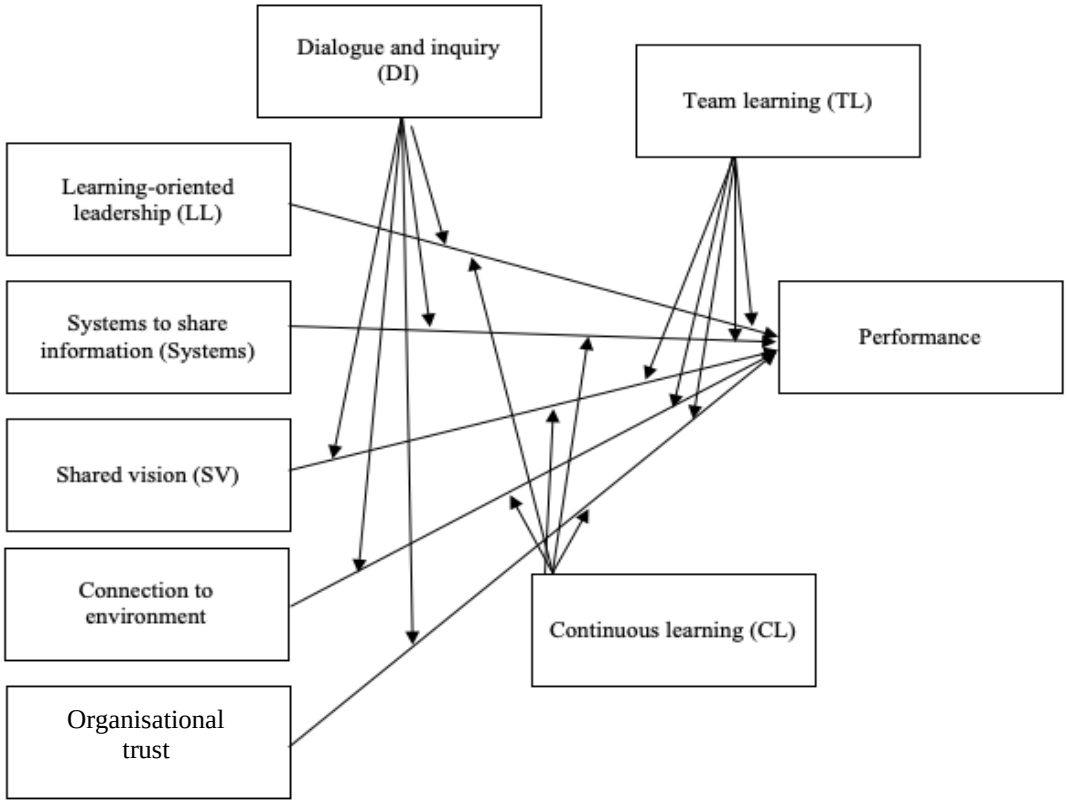

FIGURE 7: HYPOTHETICAL AALO - FULLY MODERATED MODEL

2015; Weldy & Gillis, 2010) claims that the learning organisation should be considered a unidimensional construct is logically untenable with the current empirical evidence that we have. If an empirical analysis favours a one-factor solution, this only indicates that the learning organisation construct taps into a shared underlying construct. It is *not* evidence that the construct *as defined* is singular and unitary, especially not when the construct is typically defined in multiple ways (Grieves, 2008; Örtenblad, 2018; Watkins & Kim, 2018). For example, the DLOQ has been developed with multiple dimensions from various empirical studies and case studies (Watkins & Dirani, 2013; Watkins & Kim, 2018; Yang et al., 2004). An empirical finding demonstrating a single, underlying statistical construct does not remove the evidence and conceptual definitions of a multidimensional construct. Instead of discounting the multidimensional nature of the learning organisation as Kim et al. (2105) and others (Pokharel & Choi, 2015; Weldy & Gillis, 2010) have done, the appeal for a single learning organisation construct should require further theoretical and conceptual work to explain how the multiple components act together.

2.2.5.2 AALO AS A MULTILEVEL MODEL

Overall, there has been consensus within the learning organisation literature that the learning organisation model is multilevel, in that there is agreement that it covers the individual, team and organisational levels (Grieves, 2008; Örtenblad, 2018; Watkins & Kim, 2018). Historically, there has been considerable debate about precisely what this means. Some scholars view this learning in and by organisations through an individual-level perspective. For example, Friedman et al. (2005) argued that defining anything except individuals as learners is anthropomorphic. Others such as Senge (1990) have applied a systems perspective and argued for 'holism' of a learning organisation where the team is the fundamental unit of learning. This has led to claims of reification, where the team or organisation as an abstract concept is considered concrete (Talbot et al., 2014). The nested nature and structure of organisations (namely, individuals nested within teams or groups and groups/teams nested within the larger organisation) has traditionally posed significant challenges to understanding the mechanisms that shape organisational (and individual) behaviour. Much recent effort has been paid to understanding the multilevel mechanisms which shape how individuals within teams, and teams within an organisation, and vice versa, learn (Bell et al., 2012; Kozlowski & Bell, 2008).

2.2.5.2.1 MISALIGNED THEORY AND MEASUREMENT: ANTHROPOMORPHISM AND REIFICATION

The acceptance of multilevel approaches to organisations resolves a long-held debate in organisational learning and learning organisation (and organisational behaviour more broadly) concerning reification and anthropomorphism of organisations' learning (Bell et al., 2012; Easterby-Smith et al., 2000; Watkins & Kim, 2018). The recent development of multilevel methods and theories within organisational behaviour and management literature is now being applied more widely; in this case, to organisational learning and learning organisations (Bell et al., 2012; DeChurch et al., 2019; Koeslag-Kreunen et al., 2018; Kostopoulos et al., 2013). The emerging multilevel approach offers more rigorous theoretical and empirical measures which illuminate the relationships and mechanisms occurring within nested phenomena. Nested data are found in organisations; for example, the individual (micro), team or group (meso) and organisational (macro) level relationships (AIken et al., 2019; Hoffman et al., 2019; Kostopoulos et al., 2013; Mathieu & Chen, 2011; Mathieu & Luciano, 2019; Polyhart & Hendricks, 2019).

Many scholars have recognised that specifying precisely what (or who) was doing the learning within either a learning organisation or organisational learning is conceptually and empirically difficult (Friedman et al., 2005; Grieves, 2008). There is general agreement that organisational learning is more than individual members' learning (Easterby-Smith et al., 2000; Kostopoulos et al., 2013), yet there is debate about exactly what the collective or organisational level learning looks like. Some scholars emphasise that organisational contexts (e.g., systems, procedures and structures) affect

individuals' learning (Fiol & Lyles, 1985), while others have argued that organisational learning is stored within the systems, procedures and structures (Grieves, 2008; Hedberg, 1981). For example, Hedberg (1981, p. 6) pointed out that, 'members come and go, and leadership changes, but organisations' memories preserve certain behaviours, mental maps, norms and values over time'. If this is the case, then *what* exactly is doing the learning? At this point, accusations of anthropomorphism have been made; namely, the attribution of a human capacity (i.e., learning) to a non-human entity (i.e., organisation), where 'simplistic extension of individual-level models [are applied] to model organisational learning' (Friedman et al., 2005, p. 22). Similarly, reification, where an abstract concept is treated as having a concrete existence outside its situating idea, has also been a concern in the learning organisation literature. For example, Friedman et al. (2005) pointed out that the construct of a learning organisation has become reified after Senge's (1990) popularisation of the idea of a learning organisation.

2.2.5.2.2 Multilevel theory and methods: Aligning theory and measurement

Recognising that the simplistic application of individual-level models was insufficient to adequately explain how collective or organisational levels (and vice versa) researchers now pay greater attention to multilevel phenomena and has lead to a 'classic Kuhnian' paradigmatic revolution within organisational behaviour (Mathieu & Chen, 2011, p. 611), The traditional micro vs macro-level debate initially created by misaligned theory and measurement has now been resolved by the increasingly sophisticated multilevel approach to understanding organisations (Chen et al., 2007; House et al., 1995; Mathieu & Chen, 2011). Within the multilevel approach, attention must be paid to aligning the focal level theory, measures and concepts (Klein & Kozlowski, 2000; Rousseau, 1985); in doing so, this multilevel approach has addressed the long-held concerns of anthropomorphism and (to a lesser extent) reification. As Eckardt et al. (2020, p. 22, italics as original) argued succinctly, 'theory building (development) without a multilevel perspective is *incomplete*; theory testing (methods and statistics) without a multilevel perspective is *incomprehensible*'. Likewise, there are recent calls to apply multilevel perspectives and approaches to the construct (Örtenblad, 2018; Watkins & Kim, 2017).

Drawing on the theory and practice of a multilevel perspective in this thesis will help situate the AALO's misaligned multilevel theory and measurement, and in particular, will help specify boundaries around Senge's (1990) application of systems thinking to the learning organisation construct. In this sense, I am following Cabrera et al.'s (2015) recommendations to use the systems thinking approach and specifying what is or is not considered part of the AALO.

2.3 Reconceptualising the AALO: An empirically grounded, multilevel, multidimensional taxonomy

In the absence of an *a priori* conceptual definition which (i) specifies and separates the AALO predictors from the AALO outcomes, (ii) identifies the boundaries of the AALO as a system, and (iii) justifies the inclusion and exclusion criteria for AALO dimensions, then there is little theoretical basis to group dimensions of the AALO into one construct, measurement, or experimental manipulation. Indeed, using the higher-order unitary label 'learning organisation' is inappropriate given the untenable logic outlined above. At the moment, the learning organisation literature can be considered to have created a 'complacency trap' (Levinthal & March, 1981) which has obstructed the development of understanding the AALO. As such, the current AALO approach needs to be re-framed by drawing on (i) multidimensional contingency models and (ii) multilevel perspectives to move our understanding forward. Reconceptualising the AALO construct is not to say that all ideas and insights from research into the AALO, or learning organisations in general, should be abandoned. Instead, problems have emerged when using Senge's (1990) unbounded learning organisation construct. The solutions include applying Cabrera et al.'s (2015) recommendations and re-specifying the inclusions and exclusions, separating the predictors and outcomes, and drawing on different theory and practice to propose and test alternate contingent models.

In summary, the following fundamental flaws or issues have been identified in the AALO as initially conceptualised, namely:

I. Confounding definitions: predictors and outcomes overlap conceptually.
II. Organisation systems are not specified or bounded (i.e., it is not clear what is or is not included when considering the AALO construct).
    a. The basis for inclusion or exclusion of the AALO dimensions is not clear, nor is there any clear theory to explore contingencies with the AALO.
    b. Within the AALO, neither the relationships between levels or dimensions nor cross-level relationships have been theorised.

In response to these problematic flaws within the original AALO, I am reconceptualising the AALO as an empirically grounded, multilevel and multidimensional taxonomy. In this, I am drawing on the learning organisation literature as the empirical basis. Instead of assuming any *a priori* relationships, I am characterising the AALO dimensions or levels as having no *a priori* relationship. This will allow researchers, including this researcher, to draw on a range of other theories and methods to propose and test other contingencies within and between the levels and dimensions.

2.3.1 Bounding the multilevel and multidimensional system: Reconceptualising AALO

The conceptual map of the AALO as a multilevel, multidimensional taxonomy is presented in Fig 10. The vertical and horizontal axes (levels and dimensions) show all the possible elements within the AALO. Note that no links have been drawn between the elements within the conceptual map/matrix; this reflects the lack of theory applied to the contingencies within the AALO. In this sense, the model in Fig 10 does not pre-suppose any contingencies. However, it also bounds the model to include these dimensions and levels (fulfilling a necessary condition for appropriate application of systems thinking, Cabrera et al., 2015).

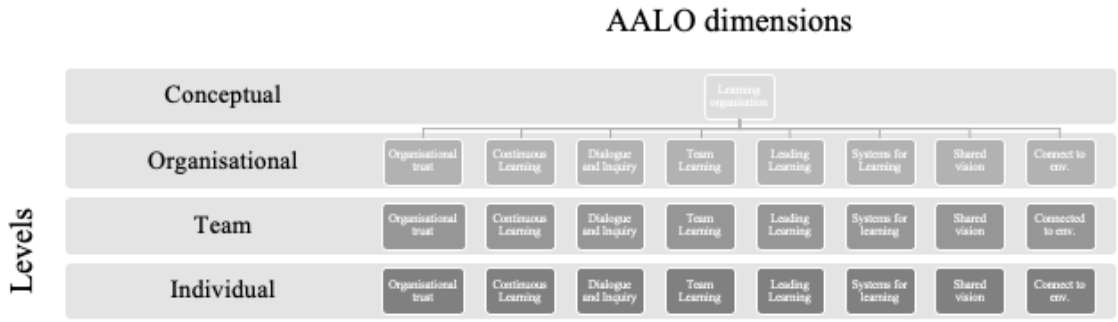

FIGURE 8: CONCEPTUAL MODEL OF THE AALO AS A MULTIDIMENSIONAL, MULTILEVEL TAXONOMY

In this, I can draw on recent theoretical and methodological developments in multilevel perspectives to specify the focal level (i.e., which layer of the vertical axis). Further, I draw on broader team and individual level literatures to theorise and evaluate the relationships between dimensions (i.e., which dimensions on the horizontal axis). Bringing these together (constructing a levels x dimensional matrix of the AALO) allows me to map out what is known and unknown within the AALO construct. The levels x dimensions matrix can then be used to better understand and map the inter-, and cross-level interactions implicit within the multidimensional, multilevel AALO construct (as outlined by Yang et al., 2003 and Stothard, 2014). In this sense, the proposed AALO levels x dimensions matrix/map is best understood as an empirically grounded taxonomy. In this, I am following a well-trodden path, with Easterby-Smith et al. (1999) noting that many learning organisation scholars move towards organisational learning/theory to help understand more problematic empirical issues within the learning organisation literature.

2.3.2 DEFINING AN OUTCOME: TEAM LEARNING IN AALO

Finally, in response to the identified problem of confounding definitions in the AALO, I will clarify the outcomes of the AALO model by removing the confounding effect of cause and effects. After evaluating the multilevel and multidimensional nature of the AALO in chapter 3, I will define team learning as the focal outcome of the AALO.

2.4 Chapter Summary

This chapter aimed to critically review the AALO construct and, in doing so, drew on recent developments in systems thinking literature to identify fundamental flaws in the original AALO conceptualisation. Like many other scholars (such as Friedman et al., 2005; Grieves, 2008; Tsang, 1997, 2017), I argue that the definitional fragmentation leads to obscure and vague definitions, which in turn makes proposing and evaluating contingencies far more difficult, if not impossible. I also suggest that one of the causes of this definitional confusion may be due to Senge's (1990) lack of specifications in his conceptualisation of the learning organisation construct and the Australian Defence research's typically insufficient theorising when applying systems thinking to organisations. Recent systems thinkers (Cabrera, 2005; Caldwell, 2012; Grieves, 2008) have argued that greater attention needs to be paid to specifying boundaries when applying systems thinking to specific, concrete issues such as organisations. Further, recent theoretical and methodological developments in the multilevel paradigm emerging from management and organisational behaviour literature can be meaningfully applied and overcome the historical debates surrounding nested phenomena such as learning in and by organisations (e.g., anthropomorphism and reification).

Bringing together the current systems thinking theory to bound the dimensions and multilevel paradigm to situate the individual, team, and organisational levels within the AALO frames the reconceptualised AALO as a multidimensional, multilevel taxonomy. Further, the confounding definitions will be clarified in Chapter 3, after I empirically evaluate the AALO to establish if it is, in fact, a multilevel and multidimensional construct.

3 MULTILEVEL ANALYSIS OF AALO

'That which is not good for the swarm, neither is it good for the bee' Marcus Aurelius, Meditations (AD 161 to 180)

This chapter aims to empirically evaluate if the critical component of the AALO, namely, the DLOQ, is, as proposed in chapter 2, a valid multilevel construct. Specifically, this chapter is a published paper that focuses on the DLOQ, the primary source of the AALO. The AALO is, essentially, made up of the DLOQ with additional measures, including organisational trust (Mayar et al., 1995) and attitudes towards organisational change. Recognising that the DLOQ is a widely used and accepted measure of the learning organisation (Watkins & Dirani, 2013; Watkins & Kim, 2018), my analysis focuses on the DLOQ rather than the more context-specific AALO model. The analysis serves two purposes; first, the DLOQ underpins the AALO and tests my reconceptualisation of the AALO as a multilevel, multidimensional construct. The analysis also answers calls in the learning organisation literature to apply a multilevel analysis to the DLOQ (Watkins & Kim, 2018).

The analysis first evaluates the validity of the DLOQ by following Chen et al.'s (2005) recommended five-step approach (see the section below for more details). This analysis also begins to evaluate the dimensionality of the AALO/DLOQ by proposing and testing a parallel mediation model. Drawing on previous research that showed that rank has a positive and direct effect on perceptions on DLOQ dimensions (Drobnjak et al., 2013; Stothard et al., 2014), I propose that the typical effects of rank (at the individual level) and rank disparity (at the team level) on learning characteristics in organisation is mediated by leadership style (for individuals and teams alike).

In particular, I evaluate the assumptions of isomorphism between the DLOQ at the individual and team level phenomenon (Chen et al., 2007; Chen et al., 2005; Klein & Kozlowski, 2000; Tay et al., 2014); isomorphism, in this sense, is the assumption that the same patterns or relationships between elements are genuine across different levels within a system. I propose and test the same mediation models within the paper, albeit at the individual and team level dimension. If both levels' mediation models are similar, then the DLOQ does display a degree of nomological isomorphism. My analysis first evaluates a multilevel assumption (i.e., Do the individual and team levels demonstrate similar patterns of behaviour and, therefore, can inferences be drawn from one level to another?), and in doing so, extends our knowledge of the contingencies within the DLOQ dimensions.

3.1 VALIDATING MULTILEVEL CONSTRUCTS

Chen et al. (2005) provided a framework for evaluating the validity of a multilevel construct while noting that defining and validating multilevel constructs is a complex and challenging process.

While my analysis within the published paper moved through these five steps, not all steps are fully articulated. To clarify the validation process occurring within the paper, Table 1 identifies the steps of analyses I used to address each step recommended by Chen et al. (2005).

TABLE 1: STEPS IN VALIDATING THE DLOQ AS A MULTILEVEL CONSTRUCT

Validation Step	**Analytic Action**
Define the focal construct at each relevant level of analysis.	DLOQ measured at the individual level: well defined (Watkins & Marsick, 1996; Yang et al., 2003). DLOQ measured at the team level: not well defined. Leadership at team/individual level construct: defined, and team level: diverse definitions (Bliese et al., 2002). Rank as an individual construct: well defined in the literature. Team hierarchy: well defined in the literature.
Determine, based on theory, the dimensionality of the construct (is it multi or unidimensional?).	DLOQ defined as multidimensional (see Chapter 2). Rank/hierarchy is a unidimensional construct: rank is a formal organisational attribute of an individual.
Determine, based on theory, the nature (i.e., central tendency or variability) of the construct.	*Team level* DLOQ defined as a referent shift construct and measured as the team's central tendency (DLOQ dimensions are measures as an aggregate: team mean). Team hierarchy defined as the variation of rank within a team (measured as the standard deviation within the team).
Specify the nature and structure of the construct at the higher level.	*Team level* DLOQ qualitatively specified as a team level construct and broadly reflects team climate and shared norms of behaviour or expectations. DLOQ team level properties would be expected to be convergent and consensual. Team hierarchy is an objective team property (Klien & Kozlowski, 2000).
Based on the nature of the construct and practical considerations, determine what type of aggregate-level measure should be used to capture the higher-level manifestations of the construct.	DLOQ as referent shift construct: Referent: team. Consensus, convergent and aggregate measures (team mean), so validity, aggregated agreement, and reliability checks are necessary. Internal consistency is needed. Team hierarchy as a Disparity/dispersion measure Referent: individual. Configural measure. No agreement/reliability needed.

Test the psychometric properties of the construct across and at different levels of analysis	The DLOQ team level ICC(1)[12], ICC(2)[13]$_{Rwg}$ and F ratios were calculated in the study. The DLOQ individual level psychometric results for the archival study were reported in Stothard (2014). Rank is not a psychometric measure, so estimates of reliability were not needed.
Estimate the extent to which the construct varies between levels of analysis.	Conducted a WABA[14] analysis using random group resampling (Bliese and Halverson, 2002) to evaluate the extent to which team-level correlations differ from individual-level correlations (assuming not team level effect).
Test the function of the focal construct across different levels of analysis.	The same mediation model was evaluated at the team and individual level to examine the assumptions of nomological isomorphism. The same antecedents and relationships were found within the DLOQ dimensions at both the individual and team levels.

The paper presents the actions taken to address all five steps to evaluate the DLOQ validity as a multilevel construct. However, further work could be done to evaluate the team-level psychometric properties (Step 2). In the paper, relatively less attention was paid to evaluating aggregate psychometric properties. Further work can build on Chen et al.'s (2005) and Methuen's (1994) recommendations to use a multilevel confirmatory factor analysis, which simultaneously evaluates the focal level individual and team level constructs (such as referent-shift models). However, Chen et al. (2005) noted that confirmatory factor analyses should be done separately for referent-shift constructs. For multidimensional constructs, multi-group structural equation modelling analyses could be used to test for factor equivalence across levels of analyses.

The paper aimed to evaluate the DLOQ as a multilevel construct (outlined in Fig 10), examine the assumptions of nomological isomorphism within the learning organisation literature, and evaluate the contingencies within the DLOQ. In this, the paper provides an analysis that follows Chen et al.'s (2005) steps and shows that the DLOQ does indeed display a multilevel structure in the ALO archival data. However, the paper did not thoroughly examine the DLOQ aggregate factor structure, as recommended by Chen et al. (2005) and Muthen (1994), nor did the paper focus on examining the psychometric isomorphism (Tay et al., 2007). Previous AALO studies have examined the individual-level DLOQ using exploratory factor analysis (Stothard, 2014), and the paper focused on evaluating

[12] Interclass Correlation Coefficient (1) [ICC(1)] defined as the estimated reliability of a single assessment of a group level property (Bliese, 2000, 2016). Where the ICC(1) is large, a single individual's rating is likely to provide a relatively reliable rating of a group mean. Where ICC(1) is small, multiple individuals' ratings are needed for a reliable estimate of group mean (Bliese, 2000, 2016).

[13] Interclass Correlation Coefficient (2) [ICC(2)] is defined as the estimated reliability of the group mean (Bliese, 2000).

[14] Within And Between Analysis (WABA) (Bliese, 2016).

the internal and external consistency of the DLOQ (through the dual mediation analyses). By the end of Chapter 3, I demonstrate that the DLOQ, and therefore, the AALO, is indeed a multilevel level construct that reliably measures a range of team-level and individual-level dimensions (i.e., the dimensions characterising the learning organisation).

3.2 STATEMENT OF AUTHORSHIP: PAPER 1

TITLE OF PAPER: Is the DLOQ learning-oriented leadership isomorphic? Learning oriented leadership mediates hierarchical teams' learning dimensions.

PUBLICATION STATUS: Published

PUBLICATION DETAILS:

Stothard, C.F. (2020). Is the DLOQ learning-oriented leadership isomorphic? Learning oriented leadership mediates hierarchical teams' learning dimensions. *The Learning Organisation.* https://doi.org/10.1108/TLO-02-2020-0027

CONTRIBUTION: 100%

STATEMENT: This paper reports on original research I conducted during my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

SIGNATURE:

Is the DLOQ learning-oriented leadership isomorphic? Learning oriented leadership mediates hierarchical teams' learning dimensions.

ABSTRACT

Design: An empirical analysis evaluated (i) if team-level Dimensions of a Learning Organisational Questionnaire (DLOQ) measures are reliable and reflect real team properties, and (ii) if DLOQ learning-oriented leadership mediates the effect of rank or team hierarchy on all other DLOQ measures. A novel approach (random group resampling) was used to evaluate if team level measures reflected either a real team property or a statistical artifact. Next, a series of mediation models evaluated if learning-oriented leadership was isomorphic, namely, displays a similar pattern at both individual and team levels.

Aim: Learning organisations are often theorised at a team level, yet there is a lack of team-level studies. This study aimed to evaluate if (i) team-level DLOQ measures are reliable and reflect real team properties, and (ii) if both individual-level and team-level DLOQ leadership mediates the effect of rank on other DLOQ measures.

Findings: The analysis found: (i) team-level DLOQ measures reflected real properties of the teams and were reliable; and (ii) learning-oriented leadership mediates between rank and team hierarchy and the other six dimensions at both individual and team-levels (i.e., DLOQ team and individual level were isomorphic).

Practical implications: The results show that hierarchical teams' learning capacities can be improved by focusing on learning-oriented leadership, which overcomes the typically negative effect of hierarchical differences within teams.

Value: This study provides a significant step forward by applying an innovative analysis that shows that the DLOQ (i) team level measures reflect real team properties, and (ii) DLOQ leadership displays isomorphic characteristics.

INTRODUCTION

A learning organisation (LO) is made up of multiple dimensions (e.g., personnel, processes, procedures, time, and capital) which span multiple levels (e.g., individual, team or organisational) that act together to enhance an organisation's capacity to learn (Örtenblad, 2002; Örtenblad *et al*., 2013; Watkins and Marsick, 1993). While it is not clear exactly *how* specific levels or dimensions act together to generate an learning organisation (Fiols and Lyles, 1985), nevertheless, evidence shows which *dimensions* typically support learning oragnisation capabilities; leadership has been identified as playing a significant role in developing a learning organisation (Goh, 1998; Watkins and Dirani, 2013). This study aims to evaluate the effect of learning-oriented leadership (LL) as both an individual- and team-level mediator to better understand LO as a multilevel phenomenon.

Clarifying a multilevel, multidimensional construct is complex; just how complex can be illustrated using the Dimensions of the Learning Organisation (DLOQ) model (Watkins and Marsick, 1993). For example, the DLOQ comprises seven dimensions[15] occurring on three levels[16] which together would create a 21-item matrix generating 5.109×10^{19} possible interactions. In that context, Örtenblad *et al*. (2013) reviewed 332 studies and identified fifteen different combinations of learning organisation elements used; the often-remarked variety of definitions used within the learning organisation literature may, in part, be caused by the sheer number of potential interactions within a multidimensional, multilevel learning organisation model (Fiols and Lyles, 1985; Örtenblad *et al.*, 2013).

Applying a multilevel paradigm to the Dimensions of a Learning Organisation Questionnaire (DLOQ): Individual and team level reliability

The DLOQ includes both individual- and team-level constructs (Watkins and Marsick, 1993). For the team-level measures, the DLOQ uses a referent shift[17] as the aggregating mechanism. For example, there is consistent evidence that the DLOQ is reliable at an individual level (Watkins and Dirani, 2013). However, there has been little attention paid to evaluating the DLOQ as a team level measure (Watkins and Kim, 2017). Consequently, this study evaluates if the team level of the DLOQ (i) is reliable at the team level (and therefore suitable for aggregation) and (ii) reflects a team property

[15] (i) Learning-oriented Leadership (LL), (ii) Continuous Learning (CL), (iii) Dialogue and Inquiry (DI), (iv) Teamwork (TW), (v) Systems to support learning (Systems), (vi) Shared vision (SV), (vii) Connection to the environment (Connect).

[16] (i) Individual, (ii) team, and (iii) organisational levels.

[17] Referent-shift refers to the prompt that specifies what level the item is asking (e.g., 'in your team…' and 'we think that…' are team-level referent shifts that cue respondents to take a team-level view rather than focusing on their own, individual perspective) (Chan, 1998).

rather than a statistical artifact (produced by using a novel random-group resampling, RGR) (Glick, 1988; Bliese and Halverson, 2002). The first hypotheses of this study are:

Hypothesis 1A: The DLOQ measures will be reliable and suitable for aggregation to team-level measures.

Hypothesis 1B: Team-level DLOQ measures will reflect real team properties.

The effect of rank disparity on team learning

Power disparity (i.e., rank difference) shapes us at a socio-cognitive level; specifically, the disparity in team members' power (i.e., rank) cues different interpretations and assumptions (Fiske and Depret, 1996; Guinote 2007; Van der Vegt *et al.*, 2010). Evidence shows that subordinates can be ambivalent towards higher-ranked members: subordinates defer to and make negative assumptions about higher-ranked team members (Posner and Snyder, 1975; Ridgeway, 2001). Similarly, higher-ranked members were found to be suspicious of subordinates' advice, ignore their input, and pigeonhole subordinates as incompetent and helpless (DeRue and Ashford, 2010; Vescio *et al.*, 2003). If unchecked, these assumptions and experiences typically suppress feedback and reflection, stifle suggestion-giving and reduce helping behaviours; together, these can create barriers to team learning (Bunderson and Reagans, 2011; Edmondson, 1999; Greer *et al*., 2018; Van der Vegt *et al.*, 2010).

However, rank differences do not inevitably inhibit team learning; collective feedback, collective perspective, and team context help hierarchical teams to learn (Bunderson and Reagans, 2011; Sinha and Stothard, 2020; Van der Vegt *et al*., 2010). Specifically, person-oriented leadership has been shown to have a significantly positive effect on team learning both at the individual level and team level (Edmondson, 1999; Koeslag-Kreunen *et al*., 2018). There is – as yet – no consensus, so there are recent calls for more attention to be paid to the contingencies which influence the effect of rank on learning dimensions in teams and organisations (Greer *et al.*, 2018).

Learning-oriented leadership and team learning

Learning-oriented leadership (LL) is a crucial factor in generating team learning and outcomes, including other DLOQ dimensions (Koeslag-Kreunen *et al*., 2018; Goh, 1998; Watkins and Marsick, 1998). Leaders support learning in teams and individuals directly by investing in resources and implementing or maintaining systems and processes for learning (Goh, 1993; McGill *et al*., 1992), and indirectly, by supporting team learning climate (Koeslag-Kreunen *et al*., 2018). LL is

characterised by leaders actively coaching and supporting their own and their subordinates' learning (Watkins and Marsick, 1998). Team learning becomes particularly important in hierarchical organisations such as the military (Dahanayake *et al*., 2013; Di Schiena *et al*., 2013; Stothard *et al.*, 2013).

Learning-oriented Leadership: Isomorphic?

Isomorphism is commonly (but not exclusively) defined as 'similarity or one-to-one correspondence between two or more elements [across levels]' (Bliese *et al.*, 2007; p. 553). Known as nomological isomorphism, this is contrasted against the stricter psychometric or measurement equivalent isomorphism (Tay *et al.,* 2014). Assuming nomological isomorphism across levels can be helpful since the levels can be treated as interchangeable (Tay *et al.,* 2014). For example, if the DLOQ individual- and team-level constructs were isomorphic (see Fig 1), then the application of interventions may be generalised to both individual and team-level constructs. In real terms, this means that interventions at the team level will have measurable impacts at the individual level or vice versa.

Team-level leadership does not necessarily have a one-to-one conceptual correspondence to individual-level leadership (i.e., nomologically isomorphic). For example, Chen *et al*. (2007, p.333) argued that team-level leadership is 'manifestly different' from individual-level leadership. Precisely, team leaders are thought to develop a shared climate by translating and implementing formal organisational policies and procedures into real, continuing, and repeating practices (Chen *et al*., 2007). Team-level leadership contrasts with individual-level leadership since individual-level leadership is based on one-on-one relationships (Chen *et al.*, 2007). Few studies have examined whether LL or any other DLOQ dimension is isomorphic (or not).

Hypothesis 2: The team-level LL will positively mediate the effect of team hierarchy on the other six team-level DLOQ measures (CL, DI, TW, Systems, SV, and Connect).

Nomological isomorphism: LL mediating between rank and DLOQ dimensions

Assuming isomorphism, we expect that team-level LL would positively affect the other team-level DLOQ measures (as proposed in H2). However, this impact is not necessarily a given: there is evidence that team-level leadership is not isomorphic to one-to-one leadership (Chen *et al.*, 2007; Bliese and Halverson, 2002). There have been no studies examining isomorphism in the DLOQ measures at both the team and individual levels. The study reported in this paper addresses this gap.

Hypothesis 3: LL will be isomorphic to other DLOQ measures; individual-level and team-level LL will show the same pattern mediating between rank differences (team hierarchy) and individual- or team-level DLOQ dimensions (see Fig 1).

METHOD

Procedure

An archival data set was used, collected using a stratified, representative sampling strategy; the data was collected from Australian Army personnel. Teams were first stratified by geography and function; teams were selected from each stratum to provide a representative range of geographies and functions. All team members were approached; questionnaires (paper and pen) were administered in person by civilians or online.

Participants A total of 3586 respondents were nested in 93 teams; team size ranged from a minimum of 6 to a maximum of 121, and the average team size was 73 (SD 44). The sample consisted of 91% males, with 39.4% aged between 18 to 25 years, 31.9% aged between 26 to 35 years, 19.1% aged between 46 to 55 years, and 1.4% aged 56 years or over. Team composition was similar to Australian Army demographics (Australian Government, 2015).

Measures: Individual level

I. *Individual rank*: An Individual's substantive and structurally determined formal rank was recorded as a measure of hierarchical position (Klein and Kozlowski, 2000).
II. *Dimensions of the Learning Organisation Questionnaire (DLOQ*): The DLOQ consisted of seven dimensions each scored on a Likert scale (1 to 6): Continuous Learning (CL) (Cronbach alpha = .99), Dialogue and Inquiry (DI) (Cronbach alpha = .86), Teamwork (TW) (Cronbach alpha = .85), Systems to capture and Share information (Systems) (Cronbach alpha = .83), empower Shared Vision (SV) (Cronbach alpha = .88), Connect organisation to Environment (Connect) (Cronbach alpha=.84), and Learning-oriented Leadership (LL) (Cronbach alpha= .91).
III. *Individual control variables*: Theory development studies increasingly limit control variables (Carlson and Wu, 2012), so only theoretically justified controls were included. Controls

included age, tenure (years in Defence), and operational deployments (Sinha and Stothard, 2020).

Measures: Team level

I. *Team hierarchy*: operationalised as the degree of disparity (measured by standard deviation) of team members' military rank. This measure of hierarchy was objective, reflecting formal and structurally determined authority; it is not a perceptual measure and is a property meaningful only at the team level (Harrison and Klein, 2007; Klein and Kozlowski, 2000).
II. *Team level control variables*: Because, as noted, theory development studies are increasingly limiting control variables (Carlson and Wu, 2012), the control variables were calculated for each team: types of teams (full-time or part-time military service), the mean number of deployments, mean military tenure, and team size. Additionally, the potential bias in modelling separation indices such as team hierarchy (SD) is eliminated (Biemann and Kearney, 2010). Team average level of rank was controlled for because team scholars recommend that the mean level of an attribute should be statistically controlled when testing relationships between the variance of an attribute (team hierarchy) and outcome variables (DLOQ team-level) (Harrison and Klein, 2007).

ANALYSIS

Overall, the study aims to evaluate if: (a) LL mediates the effect of rank and team hierarchy on the other six DLOQ dimensions (at both individual and team levels, so displaying isomorphism, see Analysis 1 and 3) and (b) if team-level DLOQ measures are reliable and reflect real-team properties (see Analysis 2). The reliability analysis (Analysis 2) is composed of several steps. First, well-established criteria evaluate if DLOQ measures are reliable and suitable to aggregate as a team-level construct. Second, a novel analytical approach (random group resampling RGR) is used to evaluate if the observed team-level effects are, in fact, real team properties.

Analysis 1 – Individual-level correlations and mediation modelling

Correlations and a series of mediation models using Hayes (2018) PROCESS were conducted to evaluate the mediating effect of LL on the rank/hierarchy–DLOQ dimensions relationship at the individual-level data.

Analysis 2.1 – Team-level reliability

Several different measures of team-level reliabilities were calculated to test *H1A*; the ICC(1) represents the amount of variance in any one individual's response that can be explained by their team membership (Bliese and Halverson, 2002). The ICC(2) represents the team's reliability means to which the individual belongs (Bliese, 2000; James, 1982). The $r_{wg(j)}$ (an agreement index) represents the 'interchangeability' of respondents (Bliese and Halverson, 2002). The criteria of an ICC(1) was a minimum of over 5%, and ICC(2) (between team) reliability criterion of .70 was used, and $r_{wg(j)}$ criteria of over .60, to assess the inter-team correlations and reliability (Bliese, 2000). As a guide to applying these indices, Bliese and Halverson (2002) argued for considering all the aggregation indices as a whole when not all measures meet all formal criteria.

Analysis 2.2 – Team-level measures: A real team property?

Random group resampling (RGR) was used to evaluate if the aggregated DLOQ measures reflect a real team property and test H1B. RGR is related to the bootstrap and jack-knife and implemented using Bleise and Halverson's (2002) R package, RGR.agree. If the observed values fall outside the confidence interval generated from the random (pseudo) sub-sampling, then the observed values are significantly different from those of the pseudo-team results (Bleise and Halverson, 2002). The actual value is compared to the pseudo-groups distributed values (using a 95% confidence interval). A within-and-between-groups analysis was conducted to evaluate if the team-level correlations between LL and the other DLOQ measures were due to real team effects or statistical artifacts. The between-group correlations (corrB) were generated at the team level (N=93). Specifically, a pseudo-team 95%CI is generated randomly and iteratively selecting (bootstrapping) 'teams' from the pooled individual-level data (N=3559). The pseudo-team 95%CI generates a range of correlations values, which would be expected if the null hypothesis were true: that team-level measure was merely a random aggregation of all the individuals pooled from the larger sample (Bliese and Halverson, 2002). If the observed corrB is outside the pseudo-team 95%CI interval, it is not likely (less than 5% probability) that the observed value happened by chance, and the null hypothesis can be discounted.

The RGR between-group correlation (corrB) was generated at the group level (N=93), and so the pseudo-group confidence interval for correlation between groups shows an extensive range. The within-group correlations W (corrW) were calculated at the individual level (N=2650), so the corrW is far more stable (and shows a much smaller confidence interval).

Analysis 3 – Team level correlations and mediation modelling

This step analysed team-level measures using Hayes (2018) PROCESS macro for SPSS (model 4). A series of mediation models evaluated H2 by replicating the series of mediation analyses at the individual level. The next step was a simple comparison to assess which of the DLOQ measures showed the same interactions at both the individual and team-level within the mediation modelling; this process tests H3.

RESULTS

Individual-level results

The individual level means, standard deviation, reliabilities and zero-order correlations are shown in Table 1. The mediation effect of LL on the effects of rank on other DLOQ dimensions was tested using Hayes (2018) PROCESS (see Table 2). Rank was the independent variable (Step 2 after controls), LL as the mediating variable (Step 3) with each of six DLOQ measures as dependent variables. The mediations analyses were a series of parallel mediation models (model 4). The results show (see Table 2) that LL mediates the effect of rank on the DLOQ measures where the direct effect of rank was reduced with the introduction of LL as a mediator (in Step 3 in Table 2) (LL-CL *B*= .60, 95%CI [.58,.62], $p < .01$; LL-DI *B*= .62, 95%CI [.59,.64], $p < .01$; LL-TW *B*= .61, 95%CI [.59,.63], $p < .01$; LL-System *B*= .64, 95%CI [.62,.66], $p < .01$; LL-SV *B*= .66, 95%CI [.63,.68], $p < .01$; LL-Connect *B*= .65, 95%CI [.63,.67], $p < .01$). The effect of rank shifted to insignificance for DI, TW, Systems and Connect, and to negative for CL and SV (see Table 2) (rank-CL, *B*= -.02, 95%CI [-.03, -.01], $p < .01$; rank-SV *B*= -.02 95%CI[-.03, -.01], $p < .01$). These results support the hypothesized mediating effect of LL on the rank-DLOQ dimensions (see Fig 1) at the individual level.

Evaluating team-level aggregation and reliability

The aggregate indices of DLOQ dimensions were calculated: the intraclass correlation coefficients (ICC[1] and ICC[2]), and the $r_{wg(j)}$ values (within-group agreement). Five percent of Systems and SV's individual variance, and up to 9% individual variance for DI and Connect was attributed to team membership. All DLOQ measures were above the minimal criteria of .60 for ICC(2). The mean $r_{wg(j)}$ for all DLOQ dimensions was above the recommended criteria of .60 (Bliese, 2000; Bliese and Halverson, 2002): LL ($r_{wg(j)}$ = .89, ICC(1) = .06, ICC(2)=.73); CL ($r_{wg(j)}$ = .96, ICC(1) = .08, ICC(2)=.79); DI ($r_{wg(j)}$ = .87, ICC(1) = .09, ICC(2)=.93); TW ($r_{wg(j)}$ = .91, ICC(1) = .07, ICC(2)=.79); SYSTEMS ($r_{wg(j)}$ = .89, ICC(1) = .05, ICC(2)=.69); SV ($r_{wg(j)}$ = .89, ICC(1) = .06, ICC(2)=.73); and CONNECT ($r_{wg(j)}$ = .89, ICC(1) = .09, ICC(2)=.79).

Taken together, the ICC(1), ICC(2), and $r_{wg(j)}$ results show that that Hypothesis 1A was supported and that the DLOQ dimensions were suitable for aggregating into a meaningful team-level construct. Hypothesis 1B was supported using two analyses: first, all dimensions ICC(2)s were over the minimum acceptable criteria of .60, meaning the team-level construct were reliable and appropriate for aggregation, and second, the RGR analysis showed that team-level relationships reflected a real team property.

Team-level DLOQ: real team property or statistical artifact?

The DLOQ group-level constructs were aggregated (averaged) together with other group-level measures and using the RGR procedure (see Table 3) to evaluate H1B (Bliese and Halverson, 2002). The within-and-between group analysis results found that for all (bar one dimension, Systems) within- and between-group correlations were outside the 95% CI interval generated from the RGR analysis (Table 3). Overall, this result supports Hypothesis 1B: the correlations between team-level DLOQ measures reflected a genuine property of the teams and were not statistical artifacts. The single exception was the correlation within-groups between LL and System, indicating that the Systems-LL team-level relationship is a statistical artifact and not a team's property.

The series of team-level mediation analyses (Table 2) supported H2; team-level LL mediated the team hierarchy's effect on other DLOQ team-level measures.

Team-level correlations and mediation modelling

The assumption of isomorphism (H3) was tested by, first, conducting a series of mediation analyses at individual-level and then team-level DLOQ measures (see Table 2, Fig 1). The independent variable (team hierarchy) was entered at Step 2 (after controls). Team-level LL was then entered as the mediator (Step 3) with each DLOQ team-level measure as a dependent variable. The results showed that team-level LL mediated the relationship between team hierarchy and all the other DLOQ components. The following regression coefficients show the effect of team-level LL on each DLOQ dependent variable (LL-CL B= .24, 95%CI [.21,.28], p < .01; LL-DI B= .24, 95%CI [.21,.27], p < .01; LL-TW B= .23, 95%CI [.19,.26], p < .01; LL-System B= .19, 95%CI [.16,.23], p < .01; LL-SV B= .21, 95%CI [.18,.25], p < .01; LL-Connect B= .21, 95%CI [.17,.25], p < .01). Moreover, the relative effect of team hierarchy shifted to non-significance or negative with the introduction of LL at Step 3 (following Baron and Kenny's procedure, Hayes, 2018).

Nomological isomorphism was demonstrated in that LL meditated the effects of rank and hierarchy on individual and team-level DLOQ measures (H3 was supported). Unlike other leadership styles investigated (see Chen *et al.*, 2007), it appears that LL behaves the same at both the individual and team level. Practically, team-level LL was found to predict the other DLOQ team-level measures positively.

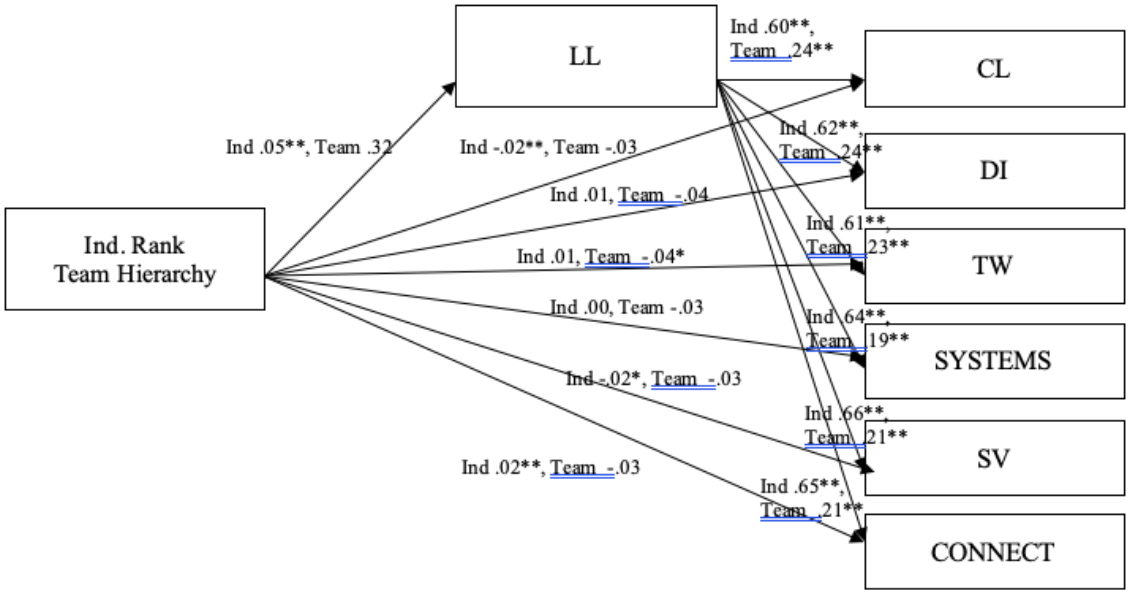

FIGURE 1: MODEL OF LL MEDIATING THE RANK - DLOQ DIMENSIONS RELATIONSHIP AT INDIVIDUAL AND TEAM LEVELS

Table 1: Individual- and team-level DLOQ dimensions and control variables: mean, SD, correlations and reliabilities

	Individual-level	Descriptives		Correlations											
		Mean	SD	1	2	3	4	5	6	7	8	9	10		
1	LL	3.46	.92	.91											
2	CL	3.51	.82	0.67	.99										
3	DI	3.55	.86	0.66	0.72	.86									
4	TW	3.21	.82	0.68	0.71	0.74	.85								
5	Systems	3.43	.84	0.71	0.66	0.63	0.68	.83							
6	SV	2.93	.90	0.68	0.65	0.64	0.73	0.75	.88						
7	Connect	3.29	.87	0.71	0.62	0.61	0.65	0.70	0.73	.84					
8	Rank^	3.29	1.84	0.10	-0.01	0.12	0.02	0.07	0.03	0.08					
9	Deployments^^	.75	.96	-0.06	-0.05	0.00	-0.07	-0.05	-0.06	-0.14	0.16				
10	Tenure (Years in military) ^^^	1.60	1.79	0.05	-0.04	0.09	-0.02	0.03	0.01	-0.01	0.57	0.25			
11	Age+	2.00	1.02	0.07	-0.02	0.10	-0.03	0.04	0.02	0.04	0.49	0.16	0.78		
	Team level			1	2	3	4	5	6	7	8	9	10	11	12
1	LL	3.46	.32												
2	CL	3.48	.34	0.83											
3	DI	3.55	.34	0.87	0.86										
4	TW	3.18	.31	0.84	0.85	0.87									
5	Systems	3.45	.27	0.81	0.76	0.79	0.75								
6	SV	2.92	.31	0.80	0.76	0.81	0.83	0.86							
7	Connect	3.39	.32	0.80	0.72	0.78	0.77	0.86	0.85						
8	Team hierarchy^	1.32	.58	0.28	0.10	0.21	0.08	0.20	0.11	0.15					
9	Mean team rank^^	3.63	1.35	0.08	-0.09	0.12	-0.06	0.16	-0.04	0.07	0.61				
10	Mean team tenure	1.95	1.14	0.15	-0.03	0.25	0.07	0.23	0.05	0.16	0.48	0.78			
11	Mean team age	2.21	.62	0.18	0.03	0.29	0.08	0.27	0.09	0.22	0.48	0.73	0.96		
12	Mean team deployments	.73	.42	-0.05	0.03	0.06	-0.03	0.00	-0.13	-0.22	0.28	0.33	0.40	0.30	
13	Type of team	1.88	.32	-0.38	-0.30	-0.39	-0.32	-0.26	-0.32	-0.42	0.00	0.15	-0.01	-0.14	0.41

^ Rank; categorised from 1= private soldier to 9 = general.
^^ Number of operational deployments
^^^ Years in military: categorised 1= 1 to 4 years; 2 = 5 to 8 years; 3 = 9 to 12 years; 4 = 13 to 20 years; 5 = 16 and over
+Age: categorised 1= 18 to 25 years; 2 = 25 to 34 years; 3 = 35 to 44 years; 4 = 45 to 54 years; 5 = 55 or over.
++ Type of team: 1= full time military, 2= part time (National Guard/Reservists)
Correlations: all *individual* level correlation coefficients > = .03 are significant at $p < 0.05$;
all *team* level correlation coefficients >= .22 are significant at $p < .05$.
Reliabilities (Cronbach's alpha) on diagonal in italics, individual-level $N = 2650$; team level $N=93$.
LL = Learning-oriented leadership; CL = continuous learning; DI = dialogue and inquiry; TW = teamwork; Systems = systems to support learning; SV= shared vision; Connect = connection with environment.

Table 2: Individual-level and team-level hierarchical linear regression: LL mediating effect of rank on other DLOQ dimensions

Individual-level	Dependent variable																					
	LL			CL			DI			TW			SYSTEMS			SV			CONNECT			
Variables	coeff	95% CI	p	coeff	95% CI	p	coeff	95% CI	p	coeff	95% CI	p	coeff	95% CI	p	coeff	95% CI	p	coeff			p
Constant	3.29	3.20,3.73	**	1.53	1.43,1.62	**	1.29	1.19, 1.39	**	1.26	1.17, 1.35	**	1.21	1.13, 1.31	**	.74	.64, .84	**	.98	.89, 1.08		**
Step 1 Control																						
Age^	0.41	-.01, .10		0.02	-.03, .03		0.03	.00, .06		-.06	-.09, -.03	**	.00	-.03, .03		-.01	-.05, .02		.05	.01, .08		**
Tenure ^^	-0.01	-.04, .02		-0.02	-.04, -.01	*	.00	-.02, .02		.01	-.01, .03		.00	-.02, .02		.01	-.02, .03		-.04	-.06, -.02		**
Deployments+	-0.07	-.11, -.04	**	0.01	-.04, .03		.02	.00, .04		-.01	-.04, .01		-.01	-.03, .01		-.02	-.04, .01		-.08	-.10, -.06		**
Step 2 Independent																						
Rank++	0.05	.03, .07	**	-.02	-.03, -.01	**	.01	.00, .03		-.01	-.02, 0.00		.00	-.01, 02		-.02	-.03, -.01	*	.02	.01, .04		**
Step 3 Mediator																						
LL				.60	.58,.62	**	.62	.59, .64	**	.61	.59, .63	**	.64	.62, .66	**	.66	.63, .68	**	.65	.63, .67		**
R^2	0.02			0.45			0.44			0.47			0.5			0.46			0.51			
MSE	0.91			0.37			0.42			0.36			0.35			0.43			0.37			
Team level																						
Constant	2.77	1.28, 4.26	**	3.53	3.25, 3.80	**	3.83	3.59, 4.07	**	3.21	2.97, 3.45	**	3.35	3.11, 3.60	**	2.89	2.61, 3.14	**	3.43	3.15, 3.69		**
Step 1 Control																						
Team deployments	.07	-.20,, .34		.05	.01, .09	*	.06	.02, .10	**	.02	-.02, .06		.00	-.04, .04		-.02	-.07, .02		-.06	-.10, .01		*
Team size	.01	-.28, .31		.01	-.04, .06		.00	-.05, .04		.03	-.01, .07		-.03	-.07, .02		.01	-.04, .06		..00	-.05, .05		
Team type^	-1.47	-2.25, -.69	**	-.01	-.14, .12		-.15	-.27, -.03	*	.00	-.12, .12		.04	-.09, .16		.03	-.11, .17		-.07	-.21, .07		
Team mean rank	-.07	-.35, .21		-.04	-.09, .01		.03	-.02, .07		.00	-.05, .03		.03	-.01, .07		.00	-.05, .04		.04	.00, .09		
Step 2 Independent																						
Team hierarchy	.32	.06, .58	*	-.03	-.08, .01		-.04	-.07, .00		-.04	-.08, -.01	*	-.03	-.07, .01		-.03	-.07, .02		-.03	-.07, .01		
Step 3 Mediator																						

LL			.24	.21, .28	**	.24	.21, .27	**	.23	.19, .26	**	.19	.16, .23	*	.21	.18, .25	*	.21	.17, .25	**
R^2	0.23		0.73			0.79			0.73			0.67			0.67			0.69		
MSE	1.18		0.03			0.03			0.03			0.03			0.03			0.3		

^Age: categorised 1 to 5. categorised 1= 18 to 25 years; 2 = 25 to 34 years; 3 = 35 to 44 years; 4 = 45 to 54 years; 5 = 55 or over.
^^ Tenure (Years in military): categorised from 1 to 5
+ Number of operational deployments
++ Rank; categorised from 1= private soldier to 9= general.
Individual level N = 3573;
Team level N=93;
* p<.05; ** p<.01
^ Team type; 1=full time; 2= part time.
^^Team hierarchy: standard deviation of team members' ranks.
LL = Learning-oriented leadership; SV= shared vision; TW = teamwork; DI = dialogue and inquiry; CL = continuous learning; ; Connect = connection with environment; Systems = systems to support learning

Table 3: Team level LL relationships to DLOQ: assessing real team effect or statistical artefact. Comparing within and between team-level correlations using observed vs random-group resampling (pseudo-correlation)

DLOQ dimension		LL			
		Observed	Random group resampling		
	Correlation Type	Correlation	Pseudo-correlation	95% CI	p
CL	Raw	0.66	0.66	NA	
	Between team	0.82	0.65	.52 - .75	*
	Within teams	0.64	0.66	.66 - .67	*
DI	Raw	0.66	0.66	NA	
	Between team	0.89	0.65	.55 - .74	*
	Within teams	0.63	0.66	.66 - .66	*
TW	Raw	0.68	0.68	NA	
	Between team	0.86	0.67	.56 - .77	*
	Within teams	0.66	0.68	.68 - .68	*
SYSTEMS	Raw	0.71	0.71	NA	
	Between team	0.81	0.71	.62 - .78	*
	Within teams	0.70	0.71	.70 - .71	
SV	Raw	0.68	0.67	NA	
	Between team	0.84	0.66	.56 - .76	*
	Within teams	0.66	0.67	.67 - .68	*
CONNECT	Raw	0.70	0.70	NA	
	Between team	0.82	0.70	.59 - .79	*
	Within teams	0.69	0.70	.70 - .71	*

* p <.05

Between team N = 93; within team N = 2650; LL = Learning-oriented leadership; CL = continuous learning; DI = dialogue and inquiry; TW = teamwork; Systems = systems to support learning; SV= shared vision; Connect = connection with environment

DISCUSSION

The study aimed to apply a multilevel paradigm to understand the nature of an LO model; specifically, to evaluate if LL mediated the typically (but not consistently) negative effect of hierarchical differences on LO capabilities (Edmondson, 1999; Bunderson and Reagans, 2011). The analysis examined both the individual and team levels; in doing so, this study extends the current understanding of LO by drawing on multilevel methods (Bliese, 2002; Bliese and Halverson, 2002; Mathieu and Chen, 2011). This study provides two significant insights into the LO literature. First, it provides an evidence-based showing that LL is nomologically isomorphic; and that LL mediates the effect of rank (individual level) and team hierarchy and the other DLOQ measures (as individuals and as a team). The analysis helps us avoid the pitfalls of misaligned levels by explicitly examining if LL is isomorphic. Multilevel methods offer a way to reconcile individual and team phenomena without accusations of anthropomorphism or reification (Mathieu and Chen, 2011). The second critical insight is that the results show that all team-level DLOQ measures are reliable and reflect an actual team property (*except* for the Systems team-level DLOQ measure with LL, which is discussed further). These results suggest that we may need to think differently about defining the DLOQ at the team level; for example, how are team-level constructs related to team climates or broader organisational cultures (c.f., Schneider *et al*., 2018)? Essentially, a learning organisation is a complex, multidimensional, and multilevel construct.

The results show that the DLOQ can be reliably aggregated to the team level. For example, the intergroup agreement index and the group mean reliabilities showed real differences between and similarities within teams. The novel random group resampling (RGR) (Bliese and Halverson, 2002) methods provided evidence that the relationships between LL and (almost) all the other DLOQ measures were real properties of the groups (rather than merely artifacts of the aggregation process). The results support the construction of the DLOQ as a team level construct. Only Systems DLOQ team-level measure appeared to be a statistical artifact; one possible explanation is that there are more similarities between teams' organisational systems (i.e., procedures and policies) than differences. For example, within the military, all personnel have to undertake basic recruit training, which provides a core of shared procedures and knowledge (Drobnjak *et al.*, 2013). It may be that these standard organisational systems or content 'overrode' any team-level differences. However, other DLOQ dimensions, such as TW, DI, SV, and CL, appear to be specific within each team, regardless of the familiar organisational context.

Exploring team and organisational contexts may be an avenue for future research: are DLOQ dimensions specific to a particular level?

Finally, the two mediation analyses at the individual and team-level showed isomorphism; LL mediated the effect of rank and hierarchy on the other DLOQ measures at both individual and team levels. While LL was found to be isomorphic, not all leadership styles or constructs be so; some scholars have argued that team-level leadership is 'manifestly different' from one-on-one individual leadership (Chen *et al.*, 2007). It remains unclear how or why LL appears to be isomorphic while other related leadership constructs are not; this would be an avenue for further exploration and study.

This study provides clear and actionable guidance for practitioners. For example, LL plays a critical, mediating role in improving DLOQ measures in hierarchical teams and reduces the typically negative effect of rank differences on team outcomes, including learning (Greer, 2014). For example, the military is a 'rigid hierarchy' which may influence the relative importance of LL when mediating the effect of team hierarchy on the other DLOQ measures; at the team level, increasing team hierarchy significantly inhibited TW (B= -.04, 95%CI [-.08, -.01], $p < .05$) in the presence of LL. So hierarchical differences were found to reduce TW, even as LL increases. This finding may be specific to the military; further attention needs to be paid to understanding how institutional contexts affect contingencies within the DLOQ.

Understanding factors that help support team learning becomes more important within hierarchical groups such as the military (Wong *et al.*, 2003; Sinha and Stothard, 2020). The military is a specific institutional context that may not readily generalise to other organisations; nevertheless, the salience of hierarchy within the military provides a practical test of the mediating effects of learning-oriented leadership. These results also show that improving LL can offer benefits beyond those potentially offered by individualised leadership experiences; for example, team members' team learning can improve even when one individual may not have sufficiently positive experiences with the immediate leader (Bliese *et al.*, 2002).

LIMITATIONS

The study is not without limitations. First, it was a cross-sectional study that employed archival data. A longitudinal study needs to be conducted to properly test the causal relationship implied by linear

regression terms (e.g., predictors). A longitudinal study would also address the common method bias, which may be introduced within a cross-sectional study. Also, as there is little work that quantifies or theorises possible team-level relationships within the DLOQ (Watkins and Kim, 2017), this dearth limits the available theoretical relationships which can be proposed and tested.

CONCLUSION

Evaluating the DLOQ dimensions for isomorphism between the individual- and team-level constructs provides methodological, theoretical, and practical insights. In doing so, this study answers calls for more attention to be paid to understanding the multilevel nature of a learning organisation (Watkins and Kim, 2018). DLOQ constructs were found to reflect team-level properties (and were not an artifact of statistical aggregation) (Bliese and Halverson, 2002), demonstrating that DLOQ is a reliable and valid measure of team-level constructs. The reliability and validity of team-level DLOQ measures were tested using multilevel methods techniques, and the results offer a significant methodological and theoretical insight into the DLOQ as a multilevel construct.

Evaluating LL's isomorphism (since not all leadership is considered to be isomorphic, Chen et al., 2017) has helped clarify the (multilevel) DLOQ model, which offers evidence for practical interventions. For example, the findings indicate that improving LL can improve a range of DLOQ measures at the individual and team level (e.g., improving team-level leadership will improve other team-level DLOQ measures such as teamwork, Tay *et al*., 2014). The study has also identified a conditional process within the DLOQ and so answered calls for a better understanding of the contingencies within the DLOQ model (Örtenblad *et al.*, 2013; Watkins and Kim, 2017). Specifically, learning-oriented leadership appears to be nomologically isomorphic, a finding which contrasts to other studies examining isomorphism in leadership (Chen *et al*., 2017). Establishing the nomological isomorphism of LL within the DLOQ also extends our understanding of the contingencies within the multilevel DLOQ model (at both the individual- and team-level) (Örtenblad *et al*., 2013; Watkins and Kim, 2017). Overall, this study supports and extends the theoretical, methodological and practical application of DLOQ to improve the learning of individuals, teams and organisations.

REFERENCES

Australian Government (2015), "Defence Census", available at https://www.defence.gov.au/defencecensus/_Master/docs/Defence-Census-2015-Public-Report.pdf (accessed 08 September 2020)

Biemann, T. and Kearney, E. (2010), "Size does matter: How varying group sizes in a sample affect the most common measures of group diversity", *Organisational Research Methods*, Vol. 13 No. 3, pp.582-599. DOI: 10.1177/1094428109338875

Bliese, P.D. (2000). "Within-group agreement, non-independence, and reliability: implications for data aggregation and analysis", Klein, K.J. and Kozlowski, S.W. (Ed.s), *Multilevel theory, research, and methods in organisation*s, Jossey-Bass, San Francisco, CA, pp.349–381.

Bliese, P.D., Halverson, R.R. and Schriesheim, C.A. (2002), "Benchmarking multilevel methods in leadership. The articles, the models and the data", *The Leadership Quarterly*, Vol 13 No.1, pp.3-14. DOI: 10.1016/S1048-9843(01)00101-1

Bliese, P.D. and Halverson, R.R. (2002), "Using Random-Group Resampling in multilevel research: An example of the buffering effects of leadership climate", *The Leadership Quarterly*, Vol 13 No. 1, pp.53-68. DOI: 10.1016/S1048-9843(01)00104-7

Bunderson, J.S. and Reagans, RE (2011), "Power, status, and learning in organisations", *Organisation Science*, Vol. 22 No. 5, pp.1182-1194. DOI: 10.1287/orsc.1100.0590

Carlson, K.D. and Wu, J. (2012), "The Illusion of Statistical Control: Control Variable Practice in Management Research", *Organisational Research Methods*, Vol. 15 No. 3, pp.413-435. DOI: 0.1177/1094428111428817

Chan, D. (1998), "Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models", *Journal of Applied Psychology*, Vol. 83 No. 2, pp.234–246. DOI: 10.1037//0021-9010.83.2.234

Chen, G., Kirkman, B. Kanfer, R. Allen, D. and Rosen, B. (2007), "A Multilevel Study of Leadership, Empowerment, and Performance in Teams", *Journal of Applied Psychology*, Vol. 92 No.2. pp.331-46. DOI: 10.1037/0021-9010.92.2.331

Dahanayake, N. and Gamlath, S. (2013), “Learning organisation dimensions of the Sri Lanka Army”, *The Learning Organisation: An International Journal*, Vol. 20 No. 3, pp.185-215. DOI: 10.1108/09696471311328451

deRue, DS and Ashford, S.J. (2010), 'Who will lead and who will follow? A social process of leadership identity construction in organisations’. *Academy of Management Review,* Vol. 35 No. 4, pp.627–647. DOI: 10.5465/amr.35.4.zok627

Di Schiena, D.R., Letens, G. Aken, E.V. and Farris, J. (2013), “Relationship between leadership and characteristics of learning organisations in deployed military units: An exploratory study”, *Administrative Sciences*, Vol. 3 No. 3, pp.143-165. DOI: 10.3390/admsci3030143

Drobnjak, M., Stothard, C.F. Talbot, S. Watkins, K. and McDowall, D. (2013), “Learning, trust and change within the Australian Army: Developing the Army Learning Organisational Questionnaire (ALOQ)”, Örtenblad, A. (Ed.), *Handbook of Research on the Learning Organisation: Adaptations and Context.* Edward Elgar, Cheltenham, UK, pp.159-178.

Edmondson, A. (1999), “Psychological safety and learning behavior in work teams”, *Administrative Science Quarterly*, Vol. 44 No. 2, pp.350-383. DOI: 10.2307/2666999

Fiols, C.M. and Lyles, M.A. (1985), “Organisational learning”, *Academy of Management Review*, Vol. 10 No. 4, pp.803-813. DOI: 10.5465/amr.1985.4279103

Fiske, S.T. and Dépret, E. (1996), “Control, interdependence and power: Understanding social cognition in its social context”, *European Review of Social Psychology,* Vol. 7 No. 1, pp.31-61. DOI: 10.1080/14792779443000094

Glick, W.H. (1988), “Response: Organisations are not central tendencies: Shadowboxing in the dark, Round 2”, *The Academy of Management Review*, Vol. 13 No.1, pp.133-137. DOI: 10.2307/258361

Goh, S.C. (1998), “Toward a learning organisation: The strategic building blocks”, *SAM Advanced Management Journal*, Vol. 63, pp.15-22.

Greer, L.L. (2014), "Power in teams: effects of team power structures on team conflict and team outcomes", Ayoko, O.B. Ashkanasy, N.M. and John, K.A. (Ed.s), *Handbook of Conflict Management Research*, Edward Elgar, Cheltenham, UK, pp.93-108.

Greer, L.L., de Jong, B.A. Schouten, M.E. and Dannals, J. (2018), "Why and when hierarchy impacts team effectiveness: a meta-analytic integration", *Journal of Applied Psychology,* Vol. 103 No. 6, pp.591–613. DOI: 10.1037/apl0000291

Guinote, A. (2007), "Behaviour variability and the situated focus theory of power", *European Review of Social Psychology,* Vol. 18 No. 1, pp.256-295. DOI: 0.1080/10463280701692813

Harrison, D.A. and Klein, K.J. (2007), "What's the difference? Diversity constructs as separation, variety, or disparity in organisations", *Academy of Management Review,* Vol. 32 No. 4, pp.1199-1228. DOI: 10.5465/amr.2007.26586096

Hayes, A.F. (2018), Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (2nd Ed), The Guilford Press, New York, NY.

James, L.R. (1982), "Aggregation bias in estimates of perceptual agreement", *Journal of Applied Psychology,* Vol. 67 No. 2, pp.219-229. DOI: 10.1037/0021-9010.67.2.219

Klein, K.J. and Kozlowski, S.W.J. (2000), Multilevel theory, research, and methods in Organisations: Foundations, extensions and new directions, Jossey-Bass, San Francisco, CA.

Koeslag-Kreunen, M., Van den Bossche, P. Hoven, M. Van der Klinck, M. and Gijselaers, W. (2018), "When leadership powers team learning: A Meta-Analysis", *Small Group Research,* Vol. 49 No. 4, pp.475–513. doi: 10.1177/1046496418764824

Mathieu, J.E. and Chen, G. (2011), "The Etiology of the Multilevel Paradigm in Management Research", *Journal of Management*, Vol. 37 No. 2, pp.610-641. DOI: 10.1177/0149206310364663

Örtenblad, A. (2002), "A Typology of the Idea of Learning Organisation", *Management Learning*, Vol. 33 No. 2, pp.213–230. DOI: 10.1177/1350507602332004

Örtenblad, A., Fan, Z., Peng, C., Li, B., Li, Z., Cong, X. and Zhou, J. (2013), "Putting the learning organisation into context: contributions from previous works", Örtenblad, A. (Ed.), *Handbook of Research on the Learning Organisation,* Edward Elgar Publishing, Cheltenham, UK, pp.35-50.

Posner, M.I. and Snyder, C.R.R. (1975), "Facilitation and inhibition in the processing of signals", Rabbitt, P. M. A. and Dornic, S. (Ed.s), *Attention and performance V,* Academic Press, NewYork, NY, pp.669-682.

Ridgeway, C.L. (2001), “Gender, status, and leadership”, *Journal of Social Issues*, Vol. 57 No. 4, pp.637-655. DOI: 10.1111/0022-4537.00233

Schneider, B., González-Romá, V. Ostroff, C. and West, MA (2017), "Organisational climate and culture: Reflections on the history of the constructs in the Journal of Applied Psychology”, *Journal of Applied Psychology*, Vol. 102 No. 3, pp.468- 482. DOI: 10.1037/apl0000090

Sinha, R. and Stothard, C.F. (2020), "Power Asymmetry, Egalitarianism, and Team Learning- Part 1: Conceptualising the Moderating Role of Environmental Hardship", *The Learning Organisation.* DOI: 10.1108/TLO-01-2020-0018

Stothard, C., Talbot, S., Drobnjak, M. and Fischer, T. (2013), “Using the DLOQ in a Military Context: Culture Trumps Strategy”, *Advances in Developing Human Resources*, Vol. 15 No. 2, pp.193–206. DOI: https://doi.org/10.1177/1523422313477592

Tay, L., Woo, S.E. and Vermunt, J. (2014), “A Conceptual and Methodological Framework for Psychometric Isomorphism: Validation of Multilevel Construct Measures”, *Organisational Research Methods*, Vol. 17 No. 1, pp.77-106. DOI: 10.1177/1094428113517008

Van der Vegt, G.S., de Jong, S.B., Bunderson, J.S. and Mollemon, E., (2010), "Power asymmetry and learning in teams: the moderating role of performance feedback", *Organisational Science*, Vol. 21 No. 2, pp.347-361. DOI: 10.1287/orsc.1090.0452

Vescio, T.K., Sechrist, G.B. and Paolucci, M.P. (2003), “Perspective taking and prejudice reduction: the mediational role of empathy arousal and situational attributions”, *European Journal of Social Psychology*, Vol. 33 No. 4, pp.455-472. DOI: 10.1002/ejsp.163

Watkins, K.E. and Dirani, K.M. (2013), “A meta-analysis of the dimensions of a learning organisation questionnaire looking across cultures, ranks, and industries”, *Advances in Developing Human Resources*, Vol. 15, pp.148–162. doi:https://doi.org/10.1177/1523422313475991

Watkins, K.E. and Marsick, V.J. (1993), Sculpting the learning organisation: Lessons in the art and science of systemic change, Jossey-Bass, San Francisco, CA.

Watkins, K.E. and Kim, K. (2017), “Current status and promising directions for research on the learning organisation”, *Human Resource Development Quarterly*, Vol. 29 No. 1, pp.15-29. DOI: 10.1002/hrdq.21293

Wong, L., Bliese, P. and McGurk, D. (2003), “Military leadership: A context-specific review”, *The Leadership Quarterly*, Vol. 14 No. 6, pp.657–692. DOI: 10.1016/j.leaqua.2003.08.001

3.3 Discussion and Implications

In Paper 1, I applied Chen et al.'s (2005) validation process to evaluate the DLOQ as a multilevel construct. I also proposed and evaluated a series of parallel mediation models to examine if learning-oriented leadership mediated the effect of rank and team hierarchy on the other DLOQ dimensions. The results provided a useful and original analysis of the DLOQ, showing the model to be a reliable multilevel, multidimensional construct. Nevertheless, several questions remain unaddressed in terms of the thesis research question.

In chapter 2, I identified three fundamental flaws with my original AALO model: (i) lack of boundaries (i.e., no explanation of when, where or why specific dimensions are or are not included in the AALO), (ii) clarifying levels (i.e., unclear what is considered to be an individual or team level construct), and (iii) confounding definition (i.e., predictors and outcomes overlap). The analysis in this chapter helped to clarify the first two flaws in the AALO system's boundaries; the paper did not address issue (iii), namely, the confounding definitions.

The paper re-analysed the original AALO data and showed that the DLOQ is valid and reliable at the team level, and that there is a link between the individual and team level dimensions (see Fig 11, the vertical axis), although it remains unclear what are the specific mechanisms in the emergence of the team-level DLOQ constructs. Clarifying the cross-level and mechanisms of emergence is a question for future researchers to answer. Also, the AALO/DLOQ model in Fig 11 does not show any directional links between the dimensions, despite the mediation model evaluated in the paper. I have not identified the relationships between the dimensions for both theoretical and empirical reasons.

First, there is little theoretical consensus around the prioritisation of contingencies within the DLOQ dimensions, and many dimensions may indeed act through cross-level interactions. Other than the measurement model (where all dimensions are affected by the others), there are few investigations of contingent models within the learning organisation literature (Örtenblad et al., 2013; Watkins & Kim, 2017). Also, while I proposed and tested a theoretically justified mediation model (which argued for rank -> learning-oriented leadership -> DLOQ dimension), nevertheless, mathematically, the mediation regression is symmetrical (Hayes, 2015). This means that the mediating effect may work the other way. Only a time-lagged or longitudinal study can help untangle the causal nature of the mediation model; this is another avenue for future researchers to explore.

While the paper evaluated one mediation model, many other models (and contingent relationships) within the DLOQ are also possible (for example, the three levels x 7 dimensions creates the 21-item matrix, which can generate 51,090,942,171,709,440,000 of all possible interactions). This means that there are over 51 trillion possible permutations and combinations of each element interacting across levels and dimensions.

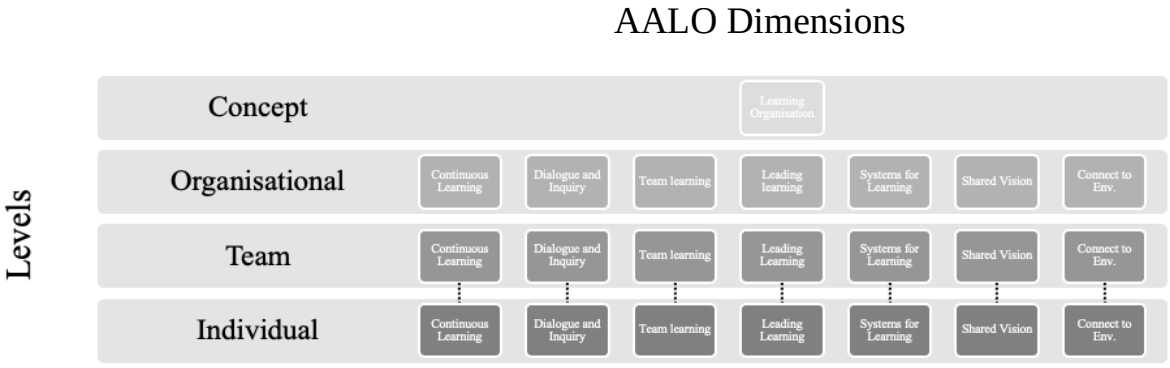

FIGURE 9: CONCEPTUAL MODEL OF THE AALO AS A MULTIDIMENSIONAL, MULTILEVEL TAXONOMY: ISOMORPHIC INDIVIDUAL AND TEAM LEVELS

Nor does the paper consider what mechanisms might be occurring to explain the emergence of the team-level DLOQ constructs; there is much discussion within the multilevel theory literature about the variety of possible mechanisms which contribute to the emergence of team-level constructs (Chen et al., 2007; Chen et al., 2005; Klein & Kozlowski, 2000; Kozlowski & Chao, 2012; Mathieu & Luciano, 2019; Tay et al., 2014). A well-established multilevel theory should specify a focal level's construct antecedents, correlates, and outcomes of constructs at multiple levels of analysis (Chen et al., 2007; Eckardt et al., 2020; Klein & Kozlowski, 2000; Mathieu & Chen, 2011). While understanding the specific mechanisms is essential, the paper primarily focused on understanding the validity of DLOQ as a team, and individual level construct. As such, the paper did aim to test what mechanisms may contribute to the emergence of the team-level DLOQ dimensions; this is an avenue for future researchers to explore.

Demonstrating isomorphism in the DLOQ allows other researchers to propose and test other possible relationships implied by nomological isomorphism. Isomorphism leads to more questions for learning organisational researchers: when does aggregate learning-oriented leadership differ from

individual leadership practices? Other questions emerge: is learning-oriented leadership a different type of leadership that is more likely to be a team-level construct compared to other styles or types of leadership? Notably, 'even highly isomorphic constructs could uniquely contribute to other variables at different levels of analysis' (Chen et al., 2005, p. 292). So, while I found that specific dimensions of the DLOQ display nomological isomorphism, this does not mean that all possible DLOQ contingent models will be isomorphic.

3.4 Resolving confounding definition: Team Learning as focal variable

While this chapter's analysis has helped clarify the AALO construct's boundaries by identifying some contingencies and validating a multilevel construct, there remains the issue of the confounding definitions. The problem is a conceptual problem rather than an empirical issue; a new, more precise outcome is needed. In response, I am choosing team learning to focus on my research question for conceptual, empirical and practical reasons. First, conceptual: team learning is widely recognised as a vital component of a learning organisation (Edmondson & Moingeon, 1998; Garvin, 1993; Garvin et al., 2008; Goh & Richards, 1997; Senge, 1990), and, importantly, team learning is sufficiently and conceptually distinct from the other AALO dimensions (Watkins & Marsick, 1996; Yang et al., 2003). It is essential to avoid the flaw of confounding definitions.

Empirically, there is a significant amount of research on team learning to inform the development of contingencies that shape team learning and progress our understanding of team learning within a military organisation (Goodwin et al., 2018; Veestraeten et al., 2014). Practically, team learning is a problematic level of learning for the Australian Army, given the gap in attention paid to the team and collective learning (Basan, 2020; Talbot, 2013; Thorburn, 2021). In choosing team learning to be my focal variable for the AALO, I am not arguing that team learning should be the outcome variable for all or any other learning organisation models or constructs. This choice is specific to this thesis to address the issues of a confounding definition within AALO and develop more precise contingency models to investigate when, where, and how Australian Army teams learn better (which, ultimately, will provide reliable evidence for recommendations).

4 LITERATURE REVIEW: TEAM LEARNING, TEAM POWER AND CONTINGENCIES

'Alone we can do so little; together we can do so much.' Helen Keller (1880-1968)

4.1 INTRODUCTION

This chapter presents a literature review to situate the clarified target variable of this thesis, namely, team learning. The research question now posed in this thesis is 'What team and individual-level contingencies help team learning in the Australian Army?'. I rethought my research question in response to the critical review of the AALO and to reflect my reconceptualisation of the AALO model. Team learning is the target variable (or outcome) for both scholarly and practical reasons: first, there is a substantial gap in research on team learning in the Australian Army, as I found in my AALO research project; next, there are repeated calls within several scholarly literatures (e.g., team learning, team power, learning organisation, organisational learning) for more attention to be paid to team-level contingencies, and finally, the lack of research means that there is no evidence base for practical recommendations for improving Australian Army's team learning.

Overall, this chapter traverses several different literatures, including team learning, team power, teams in extreme environments (or extreme teams), clinical psychology (post-traumatic growth), and military teams to establish the warrant for my proposal of two novel team learning contingencies, namely, a new mediator and moderator. The new mediator and moderator help to explain when, where and why some Australian Army teams learn, while others do not. In doing so, I extend our current knowledge of team learning in hierarchical teams and extreme environments and also directly contribute to theory-building in several scholarly literatures (e.g., team learning, team power and extreme teams).

First, this chapter literature review briefly looks at team learning in learning organisation literature and then turns to the multilevel theory literature to define team learning. Next, I review the team power literature to understand how team power affects team learning (or similar team processes). The team-level contingent factors known to shape the effect of power hierarchy on team learning are also reviewed. Finally, I briefly review the teams in extreme environments (or extreme teams) literature, which helps identify novel team-level contextual moderators of team power and performance. From this, I identify gaps in our knowledge of team context as a moderator of team learning and a specific need for a team and

individual mediator, which directly addresses the socio-cognitive effects of formal rank differences in teams. In response to these gaps, I draw on AALO qualitative evidence and extreme team literature to propose a novel mediator (team egalitarianism) and moderator (team environmental hardship, operationalised as military deployment), which are expected to reduce the typically negative team-level effects of power disparity on team learning.

4.2 TEAM LEARNING: A MULTILEVEL CONSTRUCT

Team learning has consistently been considered an essential element within many popular learning organisation models (Garvin et al., 2008; Senge, 1990, 2006; Watkins & Marsick, 1993). Similar to the characterisation of the learning organisation and organisational learning literature, team learning literature has been described as 'messy and fraught with conceptual confusion' (Bell et al., 2012, p. 859). Nevertheless, in the last decade, greater attention has been paid to team learning; for example, Kozlowski (2018, p. 28) noted that the 'rising interest' in teams as the 'focal units of research' parallels the uptake of multilevel theory and methods. In part, the increased attention paid to team learning reflects the conceptual and methodological progress in understanding the construct. Specifically, Kozlowski (2018) identifies several key developments, with team learning now being: (i) theoretically mapped, where internalised personal knowledge is transformed into group knowledge (Bell et al., 2012; Fiore et al., 2018), (ii) differentiated from other knowledge-based team outcomes (Bell et al., 2012), and (iii) theorised and empirically evaluated (Grand et al., 2016).

In defining team learning, I draw on Bell et al. (2012) to outline the multilevel nature of team learning and others (Bunderson & Boumgarden, 2011; DeChurch & Zaccaro, 2010; Edmondson, 2012; Gino et al., 2010) for the conceptual and empirical content within team learning. Bell et al. (2012) emphasise that team learning is emergent[18], multilevel phenomenon, where team learning is both an individual *and* team process, rather than an individual *or* team process. Bell et al.'s (2012) definition

[18] Notably, Bell et al. (2012) characterise team learning by drawing on Kozlowski's (2012) definition of emergence. Kozlowski (2012, p.7) argues that 'focus[ing] on the basic elements, entities, or agents is not reductionism. Rather, it is an effort to understand how the "wholeness" arises without reifying it' (Bell et al., 2012, p.7). Bell et al. (2012) avoid the logical flaw that can occur with the inappropriate application of systems thinking/approaches (Cabrera, 2006; Cabrera et al., 2015).

reframes the nested nature of individual learning by using multilevel theory and methods. In doing so, the definition eliminates both the criticisms of mystification, anthropomorphism or reification often found in criticism of team or organisational learning (Friedman et al., 2005). Bell et al. (2012) also avoid the logical flaws of holism caused by misapplied or unspecified systems thinking (Cabrera, 2006; Cabrera et al., 2015; Caldwell, 2012). Specifically, Bell et al. (2012) avoid defining team learning as a 'unique whole' (in contrast to Senge's [1990] use of systems thinking). In this, I follow Bell et al.'s (2012) reasoning, which like Cabrera (2006) and Caldwell (2012), argues that the justification of a 'unitary whole' emerging from the (mis)application of General System is 'overstated'. Instead, Bell et al. (2012, p. 6, italics as original) argued that 'team learning is *emergent*. It is not purely "holistic." It does not just magically manifest as a collective property, it develops, evolves, and emerges over time at the team level'. The challenge is not to be reductionist, assuming that learning can only be psychological while also eschewing holism, assuming that systems cannot be meaningfully decomposed (Simon, 1973). The challenge is to conceptualise team learning that encompasses both levels—individual and team—simultaneously.

Team learning, in this sense, is made up of both individual and collective activities and processes together. At the same time, I recognise that the specific mechanism which explains how individuals learn within teams, and team learning contexts influence individuals, remains a question within the multilevel theory literature (Bliese, 2000; Humphrey & LeBreton, 2019; Klein & Kozlowski, 2000; Kostopoulos et al., 2013). While Bell et al. (2012) argued that team learning is both an individual and team process, it is not clear exactly *what* these processes might be. To unpack what some of these processes or mechanisms might be, I turn to the broader team learning literature. For example, Edmondson (1999, p. 357) argued that team learning behaviour is marked by 'seeking feedback, discussing errors, seeking information and feedback from others', while Watkins and Marsick (1996, p. 6) defined team learning as 'collaboration and the collaborative skills that undergird the effective … teams'. More recently, Koeslag-Kreunen et al. (2018) considered team learning to be the extent to which teams engage in mutual learning processes and activities such as open discussion of mistakes, sharing learning and viewing everyday work as learning opportunities. There is consensus within team learning literature that it typically includes individual-level characteristics (e.g., individual behaviours, attitudes and knowledge/skills) and team-level processes, climate, and structures. Nevertheless, there is considerable variation in methodological and theoretical models applied within the team learning literature (Bell et al., 2012; DeChurch & Zaccaro, 2010; Fiore et al., 2018).

4.3 TEAM LEARNING: LITERATURE REVIEW

While there is recognition that team learning literature is messy (Bell et al., 2012; DeChurch & Zaccaro, 2010), efforts have been made to synthesise and integrate the literature. I frame the literature on team learning using Roloff et al.'s (2011) approach, which groups the team learning literature into three general streams of work: (i) outcome improvement/learning curves of teams (from research typically conducted in operational settings), (ii) task mastery (i.e., research emerging from psychological experiments and controlled team environments), and (iii) group process. The first two streams of research typically define team learning as an outcome, while the third stream, in contrast, typically defines team learning as a process. Overall, Roloff et al. (2011) found that each stream contributes a unique perspective and typically (although not exclusively) uses a specific methodological approach, so each stream contributes a specific perspective to the knowledge of team learning. Roloff et al.'s (2011) broad categorisation of streams of team learning research also helps to situate the team research primarily occurring within military research as well, and in doing so, identifies current gaps in our knowledge.

Overall, team learning research has found the following factors necessary in team learning: (i) improving team learning efficiencies are typically underpinned by practice and experience, (ii) task mastery helps to coordinate and share knowledge to build on team expertise, and (iii) group processes, in uncertain or ambiguous team contexts, help teams to learn by focusing on how they are learning, as well as what is learnt.

4.3.1 TEAM LEARNING: IMPROVING LEARNING EFFICIENCY

Studies have identified several factors which determine team learning efficiencies; one of the most consistent factors is the importance of team and task stability (Argote et al., 1990; Bell et al., 2012; Bunderson & Boumgarden, 2011; Edmondson, 2003). Typically, stable tasks and teams help clarify roles and procedures so reducing potential conflict and increasing ease of information sharing (and ultimately, improving team learning). Also, a stable team structure provides a 'safe and predictable environment where experience with tasks can lead to improvements' (Roloff et al., 2011, p. 255). While useful, the generalisation of these findings may be limited to similar contexts such as stable, repetitive environments. Many organisations, such as the military on deployment, operate in complex, ambiguous, and volatile environments where such task stability is less common (Driskell et al., 2018; Hannah et al., 2009; Meslec et al., 2020). The process improvement stream of team learning research provides important insights, yet by itself, this is not sufficient to explain when, where and how team learning occurs, particularly for

teams in extreme environments. In this situation (i.e., extremity), other approaches are needed to broaden our understanding of how, when and where team learning occurs (or not).

4.3.2 TEAM LEARNING: TASK MASTERY

The second stream of team learning research considers team learning to be 'the outcome of the communication and coordination that results from a shared knowledge' (Roloff et al., 2011, p. 255). Much military team learning research sits primarily in this stream; for example, Goodwin et al. (2018) traced how much fundamental research on team coordination, communication and cooperation emerged from investigations of military team performance (including learning). More recently, team learning in the military has focused on understanding how teams share mental models (i.e., models as an internal, individual knowledge) as part of the US Navy's TADMUS[19] program (Goodwin et al., 2018; Mathieu et al., 2000; McGrath, 1957).

The team mental model research focus has expanded and now encompasses the broader notions of team cognition (as an activity) (Cooke et al., 2012) and shared cognition (as a process, including situational awareness, transactive memory) (DeChurch & Mesmer-Magnus, 2010; Orvis et al., 2009). Much of the team learning research stream frames team learning as the outcome of coordination and communication and emphasises that improvement improves knowledge sharing. Evidence shows that information sharing (i.e., team cognition) is vital for teams that need diverse expertise or skills to perform successfully and plays a critical role in teams in extreme environments, including military teams (DeChurch & Marks, 2006; Driskell, Salas, et al., 2017; Goodwin et al., 2018)

Overall, studies on task mastery have identified several factors that underpin successful team learning; team training was found to improve team mastery. However, further analysis found that it was not the training *per se*. Instead, it was the development of a transactive memory system (TMS) that mediated team performance after training (Liang et al., 1995; Moreland & Myaskovsky, 2000). The development of the TMS was associated with greater team complexity, accuracy, and consensus in team perceptions of their expertise and an increase in sharing tacit knowledge during task execution (Gruenfeld et al., 1996; Liang et al., 1995; Moreland & Myaskovsky, 2000). This team learning research stream has provided important insights into specific mechanics of how and when individual interactions (such as

[19] Tactical Decision Making Under Stress (TADMUS)

communications) lead to team (collective) improvements in team performance (Roloff et al., 2011). These findings have been readily embraced within military research (Goodwin et al., 2018).

Evidence shows that the teams develop different knowledge systems (or TMS) related to task work and team process (Mathieu et al., 2000). Other factors also influence team knowledge, including team size (Rentsche & Klimoski, 2001), task experience (Gino et al., 2010), tenure (Smith-Jentsch et al., 2001), and team communication (Lewis et al., 2005; Moreland & Myaskovsky, 2000; Rulke & Rau, 2000). In particular, teams that promote open and honest communication are more effective than teams that do not actively promote open communication (Bell et al., 2012; Edmondson, 1999; Edmondson et al., 2001; Meslec et al., 2020; Moreland & Myaskovsky, 2000; Rulke & Rau, 2000). Specifically, shared understanding and cognition enable teams to improve existing tasks quickly or quickly develop new knowledge or techniques (Sessa & London, 2006).

4.3.2.1 TEAM LEARNING AS A TASK AND TEAM MASTERY: CONTINGENCIES

Research into factors that affect team communication (in the above section) overlaps with the third stream of team learning research, namely, focusing on the antecedents, moderators and mediators of the team or group processes. For example, team behaviours (established and promoted by specific leadership styles) directly influence team communication processes (Burke et al., 2006; Chen et al., 2007; Koeslag-Kreunen et al., 2018; Kostopoulos & Bozionelos, 2011; Kostopoulos et al., 2013). An open and supportive team climate provides an active counter to the tendency of diverse team members to stereotype others' knowledge and experience (Gruenfeld et al., 1996; Hollingshead & Fraidlin, 2003). Notably, the absence of positive or supportive leadership was sufficient to increase the adverse team effects of hierarchical disparity (Greer et al., 2017). This issue will be explored in more detail in the following section.

Within the team learning and cognition literature, there is some recognition that developing team cognition and mental models are impacted by power disparity or hierarchical differences. For example, Roloff et al. (2011, p. 256) argued that developing team mental models is 'a highly political process in that team members are particularly concerned about how expertise labels affirm their identity or enhance their self esteem'. While there has been considerable interest in the effect of leadership in military team research (Wong et al., 2003), there has been relatively little direct attention paid to understanding the contingencies of leadership on shifting the effect of rank differences on team processes or communications.

4.3.3 TEAM LEARNING: GROUP PROCESS

The third stream, group processes (or 'learning how to learn'), views team learning as a process; for example, Roloff et al. (2011) identified that much of this stream of research on team learning emerged from the input-process-output (IPO) model of team effectiveness (Ilgen et al., 2005; McGrath, 1984). In this stream, team learning research focuses on the process (namely, interpersonal mechanisms and processes), and as such, is contrasted against the first two streams (which focus on the inputs and outputs of team learning). A significant focus of military team research has been developing the IPO model of team effectiveness (Goodwin et al., 2018). Attention has been paid to understanding how team processes or factors impact military team learning, such as team-efficacy (Chen & Bliese, 2002; Chen et al., 2002) and military team leadership (Wong et al., 2003). It is only relatively recently that team climates such as psychological safety (Veestraeten et al., 2014) have been more commonly investigated in military teams.

Within the team learning as a group process steam, research efforts have been made to identify the factors which influence team learning processes. Leaders have been found to play a significant role in shaping team climate by involving teams in decision-making, clarifying goals, and managing boundaries (Edmondson, 2003; Nembhard & Edmondson, 2006; Sarin & McDermott, 2003). Team leaders can also behave in ways that either neutralise or enhance hierarchical team differences, which have been identified as creating difficulties and inhibiting team learning behaviours (Bunderson & Reagans, 2011; Edmondson, 2003; Nembhard & Edmondson, 2006; Van der Vegt et al., 2010). Again, the effect of hierarchical differences or power disparity on teams is reviewed in more detail in the next section, together with the factors known to shape the effects (including leadership behaviours).

4.3.3.1 TEAM LEARNING AS A GROUP PROCESS: CONTINGENCIES

Research has focused on understanding the contingencies which influence team learning, including a range of antecedent, mediating, moderating, and contextual factors. Evidence has shown that a range of antecedents influences team learning: the degree of interdependence needed to complete the team task (Bunderson & Sutcliffe, 2003; Ely & Thomas, 2001; Tjosvold et al., 2004), the nature of the task (e.g., routine procedures require less learning than more complex team tasks) (Edmondson, 2003), and team composition and diversity in teams (e.g., demographic, expertise or knowledge diversity (Gibson & Vermeulen, 2003; Lau & Murnighan, 2005; Sarin & McDermott, 2003; Van Der Vegt & Bunderson, 2005). Team climate is an important mediator, with much attention being paid to psychological safety in particular (Edmondson, 1999; Edmondson & Lei, 2014). Other moderating factors that influence team

learning include team identification (Van Der Vegt & Bunderson, 2005) and collective feedback and reflection (Van der Vegt et al., 2010).

Finally, research has identified several contextual variables that support team learning, including time available for team reflection (during interrupted workflows) (Zellmer-Bruhn, 2003) as well as greater organisational autonomy (compared to prescribed practices) (Zellmer-Bruhn & Gibson, 2006). Finally, much attention has been paid to the leadership styles which support team learning; for example, a recent meta-analysis of team-level leadership styles found that person-oriented leadership had a more positive effect on improving team learning processes compared to task-oriented leadership (such as transactional leadership) (Koeslag-Kreunen et al., 2018).

4.4 Power in teams

'Power without love is reckless and abusive, and love without power is sentimental and anaemic. Power at its best is love implementing the demands of justice, and justice at its best is power correcting everything that stands against love.' Martin Luther King, 1967

4.4.1 Defining power

Power is a fundamental construct within social and organisation psychology (Dépret & Fiske, 1993; Fiske & Berdahl, 2007; Galinsky et al., 2015; Greer, 2014; Guinote, 2007a; Keltner et al., 2003; Kipnis, 1972; Magee & Galinsky, 2008). Within the organisational literature, Fiske and Berdahl (2007) categorised the many different definitions of interpersonal or social power into three types: (1) power as influence, (2) power as potential influence, and (3) power as outcome control. In particular, Fiske and Berdhal (2007) argued that the traditional definitions of power include notions of social influence such as compliance, identification and internalisation processes (French & Raven, 1959 (2016); Kelman, 1958). Many early works defined power as causing a change or effect (Dahl, 1957; Russell, 1938; Simon, 1957). However, defining power by its effects is logically flawed (similar to the critique of confounding definitions of the AALO in Chapter 2) (Fiske & Burdhal, 2007).

4.4.2 Defining power: Logical flaws

An alternate approach defines social power as having the *potential* to induce an effect rather than the actual, realised effect (Fiske & Berdahl, 2007). This definition includes the highly cited French and Raven (1959) definition where social power is the capacity to influence, even in the absence of action, and continues to be used within the literature (Fiske & Brudhal, 2007). Scholars, such as Manz and Giola (1983) and Vescio et al. (2003) defined social power as the ability or potential to influence others. However, this appeal to potential influence suffers from a similar logical flaw as the more traditional 'power as influence' definition. Namely, the construct is defined by both its cause and effects. For example, influence is both a cause and an effect of having power. Neither definition type directly explains the origins of the capacity to influence, with the more recent 'potential influence' definitions attributing social influence (indirectly) to the control of valued resources (Fiske & Brudhal, 2007).

An alternate definition of social power has recently gained prominence, which primarily focuses on the structural properties of social relations (and without directly referencing any consequent effects) (Dépret & Fiske, 1993; Fiske & Berdahl, 2007; Greer, 2014; Guinote, 2017; Keltner et al., 2003). Power in this sense is defined as a resource or outcome control (i.e., power as the control over valued resources) and builds on the work of Thibaut and Kelley (1959) and Emerson (1962, p 32 in Fiske and Brudhal, 2007, p.679), where 'the power to control or influence others resides in control over the things he values'. Characterised as taking a functionalist approach to defining and applying power (Greer et al., 2017), Fiske and Bradhal (2007, p. 679) argued that, 'We believe influence effects need to be separated from the control of outcomes per se, whether or not the influence attempt is successful or even intended in the first place. People who control others' outcomes have power, like it or not'. As such, their definition avoids the logical flaw (i.e., defining a cause by its effects), and therefore provides this study with a definition where social power is 'relative control over another's valued outcomes' (Fiske & Bradhal, 2007, p. 679).

4.4.3 Defining power: A relational construct

There are several important implications in defining power as relative control over resources; primarily, this definition means that power is only understood in comparison or relation to others. So 'power is not an "attribute" of an individual but a structural property of a social relation that derives from relative control over outcomes. That is, one cannot say that someone has power without specifying over whom' (Fiske & Brudhal, 2007, p. 680). Next, the relative amount of power varies as the degree or nature of control over the valued resources. In this sense, the formality, legitimacy and stability of the control over resources determine how power might be wielded. Power based on formalised, legitimate authority

(e.g., military rank) is seen as greater compared to other, less formalised or illegitimate control since senior ranking officers can withdraw rewards or administer punishments (Dépret & Fiske, 1993; Keltner et al., 2003; Kipnis et al., 1976; Thibaut & Kelley, 1959).

4.4.4 Defining power: Functionalist vs critical perspective

Fiske and Brudhal's (2007) and related definitions of power (e.g., Keltner et al., 2003; Kipnis, 1976) have been characterised as taking a functionalist view of power, and as such, power can be seen as a positive effect. Greer et al. (2017) argued that the functionalist view of power is situated firmly within the traditional social psychological view, where people are seen as having an unconscious preference for hierarchy because it provides stability, clarity and predictability (Fromm, 1941; Kruglanski & Webster, 1996; Tiedens & Fragale, 2003; Whitson & Galinsky, 2008). For example, within the functionalist view of hierarchy in teams, a hierarchical structure is thought to help team communications and interactions by clarifying roles (Halevy et al., 2011). In contrast, Greer et al. (2017) and others (Bunderson & Van Der Vegt, 2018; Bunderson et al., 2016; Edmondson, 2003) have drawn on the more critical view of power, where power is not assumed to be positive, and a hierarchical structure is not expected to clarify roles. Instead, taking a critical perspective, team hierarchies are expected to generate conflict unless other contingent factors are present to shift the effect of power on teams (Greer & Chu, 2020; Greer et al., 2017).

4.4.4.1 Characterising power in Australian Army teams

Within a formal military hierarchy, the social power emerging from rank differences would be legitimate, formal, and stable. The control of resources that a high-ranked officer has, would (potentially) include all three types of outcomes (physical, economic and social resources). As such, Fiske and Brudhal (2007) and others (Halevy et al., 2011) within a functionalist view of power would suggest that a military team hierarchy would help team communication and coordination, regardless of team context. Alternatively, within the conflict perspective of team power, Greer et al. (2017) argued that other

contextual factors (present within the military) would be expected to shift the typically negative effect of hierarchy in teams to the positive[20].

There is a considerable body of work that has investigated the antecedents of social power (see Fiske and Brudhal (2007) and Greer (2014) for reviews). This thesis will focus on reviewing the direct effects of power on the cognitive and social factors that contribute to military team learning, and reviewing the known mediators and moderators of the effects of social power on team learning (or similar) behaviours processes. Drawing on qualitative evidence, personnel within the military are fully aware of the possible implications of formal authority and rank, regardless of whether the power is used or not (Stothard et al., unpublished, 2014); rank differences (and other power differences) are extremely salient within the military[21] (O'Toole & Talbot, 2013; Popper & Lipschtiz, 2002; Wong et al., 2003).

4.4.5 Cognitive and behavioural consequences of power

The consequences of power created by the relative control over valued resources also create 'tension between independence from others and responsibility for others… basic issue of self-versus-other, individual versus group, which may help explain why power is considered such a fundamental concept to so many social science disciplines' (Fiske & Bardhal, 2007, p. 686). In this sense, powerholders can express and achieve the two critical social drives we all have; the drive for autonomy and the drive to belong. Much attention has traditionally been paid to understanding the effect of wielding power to achieve the powerholders' ends. For example, Guinote (2017, p.357) characterised the long history of the attention on power as autonomy and recognising that 'scientists, philosophers, and political analysts have long associated power with free will, volition, and agency. In short, it is argued that power gives people the ability to act at will'.

However, Guinote (2017, p. 357) took a slightly different perspective, investigating and summarising the empirical evidence emerging from social and cognitive psychology, neuropsychology, and management literature to understand how 'power changes people'. Or, specifically, how power

[20] The role of team context in shifting the effect of team power dispersion (hierarchy) on team learning is theorised in chapter 5 and tested in chapter 6. The implications of the proposed and evaluated moderated mediation model is explored in the reflections of chapter 6.

[21] Other power differences (apart from rank) are well studied within military institutions. For example, a significant body of work within military sociology draws on various notions of power (e.g., hegemony) to better understand military organisations and society. Much attention has been paid to Connell's (2005, 2014) notions of masculinity within military institutions and other forms of demographic or socially-based power (such as gender) (see Sands and Fasting, 2013 for a complete bibliography of work on gender in the military).

affects us at the individual level. Greer et al. (2020) offered an alternate perspective, focusing on the team-level antecedents, moderators, mediators and consequences of power disparity. Specifically, Greer et al. (2020) contrasted much of Guinote's (2017) individual-level power research to team-level power research, and in doing so, expanded our understanding of the implications of power as a relational construct. This section will briefly review the individual level research to establish how power changes people and then follows with Greer et al.'s (2018) team perspective on power to identify how power disparity might be expected to shape military team learning.

4.4.5.1 Individual perspective: Socio-cognitive effects of power disparity in teams

Overall, Guinote (2017) observed that research evidence showed that powerholders could achieve their aims not only because they can act at will with less resistance (as Weber [1914/1978] observed initially) but also because of specific cognitive and behavioural effects of power, namely, greater self-regulation (DeWall et al., 2011; Guinote, 2007a). For example, powerholders selectively attend goal-related information—by ignoring irrelevant information and paying more attention to relevant information (Guinote, 2007a, 2007b, 2007c; Overbeck & Park, 2006). Powerholders have typically been more creative and flexible thinkers, engaging in more abstract thought (Smith & Trope, 2006), which, together, leads to improved, innovative solutions. However, evidence also shows that powerholders often chose to use fast decisions by taking short cuts in decision-making; that is, they rely on 'gut instinct' and subjective experience (Anderson & Galinsky, 2006; Weick & Guinote, 2008).

Increased power has been found to reduce social attention towards others and, in particular, towards those with less power (Fiske & Berdahl, 2007). While many studies found a decrease in powerholders' ability to recognise the emotions of others (Galinsky et al., 2006; Gonzaga et al., 2008; Nissan et al., 2015), this has not been a consistent result, with other studies finding no effect (Schmid Mast & Jones, 2009). Behaviourally, evidence shows that powerholders are less motivated to investigate the state of their (lower powered) partners during negotiations (Van Kleef et al., 2004) and is associated with reduced trust (Inesi et al., 2012; Schilke & Cook, 2015). Power also decreases powerholders likelihood to take another's (lower power) perspective (Galinsky et al., 2006). However, evidence for decreased recall accuracy in social judgements in powerholders is mixed, with more effects found in field studies (i.e., 'real life') studies than other types of studies such as experimental (Hall et al., 2015). There is also consistent evidence that powerholders use more stereotyping across various contexts (Fiske & Dépret, 1996; Gwinn et al., 2013; Schmid & Amodio, 2017). However, this effect appears to be contingent on the context; the negative stereotyping is reduced when powerholders are predisposed or

primed towards collective or social goals (Chen et al., 2001; Overbeck & Park, 2001; Schmid Mast & Jones, 2009; Weick & Guinote, 2008).

4.4.5.2 INDIVIDUAL-LEVEL: CONTINGENCIES

Further research has identified that the social context or goal is an essential factor in determining the effect of power. As expected, evidence shows that powerholders generally value their interest over others (i.e., powerholders sacrifice their interests for those of their (lower powered) partners less often than vice versa (Danescu-Niculescu-Mizil et al., 2012; Laurin et al., 2016; Righetti et al., 2015). Further, powerholders also more sensitive to violations in distributive justice and expect to be treated with fairness compared to lower-powered individuals (Sawaoka et al., 2015).

However, this is not an inevitable effect of power; instead, pro-social and benevolent personality and the context of greater accountability all influence the use of power to achieve a positive effect. For example, those who saw power as a responsibility sacrificed time and resources to help others (Chen et al., 2001; Galinsky et al., 2003; Hoogervorst et al., 2012; Sassenberg, 2014). Triggers leading to increased pro-social perspective (such as a greater sense of group belonging) also reduced the adverse effects of power (Guinote & Weick, 2012; Hoogervorst et al., 2012). Greater accountability was also found to reduce harmful power use (i.e., abuse) in organisations (Grant & Keohane, 2005; Ingersoll, 2003; Zimbardo, 2007). For example, in an experiment, candid feedback to the powerholders led to a fairer distribution of resources (and so changed powerholders' behaviours) while compliant feedback increased powerholders' self-serving biases (Oc et al., 2015)

To return to Fiske and Bardhal's (2007) argument that power enhances the drive towards both autonomy and belonging, it becomes more apparent that the consequences of power can shift to reflect these drives. Guinote et al. (2017, p. 368) reflected that 'power can be used for good or evil, depending on power roles, the person and the environment'. In this sense, the situated focus theory of power proposes that power intensifies the activation of self, and in doing so, helps people strive for their salient goals (Guinote, 2007a, 2010). The salience of the goals depends on context, as well as personal predispositions or opportunities. As such, Guinote's (2007) situated focus theory of power links the causes of power (control of valued resources) with the contextual effects (achievement of salient goals) and helps explain the mixed evidence from the research by identifying potential contingencies (e.g., organisational context such as accountability, collective or pro-social oriented) (Chen et al., 2001, Sassenberg et al., 2014).

4.4.6 COGNITIVE AND BEHAVIOURAL CONSEQUENCES OF POWER: TEAM PERSPECTIVE

While power is primarily defined as a relational construct, Greer (2014) observed that much research has focused and framed power as an individual-level phenomenon, including Guinote's (2017) perspective of power. In response, Greer (2014) placed the study of power firmly within teams to better understand the nuances of power differences and similarities. Importantly, reviewing the causes and effects of power in teams allows for greater focus on understanding the relational nature of power and its implications. Greer (2014) described two primary types of team power structures.[22]: (i) team power level (where the team power is the mean or average power of individuals within the team) (Greer et al., 2011; Sassenberg, 2014), and (ii) team power dispersion (or hierarchy, where there is a disparity in power within a team). High team power dispersion would be when one higher-powered team member has all the power while their subordinates have virtually no power. Low team power dispersion is when each team member has an equal measure of power over the others.

Using Greer's (2014) typology, each team can be characterised along the two dimensions of power (i.e., team power level as an average or aggregate, and team power dispersion as a measure of disparity). Reviewing the empirical evidence resulting from team power characteristics, Greer (2014) found both positive and negative effects of power within teams. This pattern was found for both team power level (mean or average power) as well as team power dispersion (hierarchy), and more importantly, there is growing evidence that the effect of team power level is dependent on both the average level as well as a level of dispersion (Greer & Van Kleef, 2010).

4.4.6.1 TEAM POWER LEVEL

Conceptually, team power levels would be expected to have both positive and negative effects on team performance, and empirical evidence has indeed found both effects. Greer (2014) pointed to the shared leadership literature for theory and evidence of the positive effects of high team power levels. Sharing leadership (as sharing influence and control, namely, power) has been found to improve a range of team outcomes, including team commitment, engagement and information exchange (Carson et al., 2010; Klien et al., 2006; Pearce & Sims, 2002). However, a counterview emerged from the negotiation and organisational behaviour literature, where team power level has been found to generate adverse team

[22] Greer (2014) also suggested a third team power type, namely, 'team power variety', where sources of power (i.e., variety of valued resources) may include variety within teams. However, this is less well-studied or theorised in the literature (Greer et al., 2017). In military teams, while there may be some variation in expertise or specialised knowledge, most power is expected to derive from formal, legitimate rank and authority. In terms of the AALO studies, power is operationalised as formal rank, and so, team power variety is not explored in this research question. The effects of other power sources might be an avenue for future researchers to examine in military teams.

outcomes and behaviours. For example, two high-powered negotiators distrust each other more than two low-powered negotiators (De Dreu, 1998; Giebels et al., 2000).

In healthcare organisations, Chattopadhyay and Finn (2010) found that multiple high-status surgeons interacting in medical teams lead to increased conflict and reduced performance. Evidence shows that teams with higher-powered members were found to have higher levels of conflict and poorer team outcomes, unlike teams with lower-powered members, showing that teams can have too many stars (Greer & Van Kleef, 2010; Groysberg et al., 2011). The reasons for such conflict within high powered or status teams are not immediately apparent; Greer (2014) and others (de Kwaadsteniet & van Dijk, 2010; Porath et al., 2008; Ronay et al., 2012) speculated that such conflict between high powered team members might be due to coordination issues. For example, Kwaadsteniet and van Dijk (2010) showed that in situations needing tacit coordination, a team with all high-powered members had more difficulties coordinating action than all low-powered teams or teams with a variety of power. However, the mechanisms for higher conflict within equally high-powered team members are far from established.

4.4.6.2 TEAM POWER DISPERSION

The effects of team power dispersion (i.e., intra-team hierarchy) have received significant attention across various team research fields and perspectives. There are two streams of team power dispersion research emerging from different perspectives and fields, and the streams are finding divergent evidence. There have been recent efforts to integrate the diverging findings (Greer & Chu, 2020; Greer et al., 2017). For example, Greer et al. (2020) argued that the two streams of team power level research emerge from different perspectives: (i) a functionalist view of team power situated in the individual-level perspective of power (Fiske & Berdahl, 2007; Guinote, 2007b, 2007c; Kipnis et al., 1976), and (ii) the critical view situated in the team-level view of power (Greer, 2014; Greer & Chu, 2020; Greer et al., 2017). Integrating the diverse perspectives and results is an essential step in understanding the contingencies shaping how power dispersion (or disparity) affects teams (and the individuals within them). Integrating the two perspectives (i.e., individual vs team-level perspectives on the causes and effects of power dispersion in teams) also provides a valuable framework to better understand and map the conflicting evidence within the field.

4.4.7 INDIVIDUAL AND FUNCTIONALIST PERSPECTIVE: POWER AS A POSITIVE

In the individual-level perspective of power (and primarily anchored in a functionalist view of power), studies have found a positive (or neutral) effect of hierarchy on team functioning. Much of this work is predicated on the classic social psychology notion that hierarchy provides significant

(unconscious) psychological benefits (namely, clarity, security, predictability and certainty) (Fromm, 1941; Kruglanski & Webster, 1996; Tiedens & Fragale, 2003; Whitson & Galinsky, 2008; Zitek & Tiedens, 2012). Based on this assumption, the functionalist perspective has typically found that hierarchical team structures are linked to (i) greater clarity of communication, making it easier to prioritise interactions and information (Halevy et al., 2011; Zitek & Tiedens, 2012), (ii) greater role clarity, which divides labour, interactions and enhances coordination (de Kwaadsteniet & van Dijk, 2010; Halevy et al., 2011; Magee & Galinsky, 2008), (iii) reduced conflict and increased compliance/cooperation (Fiske, 2010), and finally, (iv) motivation to engage in extra-role behaviours (Gruenfeld & Tiedens, 2010; Halevy et al., 2011; Magee & Galinsky, 2008). Overall, within the individual-level, functionalist view of team power dispersion, hierarchy is seen to positively affect team performance (including team learning behaviours such as sharing information, improving coordination and extra-role behaviours).

Some studies have shown a positive effect of hierarchy on team outcomes; for example, power dispersion (hierarchy) in management teams (indicated by executive compensation schemes) has been positively related to firm performances (Boone & Hendriks, 2009; Main et al., 1993). Similarly, in professional sports teams, power dispersion (based on salary or talent level) was also linked to the likelihood of winning due to improved cooperation and coordination (Frick et al., 2003; Halevy et al., 2012; Stuart, 2011; Trzebiatowski & Trevor, 2016). These studies claimed that having a key player (or star), rather than multiple stars (multiple high-powered team members), prevents conflict by limiting ego conflicts and therefore reducing failures (Groysberg et al., 2011; Swaab et al., 2014; Swaab & Galinsky, 2015). In some (but far from all) negotiation studies, evidence has been found that unequal power between negotiating partners increased the quality of the negotiated outcomes (Brett et al., 1996; Pinkley et al., 1994; Sondak & Bazerman, 1991). In student teams, team hierarchies (mainly based on levels of experience or expertise) lead to improved student team performance (typically through improved information integration) (Martins et al., 2013; Tarakci et al., 2016; Woolley et al., 2008).

4.4.8 TEAM AND CRITICAL PERSPECTIVE: POWER AS A NEGATIVE ON TEAMS

The more critical view of team power dispersion emerges from the team-level perspective of power causes and effects (Greer et al., 2020). Much of this work emerges from field research conducted on

teams in organisations. In particular, many studies show adverse effects of hierarchy on team learning and team performance more broadly (Bunderson & Reagans, 2011; Bunderson & Van Der Vegt, 2018; Edmondson, 1999, 2003; Van der Vegt et al., 2010). Across a range of organisational settings and all levels of organisations, research has typically shown a negative effect of hierarchy on team performance (beyond team learning) (Bloom, 1998; Sauer & Kauffeld, 2013; van Bunderen et al., 2018).

For example, professional sporting teams where players had unequal pay structures, were found to perform worse on the field (e.g., winning percentage) (Bloom, 1998; Jewell & Molina, 2004; Richards & Guell, 1998). Similarly, in management teams (where employees had unequal pay structures) also had an overall poorer firm performance (Patel & Cooper, 2014; Rulke & Galaskiewicz, 2000). In the medical setting, several studies have found that a greater degree of hierarchy in medical teams decreased surgical team performance, measured by either patient outcomes or other medical indicators (Edmondson, 1999, 2003; Mitchell & Boyle, 2015; Mitchell et al., 2015). Studies show that greater hierarchy produces more intra-team competition and conflict and impair team performance (Giebels et al., 2000; Greer & Van Kleef, 2010; Mannix, 1993; Wolfe & McGinn, 2005). In student team studies, hierarchical differences (in the sense of power, presence or absence of formal leaders) reduced teams' open communication and member satisfaction, and overall, reduced team performances (Becker & Baloff, 1969; Curşeu & Sari, 2015; Haslam et al., 1998; Maner & Mead, 2010; Tost et al., 2013). Overall, there is consistent evidence that hierarchy harms team communication and information sharing, necessary for effective team learning.

4.4.9 INDIVIDUAL/FUNCTIONAL VS TEAM/CRITICAL PERSPECTIVES OF POWER

Overall, the team-level perspective of team power disparity (Greer et al., 2020) contrasts with the more positive individual perspectives of team power disparity (Anderson & Galinsky, 2006; Guinote, 2017; Magee & Galinsky, 2008; Tarakci et al., 2016). While there are many positive effects to individual powerholders (such as increased activation, motivation and engagement), the individual-level positives of holding power appear to be outweighed by the aggregated effect of negatives for low(er) power team members. It appears that while there may be positive effects at the individual level for team members in hierarchical teams when viewed from the team level, the individual benefits of power disparity are not evident.

Several integrative meta-analyses evaluate the alternate views on team power dispersion of the functionalist and conflict views and studies (Greer et al., 2018; Greer et al., 2017; Greer & Van Kleef, 2010), with just two of these meta-analyses evaluated 54 studies which included 13,914 teams (Greer et al., 2018; Greer et al., 2017). The average main effect of power dispersion (hierarchy) on team

performance was negative and best explained by heightened conflict within a hierarchical team. No positive effects of the hierarchy were found on coordination within hierarchical teams; this is an important finding for understanding the effect of team hierarchy on team learning (which relies on team communication and coordination). In explaining the difference in findings within the meta-analyses, and in an attempt to reconcile the diverging findings, Greer et al. (2017, p.109) suggested that 'past functionalist assumptions on the benefits of power dispersion, or hierarchy for teams, may have been overgeneralised from findings which were theoretical or measured individual level outcomes rather than team performance outcomes'. In response, there are calls for greater attention to be paid to multilevel perspectives and assumptions and, in particular, calls for understanding team-level contingencies that might shift the adverse effects of hierarchy into the positive.

4.4.9.1 TEAM POWER DISPERSION: CONTINGENCIES

Greer and colleagues' (Greer et al., 2018; Greer et al., 2017; van Bunderen et al., 2018) meta-analyses showed that the negative effects of team power dispersion were sensitive to context and that the magnitude of the negative effect was greater under conditions that increase team conflict. Critical contingencies have been identified (Greer et al., 2017). For example, in homogenous teams, stable membership, together with stable hierarchies (all of which reduce the likelihood of team conflict), reduce the adverse effects of power dispersion. Also, positive effects of team power dispersion are possible when (in addition to stable and homogenous teams) the hierarchy is legitimate (e.g., based on apparent expertise differences) and the task requires a significant degree of coordination to complete. Teams which are suspectable to conflict (for a range of factors, including functional differences or external conflicts), may experience greater adverse effects of power dispersion (Bunderson & Sutcliffe, 2003; Bunderson & Van Der Vegt, 2018; Greer et al., 2017; van Bunderen et al., 2018).

Other empirical efforts have aimed to identify a range of contingent factors that help reconcile divergent findings on team power dispersion. Studies have examined the shape of hierarchy on team performance (Bunderson et al., 2016) and team interdependence (Ronay et al., 2012). Tarakci et al. (2016) found that team performance, in teams with either high or low hierarchy, varied as a function of the team leader's competency, so that hierarchy helps team performance when the leader is task competent, and conversely, when the team lead is incompetent, hierarchy hurts team performance. In a sports study, the effect of team hierarchy on team learning (and performance) was found to be contingent on the level of team feedback; hierarchical teams receiving team feedback were successful (Van Der Vegt & Bunderson, 2005; Van der Vegt et al., 2010). The team-level feedback and reflection were found

to promote collective orientation and emphasised team outcomes. In particular, teams who were found to ask themselves, 'How are we doing? What can we do to improve our performance' led powerholders to use their power to help the team rather than for individual gain (Van der Vegt et al., 2010). Conversely, individual feedback was found to promote individual-oriented reflections (e.g., 'How am I doing? What can I do to improve my performance?'), leading higher-powered members to improve their performance (without necessarily contributing to the team-level improvements) (Van der Vegt et al., 2010).

Much of the work reconciling the divergent evidence had focused primarily on the contingent factors which shift the team hierarchy -> team conflict relationship, which has been assumed as the key mediating factor in the team hierarchy and team performance. Greer et al. (2017) called for more attention to be paid to when power can be a positive within teams, namely, what contingent or contextual factors shape the power sensitivities within teams. Contingent factors help identify when, within the team-level power conflict perspective, hierarchy can help teams perform and learn.

4.4.10 Summary: Power in teams

Overall, there is evidence of both positive effects (emerging from the individual-level, functionalist perspective of team hierarchies) and negative effects (emerging from the team-level, conflict view of the team) of high team power disparity levels. Greer et al. (2017, p. 111) noted that the team power literature runs counter to the 'generally rosy' view of power taken within the individual-level perspective of power by Guinote (2007, 2017) and others (Fiske & Berdahl, 2007; Galinsky et al., 2012; Keltner et al., 2003). Recent meta-analyses found a direct, adverse effect of hierarchy (power dispersion) on team performance, as well as no evidence of any positive mediating effect of increased team coordination on team performances (Greer et al., 2017). Overall, the meta-analyses supported the team-level conflict perspective of the effect of hierarchical power on team performance (Greer et al., 2017). However, when taking an individual-level view of power disparity effect on team outcomes (including learning), there is more divergent evidence (for both positive and negative effects).

Several contingent factors which affect the direct effect of hierarchy on team performance have been found, including collective feedback and orientation, lead/powerholder competency, diversity of power bases, team stability, task type and hierarchy/structural stability. The familiar, underlying theme across the contingent variables is that these factors either reduce or increase the likelihood of team conflict; if the contingent or moderator increased team conflict (e.g., greater diversity of power bases or increased instability/team turnover), then this increased the harmful effects of power dispersion. So, if the

contingent factors decreased team conflict (e.g., increased stability of legitimacy of hierarchical structure or a collective-oriented lead), then the adverse effects of hierarchy were reduced.

As Greer et al. (2017, p. 118) pointed out, 'as it is likely that there will always be teams that are high power and/or power dispersed, it is important to identify situations that mitigate the harmful effects of these power structures'. In particular, there is a gap in our understanding of why and when power can benefit teams (and not only benefiting individuals). Greer et al. (2017) found that power hurt team outcomes and integrated this with the individual-level perspectives (and more positive view of the consequences of power dispersion, Fiske and Bradhal, 2007). Recently, studies have shown that the effects of power (either positive or negative) are 'contextually dependent' (Greer et al., 2017, p. 118), and as such, greater attention needs to be paid to understanding when and where power disparity may help teams (as opposed to only helping high-powered individuals within teams).

4.5 TEAMS IN EXTREME ENVIRONMENTS

In response to Greer and colleagues (Greer & Chu, 2020; Greer et al., 2018; Greer et al., 2017; Tarakci et al., 2016; van Bunderen et al., 2018), recent calls for greater attention to be paid to understanding the team-level contingencies (i.e., the factors which might shift the typically negative effect of team hierarchy on team performance to a positive), I turned to examine military team contexts and environments to help identify potential contextual factors that might shift team-level perceptions or processes. First, I searched for any studies focusing on the team-level contingencies which shape how hierarchy affects military team performance. Scholars have taken a team-level perspective to military team learning (Goodwin et al., 2018; Meslec et al., 2020; Veestraeten et al., 2014), team efficiency (Chen & Bliese, 2002; Chen et al., 2002), team cognition (Cooke et al., 2007; Reep, 2021) and many other aspects of team learning (e.g., team training) (Cannon-Bowes & Salas, 1998; Cooke et al., 2007; Goodwin et al., 2018; Salas et al., 2009). However, no studies have taken a team-level perspective to understand the contingencies affecting team hierarchy on military team learning.

The few studies that have investigated the effects of power differences (hierarchy) on military decision-making have primarily taken an individual-level view of the phenomena (and therefore may over-generalise the benefits of hierarchy, as Greer et al., 2020 argued). For example, Driskell and Salas (1991) used dyads of military personnel (one high rank, the other lower-ranked) to examine decision-making under every day and high stress (i.e., simulated military deployment). Similar to the evidence

from negotiation studies (Greer et al., 2020), in standard (non-stress/non-operational simulations), higher-ranked members were more influential in deciding the outcomes and were more likely to reject the task inputs of the lower-ranked person. However, in high stress (i.e., simulated operations), both members became more open and receptive to the other partner's inputs. However, a more recent study had a diverging result, where, under stress conditions, team leaders/higher rank members were exerting more control over decision-making (Kamphuis, 2010). Together, these two diverging results demonstrate that there are as yet unknown contingencies that shape the relationship between rank on team learning in military teams.

Traditionally, military research has characterised deployment as stress[23] (Bøg et al., 2018; Goodwin et al., 2018; Salas et al., 2009; Wong et al., 2003) and research has investigated what factors moderate or mediate stress (typically from deployment) and team performance (Salas et al., 2009). There is evidence that team group performance is reduced in stressful situations since it 'concentrates power' in the leadership ranks, which in turn leads to poorer team outcomes (Driskell et al., 1988; Janis & Mann, 1977). This evidence aligns with team power dispersion research (e.g., Greer et al., 2020), positing that in team environments that increase (potential) conflict, this reduces team performance by reducing communication. However, what is not explored in traditional military psychological studies characterising 'deployment as stress' is the effect of team hierarchy or team climates.

For example, Driskell, Salas, et al. (2017) took an individual-level, functionalist perspective of the effects of team power disparity (or hierarchy) in arguing that the development of a stable hierarchy benefits team functioning in high-stress situations. So that 'under stress [extreme environments including deployment] status structure becomes a bit flatter, in that high status team members become more responsive to task inputs from other group members, which we view as a generally positive outcome' (Driskell, 2017, pg. 439). Like many within the functionalist perspective, Driskell et al. (2017) appear to have over-generalised individual-level evidence (i.e., dyadic relationship outcomes and individual benefits) to the team-level perspective. Nevertheless, Driskell and Salas (1991) did find a team contextual effect (high stress) that shifted how power (rank differences) affected measured (individual-level) dyadic outcomes.

[23] Stress is, of course, a far larger phenomena than military deployment within the psychological research community. This review found that much of the research on deployment effects have been broadly grouped into 'stress' in the broader research literature. Consequently, I needed to identify military teams experiencing stress as a marker of deployment in the literature search.

Recent studies are emerging which closely examine the complexities and nuances of how team context (e.g., increasingly threatening or dangerous) effects critical team processes (i.e., information sharing and two-way communication) (Driskell & Salas, 1991; Driskell, Driskell, et al., 2017; Maynard et al., 2018; Van Thielen et al., 2018). In particular, Van Thielen et al. (2018) found that, for police teams, increasingly threatening team contexts were found to increase the benefits of two-way, constructive communication and increasing alignment of a task. However, this relationship was not evidenced in low-threat (i.e., regular, desk-bound) situations. In other words, in police teams experiencing greater threats, there was a greater gain from constructive, two-way feedback and increasing alignment of purposes. Similarly, an observational study of twelve multinational, multidisciplinary teams dealing with a simulated disaster(s) scenario found that for high performing teams, the type and quality of communication were markedly different compared to low performing teams (Uitdewilligen & Waller, 2018). While there were no significant differences in the number of communications, what did differ was that, during the decision-making phase, high-performing teams spent more time engaged in 'interpretation–interpretation sharing sequences' (i.e., collective sense-making) (Uitdewilligen & Waller, 2018, p.733).

Overall, these recent studies focusing on team processes in extreme environments have shown that increasing level of threat or extremity shifted team processes (in these cases, increasing the effectiveness of collective sense-making, information sharing and feedback). All these team processes, information sharing, collective sense-making and constructive feedback, are components of team learning. Therefore, it would be expected that increasing extreme team contexts would shift team processes and lead to improved team learning. However, it is not clear is what *will* support the emergence of such team processes; for example, why would one (equally hierarchical) team have more constructive communication than another? While these studies provide valuable insights into the effect of extreme contexts on team functioning, questions remain about how or what triggers hierarchical teams to show such processes or behaviours.

There is also an emerging interest in the effect of team-level climates on various aspects of military team outcomes (including team learning). However, none of those studies focusing on team learning has aligned the focal levels or avoided misapplication or over-generalisation from one level (e.g., individual) to another (e.g., team). For example, Veestraeten et al. (2014) and Paananen et al. (2020) found that a greater sense of psychological safety improved military team learning (e.g., information sharing) and other team outcomes. These studies show that a team climate of psychological safety positively affected

team learning within the military. However, while theorising and focusing on the team level constructs (i.e., team learning, team psychological climate and team cohesion), both these studies have only used individual-level measures and analyses (i.e., neither reported any team-level reliability, aggregation method, or results). While providing valuable insights into the individual-level (team members') perceptions of their teams, nevertheless, over-generalisation of individual-level data (such as the data used by Paananen et al., 2020) to team-level constructs can lead to erroneous conclusions as evidenced from the differences in team power dispersion (Greer & Chu, 2020). Overall, there is an emerging interest in military team learning (as a team-level, group process), yet no studies evaluate the phenomena using appropriate theory, methods or analyses.

4.5.1 Shifting the effect of team hierarchy on military team learning

When thinking about a team-level context or variable which might reduce the negative effect of hierarchy (power disparity) within military teams, I drew on the extant team power dispersion literature, and in particular, on Greer and colleagues' (Greer, 2014; Greer & Chu, 2020; Greer et al., 2018; Greer et al., 2017; van Bunderen et al., 2018) integrative meta-analyses and theoretical reviews. In particular, Greer and Chu (2020) argued that critical team-level mediator, team conflict, is the primary mechanism through which team hierarchy inhibits many team outcomes (including team learning); consistent evidence shows that team contextual factors reduce conflict and improves team outcomes. The effect was evident even when there may be significant power disparity within teams, and conversely, team factors that generate team conflict hinder team outcomes, even in the absence (or presence) of hierarchical differences.

Greer and Chu (2020) theorised that team hierarchy leads to conflict, reducing team outcomes. Team conflict may not be the potential mechanism of negative team outcomes within military teams; while military teams are hierarchical, there is little qualitative or quantitative evidence to suggest that military hierarchy teams initiate and sustain team conflict. In particular, using Greer and Chu's (2020) characterisation of team power hierarchies, military teams are expected to have low levels of team conflict. For example, the military is often characterised as a stable and legitimate hierarchy (Meslec et al., 2020; Paananen et al., 2020; Soeters, 2018; Wong et al., 2003); together, these characteristics are expected to reduce team conflict even in the face of a deeply hierarchical organisation (according to Greer & Chu, 2020). If there is little team power conflict, what might reduce the adverse effect of team hierarchy on team learning? There are few emerging answers in the current state of military team learning or team power literature. Instead, I drew on the qualitative work exploring (social) learning in the

Australian Army[24] in an attempt to understand what might be driving the typically negative effect on team learning (O'Toole & Talbot, 2011; Stothard et al., unpublished, 2014).

4.6 Military teams: Hierarchical action teams

Military teams typically function in uncertain, ambiguous and volatile contexts, namely, military operational deployments (as well as the more stable, specific context, such as being 'in barracks'[25]). While some military tasks or teams are repetitive or restricted, most military teams are more appropriately classed as action teams that may operate in extreme environments (Driskell, Driskell, et al., 2017; Hannah et al., 2009; Meslec et al., 2020). Driskell et al. (2017, p.435) characterised extreme environments as imposing 'significant task, social, or environmental demands that entail high levels of risk and increased consequences for poor performance'.

Also, military teams/organisations—while not unique in having an explicit, formal hierarchy—are commonly characterised by the strength of their hierarchy (Soeter, 2018). For example, Popper and Lipschitz (2002, p. 44) describe the military as 'rigid hierarch[ical]' while Wong et al. (2003, p. 660) characterise the military as having 'deeply entrenched "codes" of hierarchical differences'. While there is consistent evidence that hierarchical differences typically reduce or inhibit team learning (Edmondson and Lei, 2009; Roloff et al., 2011), there has been little direct attention paid to understanding the implications of power disparity/hierarchy on military team learning. Instead, much military team research has focused on the crucial role of leadership to improve team communication and cognition (see Goodwin et al., 2018 and Wong et al. 2003 for reviews), implicitly identifying a vital contingency in military team learning.

Similarly, the military practice of the After Action Review and other lessons learnt processes (defined as a rank-free environment to reflect on team performance) had been popularised as an example of military team learning (Dyson, 2020; Popper & Lipshitz, 2000). The importance of providing a risk-free space to share reflections, within the rigid hierarchy of the military illustrates (i) how the normal

[24] As reported in O'Toole and Talbot (2014), extensive qualitative research work was undertaken as part of the AALO research. While a segment of the work was published in O'Toole and Talbot (2014), much analysis remains unpublished in the public domain. I facilitated the focus groups, transcribing and analysing the data. I had a privileged position to evaluate and understand the emerging themes from the qualitative AALO study.

[25] In barracks is typically a military term that refers to the teams or units being in the home environment, and specifically, not on deployment.

'business as usual' military team environment is *not* seen as rank-free, and (ii) that a typical team environment would, therefore, inhibit team reflection and learning. There is consistent evidence that military teams can best be characterised as hierarchical action teams when focusing on military teams on operations (or deployed to military operations). In particular, there is consensus that rank disparity within the military is a salient facet of their organisational culture, which has a consistent effect on team functions (Popper & Lipshitz, 2000; Wong et al., 2003).

4.6.1 Military teams: Contingencies affecting hierarchy

While research on the effect of hierarchy on team performance has provided both positive (Anicich et al., 2015; Galinsky et al., 2015; Halevy et al., 2011) and negative results (Bunderson & Reagans, 2011; Bunderson et al., 2016; Edmondson, 1999), more recent integrative research shows that there is a typically negative effect of hierarchical differences on teams, and team learning in particular (Greer & Chu, 2020; Greer et al., 2017). However, little direct attention has been paid to understanding the contingent factors that shape power dispersion/hierarchy on team learning within the military team literature.

Instead, within the military team learning and training literature, more attention has been paid to understanding a variety of (generally individual-level) factors that directly affect team learning (e.g., leadership, shared mental models, training). However, the same attention has not been applied to understanding when, where or why these factors might help or hinder team outcomes (i.e., evaluating the theorised mechanisms of action). In other words, we still do not know if the positive effects of leadership come from either: (i) the direct effect of positive leadership enhancing a mediating factor (e.g., a positive team process or individual behaviours), or (ii) positive leadership reducing a negative mediator (i.e., reducing the negative effects of hierarchy/team power disparity). For example, there is a significant amount of work focusing on the direct effects of leadership (Wong et al., 2003), shared mental models (and TMS) (Cooke et al., 2007; Smith-Jentsch et al., 2001), team practices (e.g. After Action Reviews, Popper and Lipschitz, 2005) or supportive team climates (Veestraeten et al., 2014) on a range of (primarily) individual-level outcomes. There are clear benefits to be gained from improving all of these factors, yet without understanding the contingencies of such direct benefits, it becomes harder to provide practical, evidence-based recommendations (other than offering vague motherhood statements)[26].

[26] While accurate, motherhood statements do not provide the specificity needed to identify precisely when, where or how improved leadership (for example) might be of most use or generate desired benefits. Such

Recently, there has been a growing focus on team-level phenomena within military team literature, with attention being paid to understanding the antecedents and consequences of team-level (or collective) leadership and team-level self-efficacy (Chen & Bliese, 2002), and team cohesion (DiRosa et al., 2015). First, what is still missing is a focus on team learning as a team-level dependent variable (i.e., an outcome), together with an understanding of what factors might support team learning in hierarchical teams. This is a significant gap in our understanding; the apparent ubiquity of power disparity/hierarchy's adverse effects on team learning does not make it less potent for being invisible (within the military literature). Instead, it may be considered to be a blind spot. My research question aims to illuminate this apparent blind spot by drawing on a range of literature, perspectives and methodologies. In doing so, this research provides a welcome clarity (and ultimately, practical guidance) to help the hierarchical team (both inside and outside the military).

4.6.2 Effects of deployment on military teams and personnel

While wartime deployments typify operational deployments, the Australian Army regularly engages in a wide range of deployment types from disaster relief, international peacekeeping, and nation-building. For example, the Australian Army (together with many other militaries) actively operate in peacekeeping (e.g., as part of a NATO or UN response to a civil conflict such as the Bosnia/Serbia/Montenegro civil conflict, or Rwanda civil war/genocide), nation-building (e.g., support to Timor Leste during the transition to independence), disaster relief (e.g., Australian Army were deployed to provide help and support during the 2019/2020 national bushfire emergencies, and overseas events, for example after the Aceh earthquake/tsunami), as well as various types of warfare (e.g., Iran war, and Afghanistan war). Nevertheless, all types of deployment, including peacekeeping, has been identified as a stressor that increases the risk of PTSD (Brouneus, 2014; Forbes et al., 2016; Kinney, 2012; Nasveld et al., 2012). In this sense, deployments (of all types) can be considered a specific type of environmental hardship. While, typically, military psychological studies predominantly evaluate the individual-level outcomes of deployment, with relatively less attention paid to the team outcomes, there are notable exceptions which take a team-level perspectives (Chen & Bliese, 2002; Chen et al., 2002; Jex & Bliese, 1999; Lange & Bliese, 2019).

undifferentiated advice can leave practitioners frustrated and wondering how to best use the limited resources or attention to improve team learning in rigidly hierarchical teams (Popper and Lipschitz, 2002).

Specifically, there is a well-established field of research examining the moderators and mediators of military personnel's (individual level) stress responses from deployment from many international militaries. Known moderators of the stress response (primarily after deployment) include both individual-level and team-level factors. For example, there is consistent evidence that some personality types (i.e., contentiousness and extraversion) moderates a person's stress response, as does a person's perception/appraisal of the stress (Hosek et al., 2006). In the military, the research identified individual-level factors which can either help or hinder individual outcomes. For example, the USA military has identified that those with low power experienced greater negative responses to stressors, including holding a low military rank, as well as low status (lower socioeconomic or minority group status) (Adler et al., 1996; Green, 1990; Hosek et al., 2006; Kahana et al., 1988; Koenen et al., 2003). Positive team-level moderators that shift an individual's response to deployment into the positive include collective self-efficacy (Jex & Bliese, 1999), team cohesion (Milgram et al., 1989), and improved information sharing/provision (Griffith, 1998; Wright et al., 1996). Training, both individual and team, has also consistently been shown to reduce the adverse effects (stress) caused by deployment (Johnston et al., 1998; Kozlowski, 1998; Serfaty et al., 1998).

Further, military research has often characterised deployment as stress (Bowers et al., 1996) and has examined non-military and military research to investigate what moderates or mediates stress (typically used to represent deployment) and team performance (Bowers et al., 1996). There is evidence that team group performance is reduced in stressful situations since it 'concentrates power' in the leadership ranks, which in turn leads to poorer team outcomes (Bowers et al., 1996; Driskell et al., 1988; Janis & Mann, 1977). This evidence aligns with team power dispersion research (e.g., Greer et al., 2020), positing that in team environments that increase (potential) conflict, this reduces team performance by reducing communication. Similarly, Driskell, Driskell, et al. (2017) took a functional approach to understanding team hierarchy and extended the positive, individual-level effects to the team level. Overall, there is consensus that greater levels of team training (and, in particular, stress-inculcation training) reduces the negative (individual) effects of deployments. Together, this evidence shows that typically negative outcomes of exposure to deployment (as a type of environmental hardship) can be significantly reduced with positive team climates (e.g., cohesive, high morale, and collective self-efficacy).

4.6.2.1 PROPOSED MODERATOR: ENVIRONMENTAL HARDSHIP AS TEAM CONTEXT

Drawing on recent studies on teams shifting behaviours in response to extreme environments (Driskell, Salas, et al., 2017; Uitdewilligen & Waller, 2018; Van Thielen et al., 2018), together with qualitative evidence from the AALO research (O'Toole and Talbot, 2014), I propose that deployment (as a specific example of shared, environmental hardship) has a moderating effect on the team perceptions of hierarchy. In proposing a team-level contextual factor that is expected to shift the effect of team hierarchy on team learning, I am answering calls made by Greer and Chu (2020) and Johns (2006) for more attention to be paid to team context, as well as calls for greater focus on teams 'in the wild' (Johns, 2006; Zellmer-Bruhn & Gibson, 2006).

The Australian Army senior management was characterised by O'Toole and Talbot (2014, p. 60) as monitoring teams' and individuals' performances, dispensing punishments when mistakes or faults are seen, thereby 'creating cultures of fear and risk aversion, in addition to inhibiting learning through a perceived heavy administrative load' . In particular, military teams were characterised by compliance, where personnel are blamed for making mistakes. This was a common description when discussing work while in barracks and was often contrasted against the experience of deployment (Stothard, Talbot & Drobnjak, unpublished). In contrast to the conformity and restriction within barrack Army life, participants' experiences while on operations were vastly different. For example, 'Most participants acknowledged that operations/deployment provided them with their most powerful learning experience. Operational experience [deployment] was regarded as being the "pinnacle" in terms of learning, offering the "ultimate" learning experience' (O'Toole and Talbot, 2014, p. 50).

The qualitative evidence emerging from the AALO research showed that military personnel's experience of teams while on deployment was more complex than initially supposed; respondents reported largely positive experiences while working on deployment. While there is unequivocal evidence that harm emerges from military operational deployments (Bøg et al., 2018; Bricknell et al., 2020; Forbes et al., 2018), recent research into deployment has also found emergent positive experiences (alongside the negative) (Habib et al., 2018; Mark et al., 2018; Newby et al., 2005). This aligns with our findings in the AALO focus groups (Stothard, Talbot & Drobnjak, unpublished). Drawing on the qualitative evidence, together with the emerging focus on post-traumatic growth from within clinical and military literature (Habib et al., 2018; Mark et al., 2018; Newby et al., 2005), I explored the idea that a specific, team context (deployment) helped to generate (possibly directly or indirectly through some, as yet unknown mechanism) military team learning.

The emerging evidence of positive effects from deployment shows that military personnel experience benefits while on deployment (as well as negatives). As part of the AALO study, focus groups were conducted with a range of teams, discussing issues surrounding learning within the Army (O'Toole & Talbot, 2014, p. 51); specifically, deployments were often spoken of positively, namely, as the 'pinnacle and ultimate experience', where the team shared a 'common purpose or goal… [with] a palpable sense of achievement'. Participants characterised the operational environment/deployment as overwhelmingly marked by camaraderie and cohesiveness, where roles and expertise were clarified and respected rather than just rank. For example, the sense of opportunities to work in a team context that allows for more freedom of action was evident (O'Toole & Talbot, 2014, p. 52): 'in [location] when I went to plan an operation . . . we were running that ourselves, planning it and running it, and then we actually got to see what the benefits were, because there was a final result at the end of it and it was real.'

O'Toole and Talbot (2014) interpreted the quotes through their lens of social learning; the exact quotes show evidence of the sense of equality of roles and tasks that personnel felt while on deployment. This contrasted strongly with their experiences of being in barracks or at their (non-deployed) work environment. The qualitative evidence from the AALO focus groups showed that, somewhat unexpectedly, military personnel often reported positive experiences working in teams during deployment. In this sense, deployment appeared to provide precious opportunities to gain and respect all their team members' roles and tasks as part of getting their work done. The qualitative evidence suggested that their experience of their teams during deployment was not the same as their business as usual work environment in barracks. Drawing on the qualitative evidence from the archival AALO study suggested that team context, namely, deployment in military teams, did shift their experience of team hierarchy and team learning.

4.6.2.2 Proposed mediator: Egalitarianism in military teams

In particular, I wondered if the experience of deployment reduced the socio-cognitive effects of power disparity by generating a greater sense of (psychological) equality (at the individual level) and egalitarianism (at the team level), even within a highly hierarchical organisation. Drawing on Popper and Lipschitz's (2002) observations of After Action Review (where there is an explicit discounting of rank during the team reflection and feedback), I extrapolated from the qualitative evidence to investigate if military teams did share a sense of team-level egalitarianism, whether they would also report improved team learning processes. For example, in Thorburn's (2021) reflection on leading and collaborating in the Australian Army, discussed in Chapter 1, he captures the experience of engaging with his subordinates in

his team as psychological equals by recognising their role in solving and implementing team-level problems. Essentially, I propose that those military teams would be more likely to report a greater sense of egalitarianism during deployment, which would improve team learning rather than the direct effect of deployment on team learning. Egalitarianism, in this sense, is defined as sharing a sense of equality (in interactions and participation within a team) despite differences in valued resources and power, that is, regardless of rank differences or power disparity.

In the face of explicitly hierarchical teams, the sense of egalitarianism would be expected to reduce the typically negative direct effect of hierarchy on team learning. Also, similar to the pro-social orientation, or collective feedback and reflection team-level contingencies (Greer & Chu, 2020), team egalitarianism would shift perceptions to the team rather than the individual. Also, the notion of egalitarianism is theoretically more focused on negating any socio-cognitive effects of power disparity than the very popular and highly studied similar team level construct, psychological safety[27]. While the idea that psychological equality (or egalitarianism) is possible within a military organisational culture or team climates seems counterintuitive, there is qualitative evidence that military teams vary in their sense of team equality (regardless of formal rank differences). For example, that sense of respect and value for each other emerged in the AALO qualitative data collection (O'Toole & Talbot, 2014).

Importantly, I am not proposing that deployment directly affects team learning; instead, I am proposing that the effect of deployment on team learning is contingent on the degree of team hierarchy. There is a profoundly hierarchical team on deployment, and the demanding environment may lead to sense-breaking or rethinking of norms or expectations around rank and roles. As such, teams may then see themselves as psychologically equal (albeit with formal rank differences), which will improve team learning. While this proposition runs counter to some traditional military thinking (where the emphasis is

[27] Egalitarianism is expected to be related to a very well-studied construct, psychological safety (Edmondson, 1999; Edmondson and Lei, 2014). However, it is not expected to be conceptually or analytically equivalent. Delineating the precise conceptual or empirical relationship of egalitarianism to psychological safety is not the aim or intent of this thesis, nor is it part of my research question. One crucial factor in choosing to focus on egalitarianism rather than the well-studied construct of psychological safety was that, given the dangerous nature of military deployment, the notion of 'safety' might be misleading or inappropriate (possibly differentiating between a safe environment, psychological *or* physical, is made more difficult when exploring a dangerous team context). Most importantly, the notion of egalitarianism is logically linked to concepts of power inequality, and so, achieving a shared sense of equality might be expected to be more challenging for hierarchical teams (compared to achieving a sense of psychological safety). In this sense, a shared sense of team egalitarianism may be a higher threshold to reach for a rigidly hierarchical organisation such as the Army. These questions can be explored in further research.

commonly on learning from operations), there is also a stream of military thinking which puts organisational culture (and climate) in the foreground of military organisational thinking.

For example, Catignani (2014) identified a stream of military thinking which identifies 'that external threats or bureaucratic pressures may prove insufficient to effect innovation often due to the military's organisational culture[28]'. The critical point is that this brings the notion of organisational culture, or climate, as the mediating factor between context (e.g., external threats) and consequences (e.g., innovation). Within professional military thinking, the proposed interaction between a moderator (e.g., external threat of operational deployment) and mediators (e.g., shared sense of team egalitarianism) aligns within the third stream of military innovation and adaptation. Here, I am proposing that a greater sense of equality (i.e., egalitarianism) in military teams will be the mechanism that triggers team learning within hierarchical teams when on deployment.

The term 'egalitarianism' has been drawn from national culture literature; for example, initially, Hofstede (1984) and Triandis and Gelfand (1998) used the notion of egalitarianism to map national cultures. More recently, the concept has been applied to teams and national organisational cultures, and there is an emerging interest in understanding egalitarianism, specifically in terms of team outcomes (Anicach et al., 2015; Swaab & Galinsky, 1998; 2014). Drawing from these, I define *team egalitarianism* as a team-level construct, where members' share a belief that their team respect each other as equals regardless of formal rank. Similarly, *psychological equality* is the individual-level version of the same construct—the extent to which an individual considers that members of their team respect each other, regardless of rank, while recognising the formal rank and authority.

4.7 SUMMARY

This Chapter reviewed several critical literatures to understand team learning in the Australian Army and how, when and where hierarchical differences affect team learning. First, I drew on a

[28] Catignani's (2014) use of organisational culture does not necessarily align with multilevel perspective use or definitions of organisational culture. Catignani (2014) generally understands organisational culture to be expectations and norms which shape leaders (and organisational) reactions to events (so what gets attention or not). In this, it overlaps with the multilevel perspective construction of climate and culture. More typically in organisational psychology, climate and culture are related yet differentiated: 'perceptions (climate) cause beliefs (culture; seeing is believing), but also beliefs cause perceptions (believing is seeing)' (Day, 2014, p. 101).

multilevel theory to frame team learning as an individual and team level phenomenon to avoid definitional confusion (and clarify that team learning is both an individual and team level phenomenon). Reviewing the three different streams of team learning research found that most military team research framed team learning in terms of task mastery and often (but not exclusively) considered team learning as an outcome. There was relatively less attention paid to military team learning as a process or understanding the contingencies that shape military team learning (e.g., team-level mediators or moderators). Next, reviewing the team power literature found that consensus of power differences (i.e., hierarchy) was dependent on the level of analysis and theory. For example, at the team level, meta-analyses found a typically negative effect of team power dispersion (hierarchy) on team outcomes. However, there appeared to be divergent findings (i.e., both positive and negative effects) when examining the effect of power differences on team learning or team performance more broadly.

Significant gaps in the literature were identified, including the lack of attention paid to understanding critical contingencies that might shift hierarchical military teams to help learn. In response to the gap and to identify novel contingencies, I drew on several different literatures which may help clarify when, where and why military teams learn. This includes the teams in extreme environments, or extreme teams, together with clinical psychological literature, which is an emerging interest in post-traumatic growth after military deployment. I also draw on qualitative (unpublished) research collected from the AALO, which has shaped my thinking. These different literatures point to several possible sources of new contingencies. The new contingencies will extend the current theory on team learning in military or hierarchical teams by first uncovering when and where military teams learn, and second, by providing an evidence base for practical recommendations to the Australian Army (and other military organisation).

In the next chapter, I expand on the (i) theory and conceptual development, and (ii) empirical evaluation of environmental hardship (operationalised as military deployment) and psychological equality as team-level contextual factors. Specifically, Chapter 5 proposes and tests a team-level moderated mediation model where shared hardship (operationalised as deployment) is the moderator. Egalitarianism is the mediator, so that team hierarchy's effect on team learning is mediated by a shared sense of egalitarianism, which depends on the degree of shared hardship (deployment). Chapter 6 proposes and tests an individual-level multiple mediation model that evaluates the leadership styles mediating effect between rank, psychological equality, and team learning and demonstrates that learning-oriented leadership contributes to team learning by supporting a greater sense of psychological equality.

5 TEAM LEVEL FACTORS SHAPING TEAM LEARNING

'The world breaks everyone and afterward many are strong at the broken places.' Ernest Hemingway, A Farewell to Arms, 1929

5.1 INTRODUCTION

This chapter aims to evaluate when and where Australian Army teams learn. Specifically, this chapter includes two published papers (Paper 2 and Paper 3). This chapter proposes (in Paper 2) and tests (in Paper 3) a team-level moderated mediation model. This analysis aims to help explain when and where Australian Army teams learn, and I introduce two new team-level contingencies which may help shift the typically negative effect of team hierarchy to a positive on team learning. I bring together the notion of teams' shared sense of egalitarianism (as a mediator) together with a specific team context as a moderator (namely, deployment as a shared, team-level environmental hardship). I argue that, together, hierarchical teams, in the presence of an environmental hardship (e.g., deployment), re-evaluate their expectations or assumptions around respect and rank. In doing so, hardship triggers an increased sense of egalitarianism, which, in turn, improves team learning. In this model, I argue that it is not deployment alone that generates team learning, nor does simply reducing the layers of hierarchy in teams lead to improved team learning. Instead, I argue that hierarchical teams who also experience increased deployment, re-think[29] their assumptions or expectations around power disparity, and in doing so, have a greater shared sense of psychological equality. Finally, I argue that team egalitarianism directly mediates team learning.

This model serves two purposes: first, I identify and test several new explanatory factors which help explain when and where hierarchical teams learn. In doing so, I answer calls in the organisational learning, team learning and team power literature for more attention to be paid to team-level contingencies which shape when and where team power affects team outcomes (Greer & Chu, 2020; Greer et al., 2018b; Schilling & Kluge, 2009). Also, I identify actionable team-level factors for military professionals and practitioners within the Australian Army to draw on, which may ultimately improve team learning within their teams. I also bring together two previously separate literatures: the team power literature and military team research. Together, the model provides a more nuanced understanding of the

[29] My model does not articulate the individual or team level mechanisms that generate the change in team climate. Asking what the possible mechanisms might be is a question which future researchers could answer.

effect of hierarchy on team learning within Army teams and extends the current thinking on team power (by identifying and evaluating a new team context that moderates power disparity).

5.2 EGALITARIANISM: TEAM MEDIATOR

I drew on the construct of egalitarianism to help explain when Australian Army teams learn. Greer and colleagues (Greer & Chu, 2020) argued that team conflict mediates the effect of hierarchy on team outcome. In particular, Greer and colleagues suggested that conflict emerges more in unstable hierarchies when team members contest the established hierarchy. It is less clear how the mediating effect of team conflict might impact a highly stable hierarchical organisation such as the Army. The military has a very stable hierarchy, characterised by a formal, legitimate authority that is highly visible and explicit (for example, team members are all required to display rank indicators on uniforms, and saluting is typically required, unless there are specific circumstance). Finally, the Army hierarchy is backed by the military legal system, where insubordination is a criminal offence and punishable by incarceration (Johnston et al., 2006). Overall, I was expecting only a slight variation within Army teams with regard to their acceptance of rank hierarchy[30] or levels of team conflict within the Army. Consequently, I needed an alternate team-level mediator, which will help shift the psychological impact of power disparity within hierarchical teams.

What, then, is likely to reduce the known psychological adverse effects of team power disparity? I argue here – in the case of military teams with legitimate hierarchical differences – that the mere absence of team conflict is not sufficient to produce a team-level positive effect of hierarchy. Instead, I am suggesting that a sense of egalitarianism is needed to counteract the typically adverse socio-cognitive direct effects of power disparity on team learning. In other words, for hierarchical teams to learn, it is not sufficient for teams to have a stable (or low conflict) environment. It is also necessary for teams to share a sense of egalitarianism.

This suggestion, at first glance, appears to be counterintuitive; how can deeply hierarchical teams share a sense of equality in the face of explicit and enduring real power (or rank) disparity? As discussed in Chapter 4, there is a solid Australian Army value of egalitarianism (Brown, 2013; Dyrenfurth, 2016).

[30] This is an assumption that should be investigated further.

Egalitarianism may be a uniquely Australian military characteristic. The Australian Army accepts and traditionally valorises the idea of 'mateship' (defined as friendship, egalitarianism and supports that override social or formal hierarchical differences) (Dyrenfurth, 2016). For example, Dyrenfurth (2016) points to the first uses of the term 'mate' within the Australian convicts, where they not only used it amongst themselves, but also 'provocatively termed their jailers mate, and the basic message was "you're no better than us"' (Dyrenforth, 2016 in Burin, 2015, p.1). The use of mateship continues to be highly valued within the Australian Army[31] (Brown, 2013), and the value may very well help evoke a shared sense of egalitarianism to emerge during tough times (particularly during military deployment).

However, exploring the actual or specific mechanisms is beyond the scope of this research. Nevertheless, I am acknowledging that this research draws on a specific target population, the Australian Army, which has a unique national and institutional culture that values 'mateship' and a sense of egalitarianism (Brown, 2013; Dyrenfurth, 2016). Specifically, the salience of an egalitarian team climate as a mediating team context would be expected to be strengthened within the Australian military culture compared to a military without a similar cultural heritage or value. However, identifying and exploring the effect of specific national or institutional values of team-level processes is beyond the scope of my research. Other researchers are encouraged to explore the cross-level effects to understand better if (or how) national or institutional values influence team-level processes.

5.3 Deployment: Team moderator

Within Paper 2 and 3, I operationalised deployment as a specific team context of shared environmental hardship. This operationalisation served two purposes; first, shared, environmental hardship provided greater descriptive precision than deployment to a non-military audience, and operationalising environmental hardship as deployment also allowed me to draw on other literature for explanatory mechanisms. For example, there is an emerging research interest in understanding the positive effect of trauma and extreme environments on a range of (typically) individual-level outcomes (Calhoun & Tedeschi, 2004; Habib et al., 2018; Mark et al., 2018; Tedeschi & Calhoun, 2004a, 2004b). Mind you, the idea of growth (or some positive outcomes) emerging from a challenging struggle is not new; for example, Nietzsche observed 'what doesn't kill you, makes you stronger' in 1881.

[31] Brown (2013, p.248) argued that the Australian Army officers' overwhelming desire to be egalitarian undermines the Australian Army officers'' ability to command, so that 'The cultural cringe at setting boundaries between the ranks may be undermining military discipline'.

Post-traumatic growth (or adversarial growth) scholars are careful to acknowledge the harmful effects emerging from trauma (Calhoun & Tedeschi, 2004; Habib et al., 2018; Mark et al., 2018; Marziliano et al., 2019; Shakespeare-Finch & Lurie-Beck, 2014; Tedeschi & Calhoun, 2004a, 2004b). However, the acknowledgement of post-traumatic growth (together with trauma) provides a more nuanced understanding of our reactions to deployment and similar hardships. For example, a recent meta-analysis showed that post-traumatic reactions could be complex, with consistent evidence that growth co-occurs (non-linearly) with harm after a range of traumatic events, including military deployment (Shakespeare-Finch & Lurie-Beck, 2014). Specifically, Shakespeare-Finch and Beck (2014, p. 227) argued that focusing only on harmful effects of trauma 'may limit or slow recovery and mask the potential for growth'. The literature on post-traumatic (adversarial) growth firmly sits within the clinical psychology and medical/healthcare fields, and no attention has been paid to post-traumatic/adversarial growth within the organisational behaviour literature.

Overall, deployment (as a specific example of environmental hardship) is expected to shift teams' perceptions of rank disparity in Australian Army teams. While I speculate several possible mechanisms of action within the team process that then shift an individual's socio-cognitive perceptions, this remains conjecture. The qualitative data emerging from the focus groups as part of the AALO study provides insights into personnel's experiences and perceptions. A repeated theme within the groups was how, during deployment, participants did their work/tasks as they were trained to do, their efforts and outcomes were valued and respected, and they saw their team members (of all ranks and experiences) contributing to their collective outcomes (Stothard et al., unpublished). In particular, team functioning on deployment was consistently and repeatedly contrasted against 'in barracks/at home'. From the qualitative data, it is evident that Army personnel consistently experienced their teams very differently between deployment and in barracks; in this case, team context appeared to make a significant difference to how they understood their roles and their teams.

5.4 STATEMENT OF AUTHORSHIP: PAPER 2

TITLE OF PAPER: Power asymmetry, egalitarianism and team learning – Part 1: conceptualising the moderating role of environmental hardship.

PUBLICATION STATUS: Published

PUBLICATION DETAILS: Sinha, R. and Stothard, C. (2020), 'Power asymmetry, egalitarianism and team learning – Part 1: conceptualising the moderating role of environmental hardship', *The Learning Organisation*, Vol. 27 No. 5, pp. 389-401. https://doi.org/10.1108/TLO-01-2020-0018

NAME OF PRINCIPAL AUTHOR (Candidate): Christina Stothard

CONTRIBUTION TO PAPER: Conducted literature review, developed the conceptual model (and developed conceptualisation of mediators and moderators), constructed measures, and wrote the manuscript.

OVERALL PERCENTAGE: 80%

CERTIFICATION: This paper reports on original research I conducted during my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

SIGNATURE:

NAME OF CO-AUTHOR: Ruchi Sinha

CONTRIBUTION TO PAPER: Supervised the development of the conceptual model, guided the data interpretation and analysis, wrote, reviewed and edited the manuscript drafts.

OVERALL PERCENTAGE: 20%

SIGNATURE: DR RUCHI SINHA 24/05/21

Power Asymmetry, Egalitarianism, and Team Learning- Part 1: Conceptualising the Moderating Role of Environmental Hardship

Abstract

This study seeks to understand the effects of team power asymmetry (hierarchy) on team learning. Literature suggests that power asymmetry can hurt team learning due to unequal interactions. We integrate the situated focus theory of power and the theory of adversarial growth to propose that environmental hardship can moderate this relationship. Under environmental hardship, there is a shift in power relations within hierarchical teams, such that power asymmetry positively relates to team learning via increased team egalitarianism (interactional equality). The study is presented in two parts. Part I reviews the literature and builds the theoretical arguments for the conceptual model, while part II empirically examines the model on a sample of military teams. In Part 1, we propose a theoretically derived model and directions for future research in team power, dynamics and learning. The conceptual model and hypotheses contribute to the team learning literature by theoretically clarifying the conditions under which power asymmetry is likely to improve team learning. It provides directions to empirically validate a contingency-based model to resolve the dilemma of creating equality and high levels of team learning in hierarchical teams.

1. Introduction

In analysing the current literature on the effects of team power asymmetry on team learning, it is apparent that the empirical evidence encompasses divergent findings that create tensions and challenges in terms of understanding when and what may be the nature of the relationship (Greer, 2014). One school of thought rests on the functional perspective and proposes that formal hierarchy (power differences between members) can result in coordination benefits as it clarifies roles and improves decision-making (Keltner *et al.*, 2008). The other school of thought takes an inequality perspective. It proposes that high power asymmetry is likely to make members more sensitive to the influence differences arising from power roles (Greer *et al.*, 2017), preventing low power members from speaking up. At the same time, power asymmetry is likely to make high-power members give less respect to other's feedback, thereby hurting interactional equality and, eventually, team learning. Despite these theoretically driven arguments, research has not examined the boundary conditions which influence the extent to which team power asymmetry is likely to have a positive or a negative effect on interactional equality in teams and, eventually, team learning.

In this first part, the purpose is to establish the theoretical link between team power asymmetry (hierarchy) and team learning by analysing previous research findings and conceptualising both the mechanisms (why) and boundary conditions (when) for the relationship. In this work, we theoretically explore a somewhat counterintuitive idea wherein we propose that under certain circumstances, a team with formal power asymmetry can develop team egalitarianism (defined as interactional equality wherein members feel respected and treated as equals, Kozlowski *et al.,* 1996). Team egalitarianism, in turn, can increase team learning (Swaab and Galinsky, 2015; Bunderson and Reagans, 2011). We propose that environmental hardship is likely to serve as one such boundary condition that could help develop egalitarianism in teams with high power asymmetry, thereby helping team learning outcomes.

This conceptual paper seeks to clarify the complicated relationship between power asymmetry and team learning. Specifically, this paper goes beyond the typically cynical approach of looking at the adverse effects of asymmetric power in teams. Instead, it proposes a generative boundary condition that can remove the negative association between team power asymmetry, egalitarianism, and team learning. This work contributes to the team learning literature (Greer *et al*., 2018) by identifying both the mechanism by which power asymmetry affects team learning and the contingencies that need to be considered to know the nature and direction of the effects. The work also contributes to the team learning literature (Greer, 2014) by drawing on adversarial growth to discuss the theoretical impact of environmental hardship on power relations within teams. In this sense, formal hierarchy (power

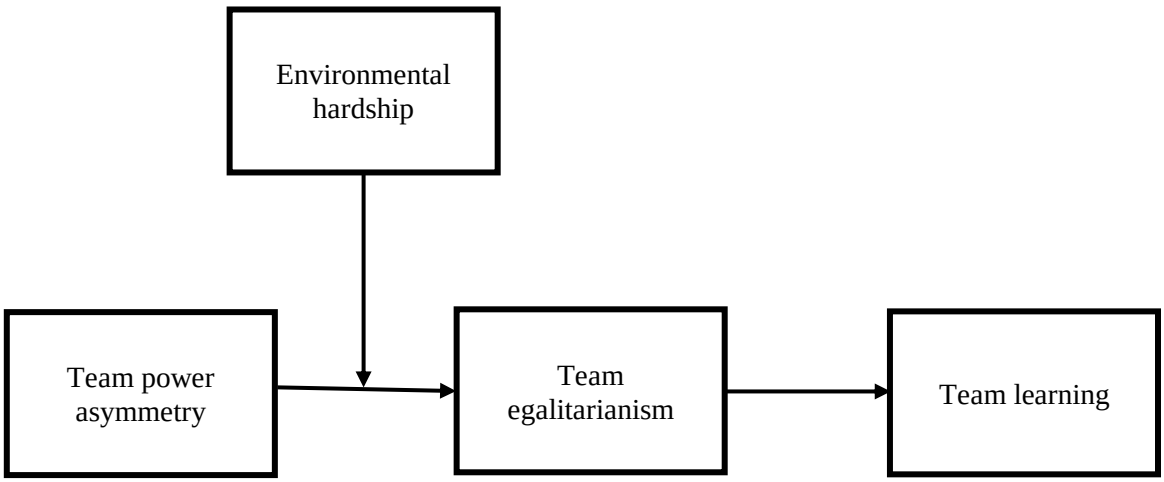

FIGURE 1: PROPOSED MODERATED MEDIATION MODEL

asymmetry) may not necessarily remove participation equality, and therefore, improve team learning; participation equality is an essential precursor for team learning (Kozlowski *et al.,* 1996). Finally, this paper outlines future research and practical implications for exploring these complex relationships

between power, hardship, equality, and learning in teams. As a follow-up to Part I, Part II empirically examines the proposed conceptual model and provides evidence for the effects of team power asymmetry on team learning.

2. Conceptual background

In this section, we seek to theorise and develop propositions around the relationships between team learning and egalitarianism and how team power asymmetry indirectly impacts team learning through its effects on team egalitarianism. We then theorise how environmental hardships could moderate the relationship between team power asymmetry and team egalitarianism, thereby influencing team learning. We aim to summarise the current state of the theoretical and empirical literature about these relationships and identify the tensions and missing parts of the puzzle that prevent us from predicting when team power asymmetry may or may not improve team learning. In sum, we aim to unpack both the process and contingencies that explain the relationship between team power asymmetry and team learning.

2.1 Team learning

As Rebelo *et al.* (2019) noted, Senge's (1990) proclamation that teams, not individuals, were the fundamental learning units in organisations triggered a surge of interest in the topic of team learning. Senge's (1990) definition of team learning (characterised as 'dialogue,' the capacity of team members to suspend assumptions and enter into genuine 'thinking together'), remains conceptually relevant. Team learning captures the extent to which teams value mutual learning processes and activities such as the promotion of inquiry/dialogue (open and constructive discussion of mistakes) and opportunities for continuous learning (sharing learning and viewing everyday work as learning opportunities) (Koeslag-Kreunen *et al.*, 2018; Watkins and Marsick, 1997). It is critical to recognise that learning is a fundamentally individual-level psychological process, while team learning is the team context that provides the conditions for individuals to learn as a collective. Team learning provides "a task and social context which shapes what is learned and how it is learned" (Kozlowski and Bell, 2008, p 27). A team, high on team learning, is likely to share and accept patterns of inquiry, dialogue, and sharing of knowledge, focusing on detecting failures and incorporating feedback (Edmondson *et al.*, 2001; Rebelo *et al.*, 2019; Watkins and Marsick, 1997). Team learning is critical for teams to adapt and adjust to dynamically changing demands and is predictive of team performance and effectiveness (Day *et al.*, 2004). Team learning is known to improve team effectiveness and performance (Chan *et al.*, 2003; Edmondson, 2002). Rather than replicating the known insights on how team learning influences team

performance[32], in this work, we focus on how a state of egalitarianism serves as the pre-condition for team learning. Also, we explore how team power asymmetry may impact team learning by affecting the pre-condition of team egalitarianism.

2.2 Team egalitarianism and team learning

Team egalitarianism represents a state where people share a sense of equality in interactions and participation within a team despite differences in valued resources and power. Such a state is considered the "theoretical engine" that drives team learning (Burke *et al.*, 2004; Kozlowski *et al.*, 2009). The term "egalitarianism" is commonly used in studies that measure psychological equality among individuals at national levels (Hofstede, 2003; Triandis and Gelfand, 1998). However, more recently, the term has been applied to understand egalitarianism in the team context that positively affects team outcomes (Anicich *et al.*, 2015; Swaab and Galinsky, 2015). Accordingly, we define *team egalitarianism* as members' shared beliefs that the team considers its members as equals, and there is respect for their roles and responsibilities regardless of formal rank/position diversity. Theories on team information-processing (Ellis and Bell, 2005; Hinsz *et al.*, 1997) posit that such a sense of equality can contribute to openness in information sharing and improve team learning (Bunderson and Sutcliffe, 2003). By contrast, when teams have low egalitarianism, members tend to respect only the role, voice, and suggestions of highly ranked members, and discount the voice, feedback, and action of lower-ranked members, thereby collectively harming team learning (Kozlowski *et al.*, 2009). Thus we propose that the level of team egalitarianism will positively influence team learning.

Proposition 1: There will be a positive association between team egalitarianism and team learning, such that higher egalitarianism will improve team learning and vice versa.

2.3 Impact of team power asymmetry on team egalitarianism and team learning

In the current business world, team structures are supposedly moving toward flatter self-managing units; however, formal power differences/asymmetry and hierarchy are still pervasive in many high-stakes industries such as hospitals and military organisations. Team power asymmetry represents

[32] In the team literature, team learning is typically seen as a positive state with beneficial outcomes for the team and organisations, however, some scholars have cautioned that "not all learning is positive" (Talbot et al., 2014, p.5). For example, military historians have argued that after a military defeat or failure, precisely what is learned, and by whom, is not always clear (Tuck, 2014; Rosen, 1991); consequently, a critical view of what exactly is learned, and by whom, should be considered in future research when examining the outcomes of team learning (Field, 2019).

differentiation in member power within teams wherein there are hierarchical differences in formal authority and rank among members (Tarakci *et al.*, 2016). Although collective learning has been broadly studied in the context of teams in management research, what has been surprisingly missing from the current literature focuses on how team learning can be encouraged in teams where there is power asymmetry.

One set of studies on team power asymmetry argue that team members working under asymmetric power structures are likely to lack a sense of psychological equality (e.g., Bloom, 1999; Van der Vegt *et al.*, 2010; Wolfe and McGinn, 2005), as members will be overly deferent to those in higher positions as they tolerate the inequality in participation and resources (Ridgeway, 2001). In such power asymmetric teams, the high-power members are likely to mistrust and ignore the advice of low-power members (deRue and Ashford, 2010; Rubin and Brown, 1975), thus reducing the collective equality in participation and increase the sharing of information primarily held by high power members (Ellis and Bell, 2005; Hinsz *et al.*, 1997). Overall, team power asymmetry was likely to reduce team learning (Van der Vegt *et al.*, 2010) by creating psychological distance among members (Bunderson and Reagans, 2011), suppressing feedback and reflections (Edmondson, 1999) and reducing interpersonal helping (Greer *et al.*, 2017).

Although a majority of previous studies have provided empirical support and have theoretically focused on the adverse effects of team power asymmetry on team learning, there are a few studies that found a nonsignificant relationship and, at times, a positive direct relationship between team power asymmetry and team learning (Gomez, 2002; Jewell and Molina, 2004; Ronay *et al.*, 2012). This divergence in results shows potential for contingencies wherein team power asymmetry may not always hurt team learning and team egalitarianism (Anderson and Brown, 2010). It may be that the effect of team power asymmetry on team learning is more complicated and moderated by boundary conditions (Halevy *et al.*, 2011). Thus, scholars have continued to call for research that examines the contingencies that influence the relationship between team power asymmetry and team learning (Greer *et al.*, 2018).

Considering that many private, governmental, and military organisations continue to adopt hierarchical team structures, it is reasonable to assume that organisations will not eliminate all forms of team power asymmetry soon. Thus, the more pertinent question is: What are contingencies and conditions under which teams can develop a sense of team egalitarianism *despite* explicit, formal, and structural rank/power differences? To answer this question, in this study, we propose a somewhat counterintuitive idea that despite high team power asymmetry, under conditions of high environmental hardship, a

psychological sense of egalitarianism can emerge, which can drive team learning (Kozlowski *et al.*, 1999). In the following section, we build our theoretical arguments for why environmental hardship may play a critical moderating role in the link between team power asymmetry and team egalitarianism and, thus, team learning.

2.4 A contingent relationship between team power asymmetry and team egalitarianism: The importance of environmental hardship

Environmental Hardship is the team's experience of intense, dynamic, ambiguous, and multiple external adverse events that threaten extensive psychological, material, or physical harm to the team (e.g., Bell *et al.*, 2016; Hannah *et al.*, 2009). The English dictionary definition of a "hardship" describes it as a severe condition where an entity faces seemingly insurmountable obstacles and adversity that is hard to endure and requires conscious control of reactions to extreme and overwhelming challenges in the environment.

The organisational literature has often suggested the need for team scholars to pay more attention to a team's external environmental conditions (Rousseau and Fried, 2001; Goodwin *et al.*, 2018) that represent both constraints and opportunities for a team to act (Johns, 2006). There is a general lack of empirical attention in the team learning literature on exploring contingencies that could facilitate psychological equality in asymmetric power teams. To fill this gap in understanding, in this work, we posit that teams with high power asymmetry who also face environmental hardship are more likely to develop team egalitarianism despite formal rank differences among members. In other words, the indirect negative effect of team power asymmetry on team learning through reduced egalitarianism is likely to be eliminated when teams face an external boundary condition – namely, environmental hardship. By identifying a contingency condition, we answer calls urging researchers to identify and test contextual factors that switch the negative association between power asymmetry and team learning to a positive one (Bunderson and Reagans, 2011; Johns, 2006; Van Der Vegt *et al.*, 2010).

2.5 The moderating role of environmental hardship

We draw primarily on theories of adversarial growth (Calhoun and Tedeschi, 2004; Tedeschi and Calhoun, 2004a, 2004b) under extreme circumstances (Bell *et al.*, 2016) and the situated focus theory of power (Guinote, 2007b) to form the basis for our arguments for why environmental hardship is likely to moderate the effects of team power asymmetry on team egalitarianism and thereby influence team learning. Specifically, we argue that environmental hardship can evoke adversarial growth through sense-

making processes that lead to cognitive reappraisals of power relations within teams with high power asymmetry.

The work on adversarial growth (Calhoun and Tedeschi, 2004; Tedeschi and Calhoun, 2004a, 2004b) discusses positive transformative change and "meaning reconstruction" (Neimeyer 2006, p. 69) that happens as a result of facing hardships and crisis (Zoellner and Maercker, 2006). Theories of adversarial growth posit that in the wake of longer-term hardship, that is distressing and stressful, individuals are likely to engage in the process of sense-making; whereby they reconsider their previous identity, challenge their assumptions, and seek new ways of defining themselves (Joseph and Hefferon, 2013; Maitlis, 2019). Other scholars have also discussed the idea that crises can trigger new ways of thinking. For example, Nonaka and colleagues theorise "creative chaos" as a state of crisis with challenging and ambiguous goals that can push teams to reconsider fundamental thinking and foster novel ways to solving problems (Nonaka *et al.,* 2000).

In this paper, we argue that in teams with higher levels of formal power asymmetry, environmental hardship is likely to facilitate novel ways of thinking and a reappraisal of power relations – wherein members are most likely to pay attention to, re-evaluate assumptions about and respect, their own and others power roles and role interdependencies (Petriglieri, 2011). Such reappraisals and sense-making (Ashforth and Schinoff, 2016; Pratt, 2000) are likely to result in adversarial growth around how members interact and deal with power relations within the team.

For example, the situated focus theory of power (Guinote, 2007b) indicates that high versus low power individuals in teams tend to make sense of stimuli and experience situations differently under normal circumstances. In high power asymmetry teams, members are likely to view each other in stereotypical ways where low power members defer to high power members (Fiske and Dépret, 1996; Keltner *et al.,* 2008) while also forming negative subjective perceptions and inflexible reasoning about higher power members (Kuhl, 1992; Posner and Snyder, 1975). Similarly, high power members in power asymmetric teams continue to be complacent of their high power and negatively stereotype low power members as having low competence and resourcefulness (Bargh *et al.,* 1995; Vescio *et al.,* 2003). Thus, in high-power asymmetry teams, power relations are likely to be typically based on unquestioned formal hierarchical control relationships and the associated negative stereotypes. However, when such teams face environmental hardship, they may be forced to question the stereotype-based categorisation on formal ranks and their learned apprehensions around power roles, thereby reducing biases and psychological distance and making members more open to accepting interactional equality and egalitarianism.

When faced with environmental hardship, members are more likely to seek information about each other's skills and capabilities as they confront the lack of control over outcomes. For instance, under environmental hardship, goals are stretched, and the situational demands are high, making high power members more likely to recognise that they lack control over the situation (Ashforth and Schinoff, 2016). High powered members may need subordinate members' help and consequently reexamine their assumptions about normative power relations (Guinote, 2007b), leading to new sense-making regarding the efficacy of the skills and abilities of lower ranks (Overbeck and Park, 2001; Vescio *et al.,* 2003). As high-power members undergo such changes in their perception and that of their teammates, they are likely to appreciate inputs from all levels (Kahneman and Frederick, 2002; Maitlis and Christianson, 2014). Similarly, under environmental hardship, which presents uncertainty and resource scarcity, high power members in asymmetric power teams are likely to call on the low ranked members to contribute with their relevant skills and abilities. Consequently, the low power members will gain greater confidence, action flexibility, and certainty about their value (Driskell *et al.,* 2017) while recognising that formal vertical differentiation has particular benefits in enhancing coordination, task implementation, communication, and command (Greer, 2014).

Through the micro dynamics and psychological process outlined above, in the presence of environmental hardship, members in high power asymmetry teams are likely to shift their focus from negative stereotypes to recognising that there is worth of both high and low power members, and together they are collectively indispensable. Such challenging assumptions and the cognitive reappraisal of power relations triggered by hardships are likely to be the crucial sense-making process (Pratt, 2000) in high power asymmetry teams, facilitating team egalitarianism and eventually team learning.

On the contrary, in teams with high team power asymmetry and no environmental hardship, the formal power differentiation is likely to become more entrenched and less challenged as there is no pressing external adversity that triggers a re-evaluation of existing power relations. The stereotypical hierarchical power interactions are likely to continue in the absence of external prompts and will continue to have the expected detrimental effects on egalitarianism and team learning. In contrast, teams with low power asymmetry are likely to have an innate level of egalitarianism/equality, to begin with, as members have none to slight difference in formal power. In such teams with *low power asymmetry*, environmental hardship is not expected to stimulate any counterfactual cognitive reappraisal of the existing equality in power relations. In sum, we posit the following:

Proposition 2. The association between team power asymmetry and team egalitarianism will be contingent on environmental hardship – such that the association becomes increasingly positive for high power asymmetric teams as environmental hardship increases and increasingly negative as environmental hardship decreases. At the same time, environmental hardship will have no moderating effect on the relationship between low power asymmetry and team egalitarianism.

In this paper, combining propositions 1 and 2, we propose an overall moderated mediation model wherein there will be an indirect contingent effect of team power asymmetry on team learning via team egalitarianism.

Proposition 3. The indirect effect of team power asymmetry on team learning through team egalitarianism will be contingent on environmental hardship, such that power-asymmetry will improve team learning through higher egalitarianism when teams have a higher level of environmental hardship. In contrast, power asymmetry will hurt team learning through reduced egalitarianism when teams do not share environmental hardships.

3. Discussions and conclusions

A comprehensive literature review of the team power and learning field reveals that power differentiation/asymmetry within teams can positively and negatively affect team learning. This work reviews the theoretical rationale and the empirical findings in the existing literature to develop novel propositions on the contingent relationship between power asymmetry and team egalitarianism. This relationship is conditioned by the extent to which teams experience environmental hardships. We propose a theoretically nuanced and contingent approach to evaluating the effects of power asymmetry in the context of team learning and seek to extend the theoretical understanding on this topic while also offering exciting avenues for future empirical research.

3.1 Theoretical contributions and future research directions

This paper makes three contributions to team power and team learning (Van der Vegt *et al*., 2010). The conceptual model and proposition developed in this article attempt to resolve some of the tensions around findings in the team power literature regarding the effect of power asymmetry in teams (Greer et al., 2018). Through a sound theoretical development of our contingency model, we challenge the normative assumption that team power asymmetry will consistently stifle interactional equality and thereby hurt team learning under all contexts (Bunderson *et al*., 2016). We propose a generative boundary

condition (environmental hardship) to suggest that the effects of formal power asymmetry on team learning via egalitarianism may be moderated by the extent to which teams experience environmental hardship. Theoretically, we push the thinking in the team power literature (Greer *et al*., 2014) by proposing a novel yet understudied contextual moderating factor and argue how inherently adverse conditions like environmental hardship represent adversity that can trigger positive dynamics teams. Second, we respond to calls by team scholars to explicate the underlying process by which structural and formal power differences can foster or hurt learning in teams (Van der Vegt and Bunderson, 2005). We introduce the team construct of egalitarianism as a team level phenomenon that captures the micro-dynamic interactional and psychological state of equality and respect among members. Moreover, we argue how power asymmetry can interact with environmental hardship to influence such a team level state of egalitarianism, and ultimately, team learning.

Finally, this conceptual work also contributes to the limited but essential topic of adversarial growth at the team level. Most of the past work has focused on personal growth; instead, we push the thinking by conceptualising how environmental hardship can change the relational dynamics within the team to influence team learning. We integrate propositions from work on adversarial growth (e.g., Tedeschi and Calhoun, 2004a, 2004b) with propositions from the situated focus theory of power (Guinote, 2007b) to show how there is a need to pay more attention to the team's external pressing circumstances that have the potential to disrupt the expected behavioural patterns within teams (Johns, 2006).

For future research, testing the proposed ideas will provide a greater empirical understanding of the effect of environmental hardship on team dynamics. Given the current state of the world, with global pandemics (such as COVID19), economic volatility and rapidly changing nature of work, and the external adversities expected to arise from geopolitical and socio-economic conditions, future research would benefit from exploring how hierarchy interacts with these and other different forms of shared environmental hardship to influence team learning.

3.2 Practical implications

By developing a contingency model for how team power asymmetry can impact team learning via egalitarianism, we aim to bridge the gap between theoretical understanding and real-world practice. There is a growing trend among managers and organisational leaders to eliminate formal power differences among team members, as it is believed to create conditions for egalitarianism and team learning.

Although there is some merit in this assumption and evidence to back the solution, formal power structures /hierarchy also provides several coordination benefits (Anicich *et al.*, 2015; Halevy *et al.*, 2011), and thus managers need to find other solutions to promote team learning without necessarily removing hierarchy. The findings from this work provide awareness to managers about the importance of environmental hardship and how it can push members to develop egalitarianism in teams despite hierarchy. Practitioners can consider utilising training and socialisation interventions to simulate shared experiences of hardships to reap the benefits for team learning in the presence of power asymmetry in teams. In metaphorical terms, maybe there was some truth to what existentialist philosophers said, "that which does not kill us, makes us stronger" (Nietzsche, 1968). We encourage academics and practitioners to continue to explore the effects of hardship related to one's job and its impact on workplace relationships and outcomes.

4. Conclusion

In this first part, we have outlined the critical propositions related to the conceptual moderated-mediated model regarding the effects of power asymmetry on team learning. In part II of this study, the proposed model is examined empirically in the context of military operational teams with an objective measure of formal rank power asymmetry, environmental hardship, team egalitarianism, and team learning.

References

Anderson, C. and Brown, C.E. (2010), "The functions and dysfunctions of hierarchy", *Research in Organisational Behavior*, Vol. 30, pp. 55–89, doi.org/10.1016/j.riob.2010.08.002

Anicich, E.M., Swaab, R.I., and Galinsky, A.D. (2015), "Hierarchical cultural values predict success and mortality in high-stakes teams", *Proceedings of the National Academy of Sciences*, Vol. 112 No, 5, pp. 1338-1343, doi.org/10.1073/pnas.1408800112

Ashforth, B.E. and Schinoff, B.S. (2016), "Identity under construction: how individuals come to define themselves in organisations", *Annual Review of Organisational Psychology and Organisational Behavior*, Vol. 3, pp. 111-137, DOI: 10.1146/annurev-org psych-041015-062322.

Bargh, J.A., Raymond, P., Pryor, J.B. and Strack, F. (1995), "Attractiveness of the underling: An automatic power→ sex association and its consequences for sexual harassment and aggression, *Journal of Personality and Social Psychology*, Vol. 68 No. 5, pp. 768.

Bell, S.T., Fisher, D.M., Brown, S.G. and Mann, K.E. (2016), "An approach for conducting actionable research with extreme teams', *Journal of Management*, Vol. 44 No. 7, pp. 2740-2765, DOI: 10.1177/0149206316653805.

Bloom, M. (1999), "The performance effects of pay dispersion on individuals and organisations", *Academy of Management Journal*, Vol. 42, pp. 25–40, DOI: 10.5465/256872

Bunderson, J.S. and Reagans, R.E. (2011), "Power, status, and learning in organisations", *Organisation Science*, Vol. 22, pp. 1182-1194, DOI: 10.1287/orsc.1100.0590

Bunderson, J.S. and Sutcliffe, K.A. (2003), "Management team learning orientation and business unit performance", *Journal of Applied Psychology*, Vol. 88, pp. 552– 260, DOI: 10.1037/0021-9010.88.3.552.

Bunderson, J.S., Van Der Vegt, G.S., Cantimur, Y., and Rink, F, (2016), "Different views of hierarchy and why they matter: Hierarchy as inequality or as cascading influence", *Academy of Management Journal*, Vol. 59 No. 4, pp. 1265-1289. DOI: 10.5465/amj.2014.0601

Burke, C.S., Salas, E., Wilson-Donnelly, K. and Priest, H. (2004), "How to turn a team of experts into an expert medical team: guidance from the aviation and military communities", *Quality and Safety in Health Care*, Vol. 13(suppl 1), pp. i96-i104, DOI: 10.1136/qshc.2004.009829.

Calhoun, L.G. and Tedeschi, R.G. (2004), AUTHORS' RESPONSE: ”The foundations of posttraumatic growth: new considerations", *Psychological Inquiry*, Vol. 15 No. 1, pp. 93-102, doi: 10.1207/s15327965pli1501_03.

Chan, C.C.A., Pearson, C. and Entrekin, L. (2003), "Examining the effects of internal and external team learning on team performance", *Team Performance Management*, Vol. 9 No. 7/8, pp. 174-181, DOI: https://doi.org/10.1108/13527590310507426

Day, D. V., Gronn, P. and Salas, E. (2004), "Leadership capacity in teams", *The Leadership Quarterly*, Vol. 15 No. 6, pp. 857-880, DOI: 10.1016/j.leaqua.2004.09.001.

deRue, D.S. and Ashford, S.J. (2010), "Who will lead and who will follow? A social process of leadership identity construction in organisations", *Academy of Management Review*, Vol. 35, pp. 627–647, DOI: 10.5465/amr.35.4.zok627

Driskell, T., Salas, E. and Driskell, J.E. (2018), "Teams in extreme environments: alterations in team development and teamwork", *Human Resources Management Review*, Vol. 28 No. 4, pp. 434-449, DOI: 10.1016/j.hrmr.2017.01.002.

Edmondson, A. (1999), "Psychological safety and learning behavior in work teams", *Administrative Science Quarterly*, Vol. 44 No. 2, pp. 350-383, DOI: 10.2307/2666999

Edmondson, A. (2002), "The local and variegated nature of learning in organisations: a group-level perspective", *Organisation Science*, Vol. 13, pp. 128–146. DOI: 10.1287/orsc.13.2.128.530

Edmondson, A., Bohmer, R. and Pisano, G. (2001), "Disrupted routines: team learning and new technology adaptation", *Administrative Science Quarterly*, Vol. 46, pp. 685–716, DOI: 10.2307/3094828

Ellis, A.P.J. and Bell, B.S. (2005), "*A framework for understanding team learning*", in Neider, L.L. and Schriesheim, C.A. (Eds), Understanding Teams, Information Age Publishing, Greenwich, CT, pp. 1-25.

Field, L. (2019), "Habermas, interests and organisational learning: a critical perspective", *The Learning Organisation*, Vol. 26 No. 3, pp. 252-263, DOI: 10.1108/TLO-04-2018-0060

Fiske, S.T. and Dépret, E. (1996), "Control, interdependence and power: understanding social cognition in its social context", *European Review of Social Psychology*, Vol. 7 No. 1, pp. 31-61, DOI: 10.1080/14792779443000094.

Goodwin, G.F., Blacksmith, N. and Coats, M.R. (2018), "The science of teams in the military: contributions from over 60 years of research", *American Psychologist*, Vol. 73 No. 4, pp. 322-333, DOI: 10.1037/amp0000259

Gomez, R. (2002), "Salary compression and team performance: evidence from the National Hockey League", *Zeitschrift für Betriebswirtschaft*, Vol. 72, pp. 203–20.

Greer, L.L. (2014), "*Power in teams: effects of team power structures on team conflict and team outcomes*", in Ayoko, O.B., Ashkanasy, N.M. and John, K.A. (Eds), Handbook of Conflict Management Research, Edward Elgar, Cheltenham, UK, pp. 93-108.

Greer, L.L., de Jong, B.A., Schouten, M.E. and Dannals, J.E. (2018), "Why and when hierarchy impacts team effectiveness: a meta-analytic integration", *Journal of Applied Psychology*, Vol. 103 No. 6, pp. 591–613, DOI: 10.1037/apl0000291

Greer, L.L., Van Bunderen, L.V. and Yu, S. (2017), The dysfunctions of power in teams: a review and emergent conflict perspective, *Research in Organisational Behavior,* Vol. 37, pp. 103-124, DOI: 10.1016/j.riob.2017.10.005

Guinote, A. (2007b), "Behaviour variability and the situated focus theory of power", *European Review of Social Psychology*, Vol. 18 No. 1, pp. 256-295, DOI: 0.1080/10463280701692813

Halevy, N., Chou, E.Y. and Galinsky, A.D. (2011), "A functional model of hierarchy: why, how, and when vertical differentiation enhances group performance", *Organisational Psychology Review*, Vol. 1 No. 1, pp. 32-52, DOI: 10.1177/2041386610380991

Hannah, S.T., Uhl-Bien, M., Avolio, B.J. and Cavarretta, F.L. (2009), "A framework for examining leadership in extreme contexts", *The Leadership Quarterly*, Vol. 20, pp. 897-919, DOI: 10.1016/j.leaqua.2009.09.006

Hinsz, V.B., Tindale, R.S. and Vollrath, D.A. (1997), "The emerging conceptualisation of groups as information processors", *Psychological Bulletin,* Vol. 121, pp. 43–64, DOI: 10.1037/0033-2909.121.1.43.

Hofstede, G. (2003). Culture's consequences: comparing values, behaviors, institutions and organisations across nations, Sage publications, London, UK.

Jewell, R.T. and Molina, D.J. (2004), "Productive efficiency and salary distribution: the case of Us Major league baseball", *Scottish Journal of Political Economy*, Vol. 51, pp. 127–142, DOI: 10.1111/j.0036-9292.2004.05101008.x.

Johns, G. (2006), "The essential impact of context on organisational behavior", *Academy of Management Review,* Vol. 31, pp. 386–408, DOI: 10.5465/amr.2006.20208687

Joseph, S. and Hefferon, K. (2013), "*Post-traumatic growth: eudaimonic happiness in the aftermath of adversity*", in Boniwell, I., David, S.A. and Ayers, A.C. (Eds). Oxford Handbook of Happiness, DOI: 10.1093/oxfordhb/9780199557257.001.0001.

Kahneman, D. and Frederick, S. (2002), "*Representativeness revisited: attribute substitution in intuitive judgment*", in Gilovich, T., Griffin, D. and Kahneman, D. (Eds), Heuristics and biases: the psychology of intuitive judgment 49, Cambridge University Press, New York, p. 81.

Keltner, D., Van Kleef, G.A., Chen, S. and Kraus, M.W. (2008), "A reciprocal influence model of social power: emerging principles and lines of inquiry". *Advances in Experimental Social Psychology*, Vol. 40, pp. 151–192, DOI: 0.1016/S0065-2601(07)00003-2

Koeslag-Kreunen, M., Van den Bossche, P., Hoven, M., Van der Klink, M. and Gijselaers, W. (2018), “When leadership powers team learning: a meta-analysis”, *Small Group Research*, Vol. 49 No. 4, pp. 475-513, doi: 10.1177/1046496418764824.

Kostopoulos, K.C. and Bozionelos, N. (2011), "Team exploratory and exploitative learning: psychological safety, task conflict, and team performance", *Group & Organisation Management,* Vol. 36 No. 3, pp. 385-415, DOI: 10.1177/1059601111405985.

Kozlowski, S. W. J. and Bell, B. S. (2008), "Team learning, development, and adaptation", in Sessa, V.I. and London, M. (Eds.), Lawrence Erlbaum Associates, Mahwah, NJ, pp. 15-44.

Kozlowski, S.W., Gully, S.M., McHugh, P.P., Salas, E. and Cannon-Bowers, J.A. (1996), "A dynamic theory of leadership and team effectiveness: developmental and task contingent leader roles", *Research in Personnel and Human Resources Management*, Vol. 14, pp. 253-306.

Kozlowski, S.W., Gully, S.M., Nason, E.R. and Smith, E.M. (1999), "*Developing adaptive teams: a theory of compilation and performance across levels and time*", in Ilgen, D.R. and Pulakos, E.D. (Eds.), The changing nature of work performance: implications for staffing, personnel actions, and development, SIOP Frontiers Series, pp. 240- 292.

Kozlowski, S.W., Watola, D.J., Jensen, J.M., Kim, B.H. and Botero, I.C. (2009), "Developing adaptive teams: a theory of dynamic team leadership", *Team effectiveness in complex organisations: cross-disciplinary perspectives and approaches*, SIOP Frontiers Series, Mahwah, NJ, pp. 113-155.

Kuhl, J. (1992), "A theory of self-regulation: action versus state orientation, self-discrimination, and some applications", *Applied Psychology*, Vol. 41 No. 2, pp. 97-129.

Maitlis, S. (2019), "Post-traumatic growth at work", *Annual Review of Organisational Psychology and Organisational Behavior*, Vol. 7, pp. 395-419, DOI: 10.1146/annurev-orgpsych-012119-044932.

Maitlis, S. and Christianson, M. (2014), "Sense-making in organisations: taking stock and moving forward", *The Academy of Management Annals*, Vol 8 No. 1, pp. 57-125, DOI: 10.1080/19416520.2014.873177

Neimeyer, S. (2006), "Complicated grief and the reconstruction of meaning: conceptual and empirical contributions to a cognitive-constructivist model", *Clinical Psychology*, Vol. 13 No. 2, pp. 141-145, DOI: 10.1111/j.1468-2850.2006.00016.x

Nietzsche, F. (1968), "*The Will to Power, trans"*, in Kaufmann, W. and Hollingdale, R.J.(Eds), Vintage, New York.

Nonaka, I., Toyama, R. and Konno, N. (2000), "SECI, Ba and leadership: a unified model of dynamic knowledge creation", *Long-range planning*, Vol. 33 No. 1, pp. 5-34, DOI: 10.1016/S0024-6301(99)00115-6.

Örtenblad, A. (2002), "A typology of the idea of learning organisation", *Management Learning*, Vol 33 No. 2, pp. 213-230, DOI: 10.1177/1350507602332004.

Overbeck, J.R. and Park, B. (2001), "When power does not corrupt: superior individuation processes among powerful perceivers", *Journal of Personality and Social Psychology*, Vol. 81 No. 4, pp. 549–565.

Petriglieri, J.L. (2011), "Under threat: Responses to and the consequences of threats to individuals' identities", *Academy of Management Review*, Vol. 36 No. 4, pp. 641-662, DOI: 10.5465/amr.2009.0087.

Posner, M.I. and Snyder, C.R.R. (1975), "Facilitation and inhibition in the processing of signals". *Attention and performance V*, pp. 669-682.

Pratt, M.G. (2000), "The good, the bad and the ambivalent: managing identification among Amway distributors", *Administrative Science Quarterly*. Vol. 45 No. 3, pp. 456-493.

Rebelo, T., Lourenço, P. R. and Dimas, I. D. (2019), The journey of team learning since "The Fifth Discipline", *The Learning Organisation*, Vol. 27 No. 1, pp. 42-53, DOI: 10.1108/TLO-10-2019-0144.

Ridgeway, C.L. (2001), "Gender, status, and leadership", *Journal of Social Issues*, Vol. 57, pp. 637-655, DOI: 10.1111/0022-4537.00233.

Ronay, R., Greenaway, K., Anicich, E. M. and Galinsky, A. D. (2012), "The path to glory is paved with hierarchy: when hierarchical differentiation increases group effectiveness", *Psychological Science*, Vol. 23 No. 6, pp. 669–77, DOI: 10.1177/0956797611433876.

Rosen, S.P. (1991), *Winning the Next War: Innovation and the Modern Military*, Cornell University Press, London, available at http://www.jstor.org/stable/10.7591/j.ctv2n7k6j (accessed 30 April 2020).

Rousseau, D.M. and Fried, Y. (2001), "Location, location, location: contextualising organisational research", *Journal of Organisational Behavior*, Vol. 22 No. 1, pp. 1-13, DOI: /10.1002/job.78.

Rubin, J.Z. and Brown, R. (1975), *The Social Psychology of Bargaining and Negotiation*, Academic Press, New York.

Swaab, R.I. and Galinsky, A.D. (2015), "Egalitarianism makes organisations stronger: cross-national variation in institutional and psychological equality predicts talent levels and the performance of national teams", *Organisational Behavior and Human Decision Processes*, Vol. 129, pp. 80-92, DOI: 10.1016/j.obhdp.2014.05.002.

Senge, P.M. (1990), The Fifth Discipline: the Art and Practice of the Learning Organisation, Doubleday, New York, NY.

Talbot, S., Stothard, C., Drobnjak, M. and McDowall, D. (2014), *Learning organisations: a literature review and critique* (DSTO-TR-2928), Defence Science and Technology Science Organisation, Adelaide, Australia.

Tarakci, M., Greer, L. and Groenen, P.J.F. (2016), "When does power disparity help or hurt group performance?", *Journal of Applied Psychology*, Vol. 101 No. 3, pp. 415-429, DOI: 10.1037/apl0000056.

Tedeschi, R.G. and Calhoun, L.G. (2004a), "Posttraumatic growth: conceptual foundations and empirical evidence", *Psychological Inquiry*, Vol. 15 No. 1, pp. 1-18, doi: 10.1207/s15327965pli1501_01.

Tedeschi, R. G. and Calhoun, L. (2004b), "Post-traumatic growth: a new perspective on psychotraumatology", *Psychiatric Times*, Vol 21 No. 4, pp. 58-60.

Triandis, H.C. and Gelfand, M. (1998), "Converging measurements of horizontal and vertical individualism and collectivism", *Journal of Personality and Social Psychology*, Vol. 74, pp. 118–28.

Tuck, C. (2014), *Understanding Land Warfare*, Routledge, UK.

Van der Vegt, G. S. and Bunderson, J.S. (2005), "Learning and performance in multidisciplinary teams: the importance of collective team identification", *Academy of Management Journal*, Vol. 4 No. 3, pp. 532-547, DOI: 10.2307/20159674.

Van der Vegt, G.S., de Jong, S.B., Bunderson, J.S. and Mollemon, E. (2010), "Power asymmetry and learning in teams: the moderating role of performance feedback", *Organisational Science*, Vol. 21, pp. 347-361, DOI: 10.1287/orsc.1090.0452.

Vescio, T.K., Sechrist, G.B. and Paolucci, M.P. (2003), "Perspective taking and prejudice reduction: the mediational role of empathy arousal and situational attributions", *European Journal of Social Psychology*, Vol. 33 No. 4, pp. 455-472, DOI: 10.1002/ejsp.163.

Watkins, K.E. and Marsick, V. J. (1997), *Dimensions of the Learning Organisation Questionnaire*, Partners for the Learning Organisation, Warwick, RI.

Wolfe, R. J. and McGinn, K. L. (2005), "Perceived relative power and its influence on negotiations", *Group Decision and Negotiation*, Vol. 14 No. 1, pp. 3-20, DOI: 10.1007/s10726-005-3873-8.

Zoellner, T. and Maercker, A. (2006), "Post-traumatic growth in clinical psychology—a critical review and introduction of a two component model", *Clinical Psychology Review*, Vol. 26 No. 5, pp. 626-653, DOI: 10.1016/j.cpr.2006.01.008.

5.5 STATEMENT OF AUTHORSHIP: PAPER 3

TITLE OF PAPER: Power Asymmetry, Egalitarianism, and Team Learning- Part 2: Empirical Examination of the Moderating Role of Environmental Hardship.

PUBLICATION STATUS: Published

PUBLICATION DETAILS: Sinha, R. and Stothard, C. (2020), "Power asymmetry, egalitarianism and team learning – part II: empirical examination of the moderating role of environmental hardship", *The Learning Organisation*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/TLO-06-2020-0115

NAME OF PRINCIPAL AUTHOR (Candidate): Christina Stothard

CONTRIBUTION TO PAPER: Designed and collected the data, developed the conceptual model (and developed theory of mediators and moderators), conducted literature review, constructed and tested measures, performed analysis on all samples, interpreted data, and wrote manuscript.

OVERALL PERCENTAGE: 80%

CERTIFICATION: This paper reports on original research I conducted during my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

SIGNATURE:

NAME OF CO-AUTHOR: Ruchi Sinha

CONTRIBUTION TO PAPER: Supervised the development of the conceptual model, guided the data interpretation and analysis, wrote, reviewed and edited the manuscript drafts.

OVERALL PERCENTAGE: 20%

SIGNATURE: DR RUCHI SINHA 24/05/21

Power Asymmetry, Egalitarianism, and Team Learning- Part II: Empirical Examination of the Moderating Role of Environmental Hardship

Abstract

Purpose: In this paper, we seek to clarify under which conditions, and via what mechanisms, power asymmetry is likely to affect team learning. This work is part of a two-paper series. Part I presents the theoretical arguments linking power asymmetry to team learning via egalitarianism and the moderating role of environmental hardship. In Part II, we provide an empirical evaluation of the conceptual model presented in Part I.

Design & Findings: Data was gathered on 4637 military personnel nested in 143 ongoing teams. Multiple regression analysis was used to analyse the proposed moderated mediation model. The results show that teams with higher power asymmetry under higher levels of environmental hardship (greater hierarchy) show greater team egalitarianism and higher team learning.

Value: This work provides insights to help practitioners to preserve the coordination benefits of hierarchy while still promoting more egalitarianism and team learning in hierarchical teams.

Research Limitations: The empirical examination of the proposed relationships is based on a large sample of military teams in the real world. Future research would benefit from testing the model on different samples across industries and adopting different operationalisations for environmental hardship relevant to each industry.

Keywords: Teams, Power asymmetry, Egalitarianism, Team learning, Environmental hardship

Paper type: Empirical paper

1. Introduction

Team learning is an essential part of learning organisations (Örtenblad, 2002; Senge, 1990). Theoretically, team power asymmetry (hierarchical differences in authority/rank among members) is considered an inhibitor of team learning (Edmondson, 1999; Bunderson and Reagans, 2011). Nevertheless, hierarchical teams remain a reality in most organisations (Greer *et al*., 2018), making it critical to identify contextual factors wherein team power asymmetry does not hurt team learning. The empirical relationship between team power asymmetry and team learning is complicated, with some empirical studies suggesting that power asymmetry can hurt team learning while others showed no direct effects (Bunderson and Reagans, 2011; Halevy *et al.*, 2011; Greer *et al*., 2018). The current literature on team power and team learning presents divergent findings that create tensions and challenges (Greer *et al*., 2018) in terms of understanding when and how power asymmetry influences team learning (for an extensive review, see Part I of this work) (Sinha and Stothard, 2020). In this work, we propose and test "environmental hardship" as a critical contingency that could explain when and how team power asymmetry might hurt or help team learning. In doing so, we answer calls to understand team learning contingencies (Örtenblad, 2017).

This paper is the second of a two-part study. In Part I, we developed a conceptual model that aimed to account for the effects of team power asymmetry (hierarchy) on team learning. In this paper (Part II), we empirically test the full conceptual model by examining the effect of team power asymmetry on team learning via team egalitarianism and the moderating role of environmental hardship.

2. Conceptual Model and Hypotheses

In this study, we propose and test three propositions: (i) higher levels of team egalitarianism will improve team learning, (ii) the effect of team power asymmetry on team egalitarianism will be contingent on the level of environmental hardship faced by teams, and (iii) the indirect effect of team power asymmetry on team learning via team egalitarianism will be moderated by the level of environmental hardship faced by teams.

2.1 Team learning and team egalitarianism

Team learning is critical for team performance and is characterised as a team’s willingness to share knowledge, failures and incorporate feedback (Edmondson, 1999; Rebelo *et al.*, 2019; Watkins and Marsick, 1997). Egalitarianism among members is proposed as a "theoretical engine" that drives learning

(Burke *et al.*, 2004). In this work, team egalitarianism is defined as the shared belief among members that they are equal and respect others' roles and responsibilities regardless of formal rank or position. Relying on team information-processing theory (Ellis and Bell, 2005; Hinsz *et al*., 1997), we posit that a shared sense of equality (team egalitarianism) will enable openness in information sharing and will thereby improve team learning (Bunderson and Sutcliffe, 2003).

Hypothesis 1: There will be a positive association between team egalitarianism and team learning, such that higher egalitarianism will improve team learning, and lower egalitarianism will hurt team learning.

2.2 The contingent effect of team power asymmetry on team egalitarianism: Role of Environmental Hardship

Team power asymmetry represents differences in member power within teams and captures the formal hierarchical differences in authority/rank among members (Tarakci *et al.*, 2016). There is evidence that greater team power asymmetry creates psychological distance (Bunderson and Reagans, 2011), suppresses feedback (Edmondson, 1999), and reduces team learning (Van der Vegt *et al.*, 2010). However, team power asymmetry has also been proposed to provide benefits by improving coordination and communication dynamics in teams (Anicich *et al.*, 2015). Suppose organisations seek to optimise team performance by maintaining the coordination benefits of the formal hierarchy while simultaneously reducing the potential harm to team learning. In that case, it is critical to understand how to improve egalitarianism and learning in the presence of team power asymmetry. We argue that environmental hardship is one such contingency factor that can moderate the effects of team power asymmetry on team egalitarianism and thereby influence team learning.

Environmental Hardship is defined as the team's experience of intense, dynamic, ambiguous, and multiple external adverse events that threaten extensive psychological, material, or physical harm to the team (Bell *et al.*, 2016). Hardship can provide teams with more opportunities to challenge stereotypical assumptions and expectations about asymmetric power (Tedeschi and Calhoun, 2004a, 2004b). In hierarchical teams (with a high level of power asymmetry), hardships can aid the reconfiguration of stereotypical power relations through sense-breaking and sense-making (Ashforth and Schinoff, 2016; Pratt, 2000), meaning reconstruction (Neimeyer and Stewart, 2000), and 'creative chaos' (Nonaka *et al.*, 2000), thereby triggering egalitarianism. For example, when hierarchical teams experience significant environmental hardships, members may come to respect and appreciate others' actions or roles as they

struggle to survive together. Environmental hardship can enable team members to shift their conventional thinking or expectations regarding power differences (Ashforth and Schinoff, 2016). In contrast, teams with high power asymmetry in non-hardship situations are likely to adhere to their stereotypical perceptions and experiences of power roles (Tedeschi and Calhoun, 2004a). Teams with low power asymmetry are expected to have a generally high base level of egalitarianism and, therefore, we do not expect environmental hardship to modify the effect of power asymmetry on egalitarianism significantly and, eventually, team learning.

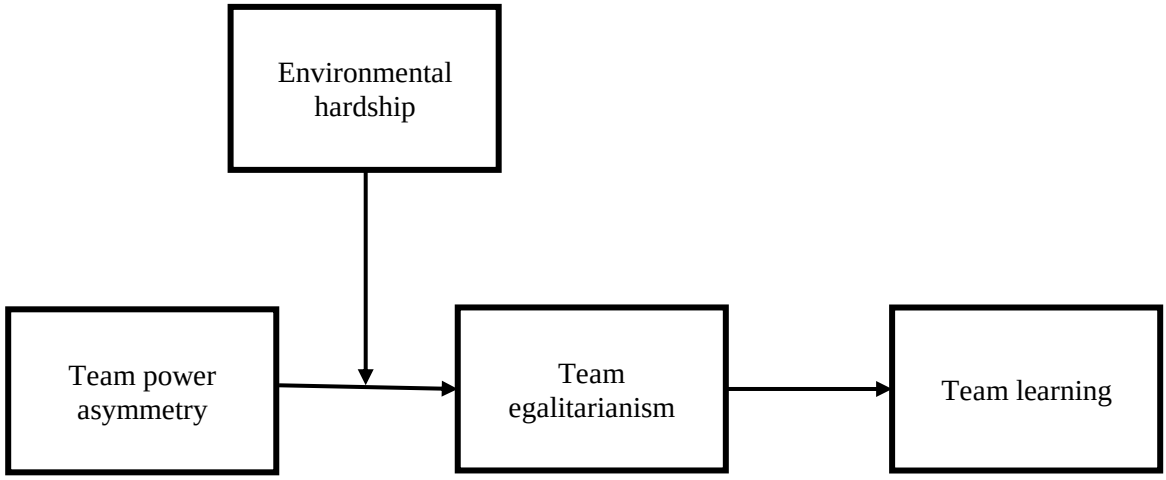

FIGURE 1: PROPOSED MODERATED MEDIATION MODEL

Formally stated:

Hypothesis 2: The association between team power asymmetry and team egalitarianism will be contingent on environmental hardship – such that the association becomes increasingly positive for high power asymmetric teams as environmental hardship increases and increasingly negative as environmental hardship decreases. In comparison, environmental hardship will have no moderating effect on the relationship between low power asymmetry and team egalitarianism.

Combining Hypothesis 1 and 2, we propose an overall model (see Part 1 for a detailed description of propositions 1 and 2) that posits an indirect contingent effect of team power asymmetry on team learning via team egalitarianism, where environmental hardship moderates the link between team power asymmetry and team egalitarianism (see Fig. 1). Specifically, we hypothesise:

Hypothesis 3: The indirect effect of team power asymmetry on team learning through team egalitarianism will be contingent on environmental hardship, such that power asymmetry will improve team learning through higher egalitarianism when teams have a higher level of environmental hardship. In contrast, power asymmetry will hurt team learning through reduced egalitarianism when teams do not share environmental hardships.

3. Method

3.1 Research context

For the past 60 years, within the discipline of organisational behaviour, a large body of empirical work on teams has emerged from research on military teams (Goodwin *et al.,* 2018). In this study, military teams provided a relevant context because the critical constructs (power asymmetry and environmental hardship) and the resulting dynamics are likely to be both prevalent and salient.

3.2 Data collection procedure

The data was collected from Australian Army personnel working in operational support, administrative, combat, and medical teams. A stratified, representative sampling strategy was employed to balance teams by geographical location and team function. The teams within the Australian Army were identified with the aid of local military leaders, and all team members within each unit were approached to complete the questionnaires. Questionnaires were administered either in person by civilians (paper and pen) or online for locations too remote for in-person collection.

3.3. Sample

The sample for this study included a total of 4637 respondents nested in 143 military units. Team size ranged from 6 to 121, and teams were also referred to as the "Company" or "Unit" in the military context (Goodwin *et al.*, 2018). Eighty-nine per cent of the sample was men, and age distribution was as follows: 18 to 25 (23%), 25 to 35 (31%), 35 to 45 (26%), 45 to 55 (16%), and over 55 (3%).

3.4 Measures

Team power asymmetry. The variance (standard deviation) in the formal military rank of members within a team was used to operationalise team power asymmetry (Harrison and Klien, 2007). This

measure of power asymmetry was based on objective, structural, and formal power differences in organisational ranks and not a subjective perception of informal power. The standard deviation index in the data ranged from -2.59 to +3.51 SD.

Team egalitarianism. Team egalitarianism was measured using three referent-shift items[33] adapted from Watkins and Marsick (1997). The items were adapted with military terms replacing corporate terms (see Stothard, 2014, for more details). Sample items: "In this unit, we treat team members as equals regardless of rank or other differences," and "In this unit, we treat each other with respect." All items were rated on a Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*). Supporting aggregation of individual ratings of egalitarianism to the team level, there was adequate levels of agreement and reliability, indicated by R_{wgj} = .79, ICC (1) = .05 and ICC (2) = .77 (F = 4.44, p = .001) (Bliese, 2000).

Team learning. Team learning is defined as the shared collective perception that the group values mutual learning processes and activities such as the promotion of inquiry/dialogue (open and constructive discussion of mistakes) and opportunities for continuous learning (sharing learning and viewing everyday work as learning opportunities) (Edmondson, 1999, Watkins and Marsick, 1997). We use four reference-shift items to measure team learning (Edmondson, 1999; Watkins and Marsick, 1997). Once again, the items were adapted with military terms replacing corporate terms (See Stothard, 2014, for more details). Sample items include: In this unit/company, "we openly discuss mistakes in order to learn from them," "failures are discussed constructively," "we make lessons learned available to all its people," and finally, "we view problems in our work as an opportunity to learn." All items were answered on a scale from 1 (*strongly disagree*) to 6 (*strongly agree*). Supporting aggregation to the team level, there was adequate levels of agreement and reliability, indicated by R_{wgj} = .80, ICC (1) = .08 and ICC (2) = .82 (F = 5.58, p < .001) (Bliese, 2000).

Environmental hardship. Environmental hardship was operationalised as a military deployment. Military teams are deployed to severe and adverse environments such as warzones and areas with active conflict that require military-driven nation-building, peacekeeping, and humanitarian aid[34] (Australian

[33] Referent-shift items prompt the respondents to focus on the collective and the team by using cues such as "In your team…" or "We think that…". Referent shift items are considered appropriate to capture team-level phenomenon rather than asking respondents to report their perspectives about their psychological states (Chan, 1998).

[34] Illustrative quote of deployment as environmental hardship: "nontraditional military [deployments] … underlined the risky, challenging, dangerous, complex, and adverse environments … the physical and organisational risks... were palpable and persistent features [of deployment]" (Gilmore, 2016, p. 5 - 10).

Army, 2014; Newby *et al.*, 2005). When teams are not deployed, they are likely to work at their home locations without exposure to environmental hardships. Teams are typically deployed for six to nine months every three years and occasionally every two years (Australian Army, 2017). For this study, we captured the number of deployments in the last five years, which ranged in our sample from "none" to "three or more", with 51% members who were never deployed in the past five years, 33% deployed once, 12% deployed twice, and 4% deployed three or more times. At the team level, environmental hardship was an average of member deployments and represented a continuous variable that ranged from a minimum of 0 to a maximum of 2.5.

a. Control variables

In line with suggestions to include only theoretically and statistically justified control variables (Becker *et al.*, 2016), we adopted two criteria to select control variables. The first was to remove possible methodological bias, and the second was to account for alternate theoretical explanations. As the conceptual model and hypotheses posit team power asymmetry (predictor) as a disparity measure captured by the level of variance in ranks among members, it is essential to control two related variables. First, team size is a source of bias in disparity measures in teams (c.f. Biemann and Kearney, 2010). Second, mean team power level (the average rank/power of the team as a whole) needs to be statistically controlled when testing relationships between the variance of an attribute and outcome variables (c.f., Harrison and Klien, 2007). Past research has shown that the level of task interdependence can influence team outcomes (Kozlowski and Bell, 2008). Task interdependence was controlled for in line with recommendations from Bell and Kozlowski (2002), wherein task/workflow interdependence was coded as either (1) high or (2) low task interdependence[35].

b. Confirmatory factor analysis

The factor structure and discriminant validity of the two self-rated perceptual variables (team egalitarianism and team learning) were assessed using confirmatory factor analysis. We examined a two-factor structure measurement model to establish the validity of the model variables. The single factor model (Model 1) was specified such that all items associated with team egalitarianism and team learning

[35]. The control variable (task interdependence) was evaluated using Becker *et al*.'s (2016) recommendations: the analysis was run swapping the control and moderator. There was no significant moderation of task interdependence on the effect of team power asymmetry on team egalitarianism (*B*=.06, SE=.09, *ns*). Therefore, task interdependence was kept as a control variable.

were constrained to load on a single latent factor – assuming significant overlap and low discriminant validity. In contrast, we also specified a two-factor model (Model 2), wherein team egalitarianism and team learning items were constrained to load on two separate latent variables – indicating two differentiated constructs. The overall fit of the two-factor model (Model 2: CFI ≥ .98; RMSEA≤.05; AGFI≥ .95) was satisfactory based on the recommended fit indices (Hu and Bentler, 1999), and the chi-square difference test showed that the hypothesised two-factor model fit significantly better than the alternative one-factor model ($\Delta\chi 2$=129.3, df (1), p<0.001). The two-factor model was retained as it supports the discriminant validity of the conceptual model variables.

4. Results

Table 1 includes descriptive statistics and bivariate correlations. There was a significant variance in model variables indicating adequate sampling. Some zero-order correlations between variables worth noting include team power asymmetry and environmental hardship (r = 0.18, p < 0.05), and team power asymmetry and team egalitarianism (r = 0.19, p < 0.05).

Hypothesis 1 postulated that there would be a positive relationship between team egalitarianism and team learning. The regression results support the hypothesis, showing that team egalitarianism was significantly related to team learning (B = .65, *S*.E. = .06, p < .01). *Hypothesis 2* postulated that there would be a contingent relationship between team power asymmetry and team egalitarianism that was moderated by the environmental hardship. Table 2 reports the moderation regression analysis results. As hypothesized, environmental hardship moderated the relationship between team power asymmetry and team egalitarianism (see Table 2, B = .07, p < .05; Δ *Adjusted* R^2= .04*). The interaction pattern was plotted (see Figure 2), and simple slopes tests were conducted (See Table 3). The results support Hypothesis 2 and indicate that team power asymmetry was positively associated with team egalitarianism under higher levels of environmental hardship (+1 S.D., t = 2.37, p < .05). In addition, the indirect effects of team power asymmetry on team learning was positive when teams experienced high levels of environmental hardship (See Table 3; +1 SD indirect effect = .06; 95% CI: .01, .11; p < .05) but not significant under low levels of hardship (-1 SD indirect effect = -.03; 95% CI: -.08, .02, *ns*). These findings support Hypothesis 2. As expected, we did not find any evidence for the direct effect of environmental hardship on team egalitarianism or team learning, as denoted in the regression coefficients (see Table 2: team learning: B = 0.01, *ns*; team egalitarianism: B = 0.05, *ns*).

Hypothesis 3 posited a full moderated-mediation model wherein an indirect contingent effect was proposed. As recommended by Preacher and Hayes (2008), we used a nonparametric bootstrap PROCESS (model 8) macro in SPSS (with 5000 bootstrap samples) to compute the index of moderated mediation. The results indicate a significant conditional indirect effect (coefficient = 0.05, *SE* = 0.02, 95% CI = [.01, .08]) of team power asymmetry on team learning. In addition, the team power asymmetry X environmental hardship interaction term was significantly associated with team egalitarianism (*B* = .07, *SE* = .03, $p < .01$), and team egalitarianism was significantly related to team learning (*B* = .65, *SE* = .06, $p < .01$). Taken together, we conclude that the results support Hypothesis 3.

Table 1: Means, SD, and correlations among study variables

Variables	Mean	SD	1		2		3		4		5		6	
Team power asymmetry	1.76	0.41	-											
Team learning	3.26	0.35	0.14		(.76)									
Team egalitarianism	3.42	0.38	0.18	*	0.73	**	(.72)							
Environmental hardship	1.74	0.28	0.19	*	-0.03		0.08		-					
Task interdependence ^	1.91	0.29	-0.04		-0.31	**	-0.35	**	0.32	**	-			
Team power mean	4.43	1.21	0.48	**	0.17	*	0.20	*	0.31	**	0.04		-	
Team size	29.53	22.11	-0.08		-0.06		-0.07		0.03		0.07		-0.24	**

* p<.05 ; ** p<.01, N=143; Reliability on the diagonal.
^ Environmental hardship: 1 = no deployments in last five years to 4 = three or more deployments in last five years
^ ^Lower task interdependence = 1; Higher task interdependence = 2.

Table 2: Hierarchical Regression Analysis

		DV: Team Egalitarianism			DV: Team learning		
Predictors		*B*	*SE*		*B*	*SE*	
Controls	Constant	4.41	0.21	**	1.13	0.29	**
	Task interdependence	-0.53	0.10	**	-0.06	0.08	
	Team power level	0.05	0.03		0.01	0.02	
	Team size	0.01	0.04		0.01	0.03	
Adjusted R2		*0.17*	**		*0.13*	**	
Predictor	Team power asymmetry	0.04	0.03		0.00	0.02	
Moderator	environmental hardship	0.04	0.03		0.04	0.03	
Adjusted ΔR2		*.02*			*0.00*		
Moderation	Team power asymmetry X environmental hardship	0.07	0.03	**	0.01	0.02	
Adjusted ΔR2		*.04**			*0.03*	*	
Mediation	Team egalitarianism				0.65	0.06	**
Adjusted R2					*0.54*	**	

* p < .05; ** p< .01; N= 143

Note: Variance inflation factors (VIFs) ranged from 1.03 to 1.60, well under the VIF threshold for collinearity of 10 (Neter, Wasserman, and Kutner, 1989: p. 409)

Footnote: 1To test the possible moderation effect of task interdependence on the relationship between power asymmetry and team egalitarianism, we tested the model with the following interaction term (task interdependence x team power asymmetry). No significant interaction effect was found for team egalitarianism (b = 0.06 (SE = .09), ns) and team learning (b = .08 (SE =.07), ns). Consequently, we removed that term and did not include it in the final model for parsimony.

Table 3: Conditional effects of environmental hardship on team egaliltarianism

Conditional effects on Team egalitarianism at the values of +/-1 S.D. of Environmental Hardship					
Conditional effects	DV: Team Egalitarianism			95% CI	
Environmental Hardship	Effect	S.E.	t value	LLCI	ULCI
-1 SD	-0.04	0.04	-1.14	-0.11	0.03
M	0.02	0.03	0.72	-0.04	0.08
+1 SD	0.09	0.04	2.37*	0.01	0.16
Direct Effect and Conditional Indirect Effects on Team Learning					
Indirect effects	DV: Team Learning			95% CI	
Environmental Hardship	Effect		SE	LLCI	ULCI
-1 SD	-0.03		0.03	-0.08	0.02
M	0.01		0.02	-0.03	0.06
+1 SD	0.06		0.03*	0.01	0.11
Direct effects					
X → Y	0.00		0.02	-0.03	0.04
Mediator → Y	-0.02		0.02	-0.06	0.02

* $p < .05$; ** $p < .01$; N=143

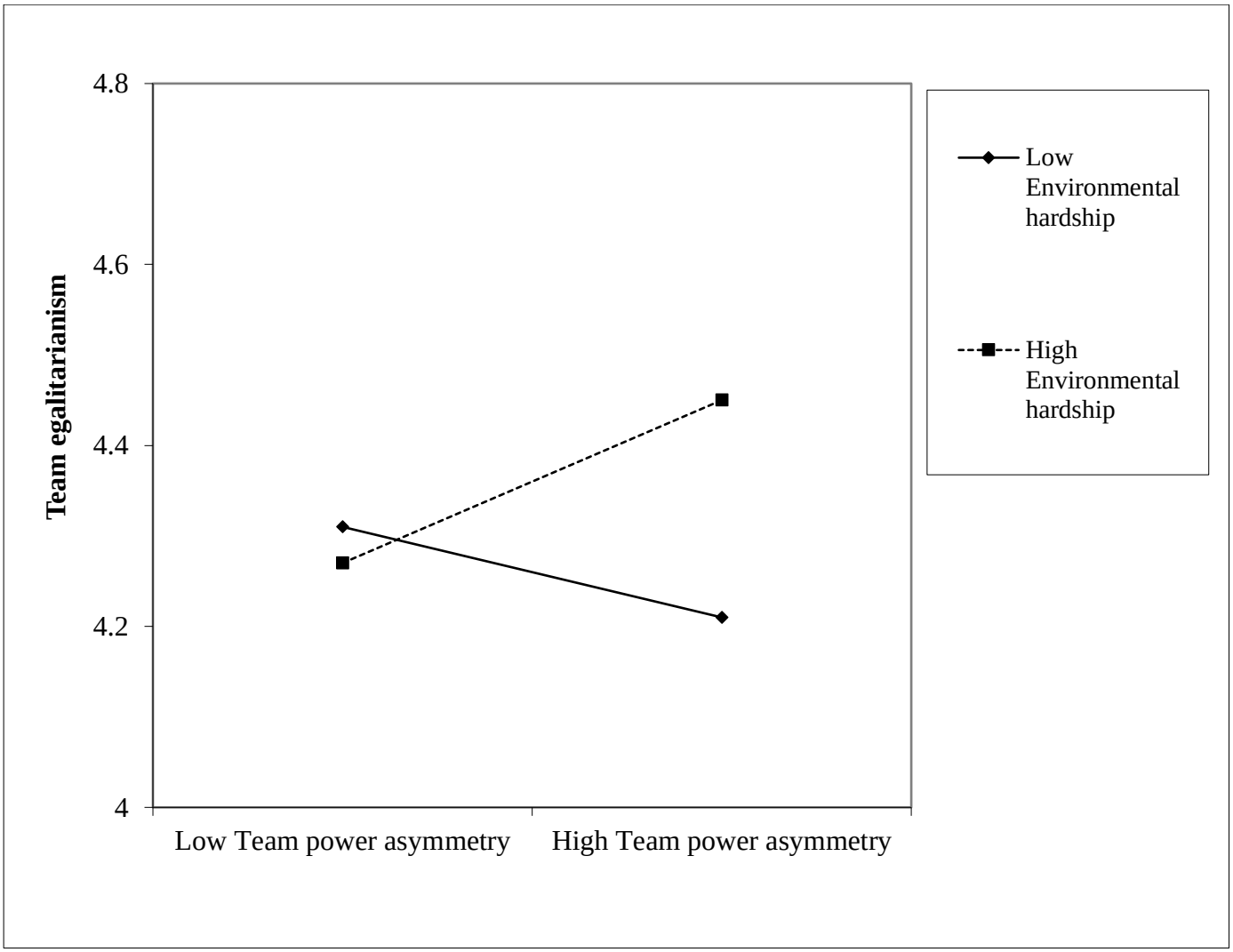

Figure 2:Interactive relationship of team power assympetry and environmental hardship on team egalitarianism

5. Discussion

In this study, we examined the indirect effect of team power asymmetry on team learning. We found that teams with high levels of power asymmetry and a high level of hardship show higher egalitarianism, thereby more team learning. We believe this work provides theoretical and empirical contributions to team power and team learning while also providing a novel perspective to practitioners on the role of hardships in triggering learning in hierarchical teams.

5.1 Theoretical implications

Empirically, past research has found evidence for the adverse effects of power asymmetry on voice and equality in engagement (Greer *et al.,* 2018). This work provides insights regarding the generative role of the external team environment (hardships) as a contextual factor that can shift the typical adverse effects of asymmetric team power on team learning. This work contributes to the team learning literature in several ways. It answers recent calls for contingency-based models of team learning (a vital element of a learning organisation) (Örtenblad, 2019; Watkins and Kim, 2017). It extends the understanding of how context affects teams, typically an understudied area in organisational research (Johns, 2006). Finally, it identifies both the contingency (hardship) and the explanatory mechanism (egalitarianism) to explicate the complicated relationship between power asymmetry in teams and team learning and answers the call for research on the learning effects of team power (Greer *et al.,* 2018).

In exploring how environmental hardship might trigger egalitarianism in teams with high power asymmetry, we assume that teams with high power asymmetry and no exposure to hardship are likely to have lower egalitarianism. However, it is worth mentioning that in our sample, even under low levels of environmental hardship, teams with high power asymmetry did not show a significant negative relationship with egalitarianism. One explanation could be the unique nature of the military teams in our sample. Members in military teams who may not have been deployed in hardship conditions are also likely to have some level of appreciation and awareness as they anticipate the chance of facing such hardships if deployed. Teams with no environmental hardships in terms of deployments may still have some base level of second-hand exposure to hardship from peers. Future research is encouraged to explore and validate our theoretical model on contrasting teams, wherein teams with low environmental hardship truly function in mundane and routine organisational environments, while those with a high level of hardship face highly challenging environments.

The idea of "that which does not kill us makes us stronger" (Nietzsche, 1968) is still prevalent. However, we would like to acknowledge that environmental hardships, particularly dangerous and threatening environments, can be traumatising (Galea *et al.,* 2005). Researchers interested in building theory around hardships should explore the positive growth emerging from temporary organisational hardships while simultaneously studying the stress and adverse psychological effects on teams that face prolonged exposure to hardships (Neimeyer and Stewart, 2000). The positive effects of hardship may be a key area of investigation as the world faces threats from economic recession and an increase in mental health issues in the wake of shared hardships arising from the COVID-19 pandemic.

Also, it is critical to note that not all teams exposed to hardship may react the same way. In this work, we theorised that environmental hardship pushes members to re-evaluate their assumptions and expectations around team power roles. However, teams may also come to re-evaluate power arrangements at the organisational or institutional level. For example, military historians have argued that a military defeat can result in personnel drawing various lessons (Rosen, 1991). Consequently, it is not always clear what is learned by whom or whether it is positive or negative for the team versus the organisational structure/culture. Team learning and the nature of the content of that learning should be critically evaluated by drawing on other disciplines such as military sociology and history (Field, 2019; Talbot *et al.*, 2014).

5.2 Managerial implications

The findings from this study can have important implications for practice. Our study provides insights for managers and leaders by showing that experienced environmental hardship can positively facilitate egalitarianism and learning in teams with high power asymmetry. Moving forward, practitioners can explicitly develop training simulations of hardship, wherein newly formed teams are given conditions to work in where they are subjected to environmental hardships. Alternatively, training managers can implement focus group interventions where teams plan for hypothetical hardships and, in doing so, come to terms with their stereotypes and assumptions about power roles that may be hindering egalitarianism and learning in the team.

5.3 Limitations and avenues for future research

It is essential to acknowledge some limitations of the study; first, caution is needed in inferring causality between team egalitarianism and team learning, as the relationship may be reciprocal over time. Although the measurement analysis indicated the discriminant validity of the two variables, and we did not find empirical support for reverse causality, future research could employ longitudinal design to delineate the causal or reciprocal relationship over time. We note that the study data was gathered from military teams and did not assume that the relationship will manifest in the same form in non-military contexts. Although we sampled various teams within the military, from combat teams to teams engaged in administrative, medical, senior management, and logistics tasks, we encourage practitioners and researchers to carefully identify and compare sample characteristics as they seek to generalise from this work. Our study results are likely to generalise to action teams or teams that work in a high tempo, high stakes, or extreme environments such as medical, space exploration, submarines, or oil gas exploration in

isolated environments (Bell *et al.*, 2016). For example, given the COVID-19 pandemic, future research can explore the generative effects of environmental hardships on teams of virologists or epidemiologists and hospital teams currently grappling with the crisis in hardship conditions.

Finally, we acknowledge that our operationalisation of environmental hardship was based on an external objective team experience without directly measuring members' subjective perceptions of trauma, adversity, and hardship. Future research would benefit from measuring both objective and perceptual beliefs about hardships to see how it influences cognitive appraisals, type of adversarial growth, team dynamics, and learning processes. In this study, we focussed on power asymmetry in teams by looking at variance on a formal source of power (i.e., organisational rank) of members. There are other alternate informal sources of power (e.g., expertise, information, status, and surface attributes like race, gender, and age), which may differentially affect team dynamics and team learning (Ancona and Caldwell, 1992; Galinsky *et al.*, 2015). Future research would benefit from exploring the effects of power asymmetry on team learning by exploring both formal and informal sources of power asymmetry. Future research could also explore other configurations of power asymmetry within teams – e.g., how centralised hierarchy with one high power member versus more distributed power asymmetry (Greer *et al.,* 2018) affects team learning.

5.4. Conclusion

Organisations now operate in an uncertain and volatile world, with potential hardships emerging at both local and global levels. Teams are likely to face hardships from local organisational factors (e.g., threats of redundancy) and global black swan events like the recent COVID-19 pandemic. Practitioners and team leaders can apply the insights from this work to reframe such crises as opportunities to re-evaluate power roles within teams (Tedeschi and Calhoun, 2004a, 2004b) and, potentially, have discussions on how egalitarianism and learning can be encouraged. We encourage academics and practitioners to continue to explore the effects of hardship (local and global) on workplace relationships and team outcomes.

References

Ancona, D.G. and Caldwell, D.F. (1992), “Demography and design- predictors of new product team performance”, *Organisation Science*, Vol. 3 No. 3, pp.321-341.

Anicich, E.M., Swaab, R.I. and Galinsky, A.D. (2015), “Hierarchical cultural values predict success and mortality in high-stakes teams”, *Proceedings of the National Academy of Sciences*, Vol. 112 No. 5, pp.1338-1343.

Ashforth, B.E. and Schinoff, B.S. (2016), “Identity under construction: how individuals come to define themselves in organisations”, *Annual Review of Organisational Psychology and Organisational Behavior*, Vol. 3, pp.111-137. doi: 10.1146/annurev-org psych-041015-062322

Australian Army (2014), *The Australian Army: an aide-memoire*, available at: https://www.army.gov.au/sites/g/files/net1846/f/aide_memoire.pdf (accessed 11 April 2020)

Australian Army (2017), *Combat Brigades*, available at: https://www.army.gov.au/our-future/modernisation-projects/plan-beersheba/multi-role-combat-brigades (accessed 11 April 2020)

Becker, T.E., Atinc, G., Breaugh, J.A., Carlson, K.D., Edwards, J.R. and Spector, P.E. (2016), "Statistical control in correlational studies: 10 essential recommendations for organisational researchers", *Journal of Organisational Behavior*, Vol. 37 No. 2, pp.157-167. DOI: 10.1002/job.2053

Bell, B.S. and Kozlowski, S.W. (2002), "A typology of virtual teams: implications for effective leadership", *Group & Organisation Management*, Vol. 27 No. 1, pp.14-49.

Bell, S.T., Fisher, D.M., Brown, S.G. and Mann, K.E. (2016), "An approach for conducting actionable research with extreme teams", *Journal of Management*, Vol. 44 No. 7, pp.2740-2765. DOI: 10.1177/0149206316653805

Biemann, T. and Kearney, E. (2010), "Size does matter: how varying group sizes in a sample affect the most common measures of group diversity", *Organisational Research Methods.* Vol. 13 No. 3, pp.582-599. DOI: 10.1177/1094428109338875

Bliese, P.D. (2000), "Within-group agreement, non-independence, and reliability", Klein, K.J. and Kozlowski S.W.J. (Ed.s), *Multi-level theory, research and methods in organisations*, Jossey-Bass, San Francisco, CA, pp.349–381.

Bunderson, J.S. and Reagans, R.E. (2011), "Power, status, and learning in organisations", *Organisation Science*, Vol. 22 No. 5, pp.1182-1194. DOI: 10.1287/orsc.1100.0590

Bunderson, J.S. and Sutcliffe, K.M. (2003), "Management team learning orientation and business unit performance", *Journal of Applied Psychology*,Vol. 88 No.3, pp.552–560.

Burke, C.S., Salas, E., Wilson-Donnelly, K., and Priest, H. (2004), "How to turn a team of experts into an expert medical team: guidance from the aviation and military communities", *Quality and Safety in Health Care*, Vol. 13 (suppl. 1), pp.i96-i104. DOI: 10.1136/qshc.2004.009829

Chan, D. (1998), "Functional relations among constructs in the same content domain at different levels of analysis: A typology of composition models", *Journal of Applied Psychology,* Vol. 83 No. 2, pp.234–246. DOI: 10.1037//0021-9010.83.2.234

Edmondson, A.C. (1999), "Psychological safety and learning behavior in work teams", *Administrative Science Quarterly*, Vol. 44 No. 2, pp.350-383. DOI: 10.2307/2666999

Ellis, A. P. and Bell, B. S. (2005), "Capacity, collaboration, and commonality: A framework for understanding team learning", Neider, L.L. and Shriesheim, C.A. (Ed.s.), *Understanding teams: A volume in research in management*, Information Age, Greenwich, CT, pp.1–25.

Field, L. (2019), "Habermas, interests, and organisational learning: a critical perspective", *The Learning Organisation*, Vol. 26 No. 3, pp.252-263. DOI: 10.1108/TLO-04-2018-0060

Galea, S., Nandi, A. and Vlahov, D. (2005), "The epidemiology of post-traumatic stress disorder after disasters", *Epidemiologic Reviews*, Vol. 27 No. 1, pp.78-91. doi:10.1093/epirev/mxi003

Galinsky, A.D., Rucker, D.D. and Magee, J.C. (2015), "Power: past findings, present considerations, and future directions", Mikulincer, M.E., Shaver, P.R., Simpson, J.A. and Dovidio, J.F. (Ed.s), *APA Handbook of Personality and Social Psychology, Volume 3: Interpersonal Relations*, American Psychological Association, Washington, DC, pp.421-460.

Gilmore, P.W.G. (2016), "*Leading a resilient Force: insights of an Australian General*", Army Insight Paper No. 11, Army Research Centre, Canberra, Australia, available at: https://www.army.gov.au/sites/g/files/net1846/f/161107_gilmore_resilient.pdf (accessed 11 April 2020).

Goodwin, G.F., Blacksmith, N. and Coats, M.R. (2018), "The science of teams in the military: contributions from over 60 years of research", *American Psychologist*, Vol. 73, No. 4, pp.322-333. DOI: 10.1037/amp0000259

Greer, L.L., de Jong, B.A., Schouten, M.E. and Dannals, J.E. (2018), "Why and when hierarchy impacts team effectiveness: a meta-analytic integration", *Journal of Applied Psychology*, Vol. 103 No. 6, pp.591-613. DOI: 10.1037/apl0000291

Halevy, N., Chou, E.Y. and Galinsky, A.D. (2011), "A functional model of hierarchy: why, how, and when vertical differentiation enhances group performance", *Organisational Psychology Review*, Vol. 1 No. 1, pp.32-52. DOI: 10.1177/2041386610380991

Harrison, D.A. and Klein, K.J. (2007), "What's the difference? Diversity constructs as separation, variety, or disparity in organisations", *Academy of Management Review*, Vol. 32 No. 4, pp.1199-1228. DOI: 10.5465/amr.2007.26586096

Hayes, A.F. (2017), Introduction to mediation, moderation, and conditional process analysis: a regression-based approach (2nd Ed), Guilford Publications, New York, NY.

Hinsz, V. B., Tindale, R. S. and Vollrath, D. A. (1997), "The emerging conceptualisation of groups as information processors", *Psychological Bulletin*, Vol. 121 No. 1, pp.43–64. DOI: https://doi.org/10.1037/0033-2909.121.1.43

Hu, L.T. and Bentler, P. (1999), "Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives", *Structural Equation Modeling*, Vol. 6, pp.1–55. DOI: 10.1080/10705519909540118

Johns, G. (2006), "The essential impact of context on organisational behavior", *Academy of Management Review*, Vol. 31 No. 2, pp.386–408, DOI: 10.5465/amr.2006.20208687

Kozlowski, S.W.J. and Bell, B.S. (2008), "Team learning, development, and adaptation", Sessa, V.I. and London, M. (Ed.s.), *Workgroup learning*, Lawrence Erlbaum Associates, Mahwah, NJ, pp.15-44.

Neimeyer, R.A. and Stewart, A.E. (2000), "Constructivist and narrative psychotherapies", Snyder, C.R. and Ingram, R.E. (Ed.s.), *Handbook of psychological change: Psychotherapy processes & practices for the 21st century*, Wiley, New York, NY, pp.337–357.

Neter, J., Wasserman, W. and Kutner, M. (1989), *Applied Linear Regression Models*, Irwin, Homewood, Ill.

Newby, J.H., McCarroll, J.E., Ursano, R.J. and Fan, Z. (2005), "Positive and negative consequences of a military deployment", *Military Medicine*, Vol. 170 No. 10, pp.815-819.

Nietzsche, F. (1968), *"The Will to Power*, trans", Kaufmann, W. and Hollingdale, R.J.(Ed.s), Vintage, New York, NY.

Nonaka, I., Toyama, R. and Konno, N. (2000), "SECI, Ba, and leadership: a unified model of dynamic knowledge creation", *Long-range planning*, Vol. 33 No. 1, pp.5-34.

Örtenblad, A. (2002), "A Typology of the Idea of Learning Organisation", *Management Learning*. Vol. 33 No. 2, pp.213–230. DOI: 10.1177/1350507602332004

Örtenblad, A. (2017), "Editorial", *The Learning Organisation*, Vol. 24 No. 1, pp.2-12.

Örtenblad, A. (2019), *The Oxford Handbook of the Learning Organisation*, Oxford University Press, Oxford, U.K.

Pratt, M.G. (2000), "The good, the bad, and the ambivalent: managing identification among Amway distributors", *Administrative Science Quarterly*, Vol. 45 No. 3, pp.456-493. DOI: 10.2307/2667106

Preacher, K.J. and Hayes A.F. (2008), "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models", *Behavior Research Methods*, Vol. 40, pp.879-891. DOI: 10.3758/BRM.40.3.879

Rebelo, T., Lourenço, P.R. and Dimas, I.D. (2019), "The journey of team learning since "The Fifth Discipline",", *The Learning Organisation*, Vol. 27 No. 1, pp.42-53. DOI: 10.1108/TLO-10-2019-0144

Rosen, S.P. (1991), *Winning the Next War: Innovation and the Modern Military*, Cornell University Press, London, UK.

Senge, P.M. (1990), The Fifth Discipline: the Art and Practice of the Learning Organisation, Doubleday, New York, NY.

Sinha, R. and Stothard, C.F. (2020), 'Power asymmetry, egalitarianism and team learning–Part 1: conceptualising the moderating role of environmental hardship'. *The Learning Organisation*. DOI: 10.1108/TLO-01-2020-0018

Stothard, C.F. (2014), The Army learning organisation questionnaire: developing a valid and reliable measure of learning organisation characteristics (DSTO-TN-1325), Defence and Science Technology Organisation, Adelaide, Australia.

Talbot, S., Stothard, C.F., Drobnjak, M. and McDowall, D. (2014), *Learning organisations: a literature review and critique* (DSTO-TR-2823), Defence Science and Technology Organisation, Adelaide, Australia.

Tarakci, M., Greer, L. and Groenen, P.J.F. (2016), "When does power disparity help or hurt group performance?", *Journal of Applied Psychology*, Vol. 101 No. 3, pp.415-429. DOI: 10.1037/apl0000056

Tedeschi, R.G. and Calhoun, L.G. (2004a), "Posttraumatic growth: conceptual foundations and empirical evidence", *Psychological Inquiry*, Vol. 15 No. 1, pp.1-18. doi: 10.1207/s15327965pli1501_01

Tedeschi, R.G. and Calhoun, L. (2004b), "Post-traumatic growth: a new perspective on psychotraumatology", *Psychiatric Times*, Vol 21 No. 4, pp.58-60.

Van der Vegt, G.S., de Jong, S.B., Bunderson, J.S. and Mollemon, E., (2010), "Power asymmetry and learning in teams: the moderating role of performance feedback", *Organisational Science*, Vol. 21 No. 2, pp.347-361. DOI: 10.1287/orsc.1090.0452

Watkins, K.E. and Kim, K. (2017), "Current status and promising directions for research on the learning organisation", *Human Resource Development Quarterly*, Vol. 29 No. 1, pp.15-29. DOI: 10.1002/hrdq.21293

Watkins, K.E. and Marsick, V. J. (1997), *Dimensions of the Learning Organisation Questionnaire*, Partners for the Learning Organisation, Warwick, RI.

5.6 Discussion and Implications

Paper 2 and Paper 3 demonstrated that Australian Army teams could, indeed, learn. Specifically, Australian Army teams learn when more hierarchical teams deploy, and in doing so, generate a greater sense of egalitarianism and, ultimately, team learning. This study contributes to several literatures; first, the team power literature by answering the call by Greer and colleagues (Greer & Chu, 2020; van Bunderen et al., 2018) to extend our knowledge of team-level contexts which shape the effect of hierarchy on team outcomes. These papers identified a team-level context (namely, environmental hardship or deployment) which does, indeed, shift team contexts and thereby (within hierarchical teams) tips the typically negative effect of hierarchy into a positive. In doing so, I extend our knowledge of exactly when and where a rigidly hierarchical Australian Army team shifts to positive team learning.

This research has contributed to the team learning literature by identifying and testing several conceptually (and empirically) important factors which mediate against the effect of power. Namely, egalitarianism is a mediating factor that helps Army teams to learn and appears to counter the known negative effects of rank disparity; specifically, there is a strong positive relationship between team-level egalitarianism and team learning. Additionally, these papers took a specific view of team-level learning. The focus was only on the team-level constructs; thus, these papers extended the team learning literature by offering an explicitly team-level view of theory and analysis for team learning.

While these papers were not published within the military psychological literature, given the specific sample (and broader research focus of my thesis/dissertation), the research contributes to a greater understanding of the consequences of deployment. In particular, the approach took a new perspective within military psychology. Namely, I took a team-level perspective to understand how deployment can be a generative force, not only an opposing force. The results showed an interaction between enduring characteristics of Army teams (i.e., hierarchy) to generate a specific (egalitarian) team climate that supported team learning. In this, I have extended current thinking within military psychology, especially in terms of understanding the practical implications of deployment on military teams. Also, taking a team-level perspective and drawing on the emerging post-traumatic growth/adversarial growth research (Tedeschi & Calhoun 2004a; 2004b). I have identified a positive team-level effect emerging from what is typically characterised as an adverse, stressful event (i.e., deployment) (Adler et al., 1996; Forbes et al., 2018; Kahana et al., 1988).

In terms of specific mechanisms that might explain these findings, Paper 2 and 3 suggest several possible mechanisms that might occur at the individual level to produce such a change. However, the critical mechanism(s) that drive the team-level change triggered by deployment (interacting with team hierarchy) remains unclear. Nor is it clear exactly which aspects of deployment might trigger an individual or team to shift perceptions. From the Australian Army, deployment can cover many different tasks, teams, and many different contexts and environments. While the research constructed deployment in terms of environmental hardship, it remains to be seen how deployment compares in the generative effects to other possible types or classifications of environmental hardship. It is also unclear which aspects of deployment make the most impact on shifting team perceptions of power and hierarchy.

For example, these findings may be unique to the Australian Army. For example, the Australian Army explicitly values mateship (Dyrenfurth, 2016) and egalitarianism (Brown, 2013). Alternatively, these results may also reflect the collective/pro-social focus of military leadership training typically found within the Australian Army's pre-deployment and deployment training (Australian Defence Force, 2006). There is growing evidence that team-level contexts which emphasise pro-social/collective perspectives improve team performance, and importantly, team learning (Bunderson & Reagans, 2011; van Bunderen et al., 2018; Van der Vegt et al., 2010). Deployment (in the context of many, many hours of leaders' pre-deployment training focused on team functioning, support and success) does allow this positive, pro-social perspective to support team egalitarianism and, consequently, team learning within the Australian Army.

Another possible explanation for this finding points to the specific organisation context, namely, the Australian Army. The Australian Army has a specific cultural, national and historical identity (as do all national militaries). First, the Digger has been characterised as a low ranked private soldier, emerging from WW1 and, particularly, from the Australian and New Zealand Army Corps (ANZAC) defeat at Gallipoli in WW1. Traditionally a Digger is known for his[36] 'hardiness, democratic spirit, mateship and resourcefulness' together with 'dash and courage' (Glover, 2018; Hunter, 2018). The Australian Army celebrate the idea and reality of the Digger and take great pride in the term 'digger', evoking courage, hardiness, and—importantly for this argument—a sense of democratic spirit (or egalitarianism). Brown (2013) argues that the Australian Army's valorisation of the Digger and egalitarianism goes too far (to determine the officers' ability to maintain discipline).

[36] I use the term 'him' to show that the Digger is eulogised/mythologised only as a man or male. The term and the mythology of the Australian Digger is deeply gendered. Over 100 years later, there is much research focusing on understanding the role of hypermasculinity and hegemonic masculinity within the Australian Army (Carter, 2021; Jericho, 2015).

While I do not necessarily support Brown's (2013) conclusion, nevertheless, he has argued for the importance of egalitarianism within the Australian Army, and in particular, by officers.

Similarly, mateship is traditionally promoted within the Australian Army (Glover, 2018; Hunter, 2018). Mateship, in this sense, includes friendship and unconditional support (and has typically been constructed as an essential part of team morale, in Army thinking). However, there is a subtle nuance of mateship that may not be obvious to outside observers. Mateship also has a staunchly egalitarian connotation; claiming 'mateship' imbues a sense of equality regardless of formal rank (Dyrenfurth, 2016). Even today, the Australian Army continues to proudly reference the ANZAC spirit embodied by the Australian Digger. Both are underpinned by a sense of egalitarianism or democratic spirit (together with courage, hardiness/resilience, mateship and resourcefulness).

It remains to be seen what effect the national culture or organisational culture might have on these results; only a cross-cultural comparison of these phenomena would shed light on understanding the nested nature of organisations (such as the Army) within nations (such as Australia). While, understandably, there are complexities in understanding how the broader national or organisation culture might influence any specific military team, this could be investigated using cross-cultural theories and methods (which are beyond the scope of this thesis/dissertation). I would encourage such approaches within allied militaries, such as through the bilateral and multilateral agreements across UK, USA, Canada, NZ and Australia. Other nations' militaries might only evidence a shared sense of egalitarianism in environments where egalitarianism is accepted and encouraged more broadly.

5.7 Understanding individual-level egalitarianism in Australian Army teams

The research has extended our knowledge in several scholarly fields, including team learning, team power dispersion, and military thinking, and indirectly contributed to the knowledge within the organisational learning, learning organisation, and military psychology fields. However, several important questions remain. The study only focused on the team level; there was no exploration or testing of any individual-level or cross-level mechanisms that might explain these team-level results. The results do generate a range of additional questions when taking a multilevel perspective. For example, does looking 'downwards' to examine the contributing individual and cross-level mechanisms contributing to the team-level evidence? Vice versa, how might the team-level constructs influence the individual-level? Further, looking 'upwards' a level or two, the possible influence of organisational (or even national) culture on this specific team-level finding remains to be explored.

The following study (Paper 4) focuses on evaluating the contingencies which shape team learning at the individual level.

6 INDIVIDUAL FACTORS SHAPING TEAM LEARNING

'Leadership and learning are indispensable to each other.' John F. Kennedy, 1963

'Always acknowledge a fault frankly. This will throw those in authority off their guard and give you an opportunity to commit more.' Mark Twain, 1927

6.1 INTRODUCTION

Australian Army teams generate more team learning when (more) hierarchical Army teams are deployed; together, these two factors (degree of hierarchy, or spread of ranks, with the number of deployments) interact, leading to a greater sense of egalitarianism (which, in turn, lead to team learning). However, it is unclear exactly what, at the individual level, might explain the emergence of a shared sense of psychological equality[37] (and ultimately, Australian Army team learning). The study builds on the previous analyses (presented within Paper 1, Paper 2 and Paper 3) to better understand the contingencies that shape individual team learning. Specifically, Paper 4 (in this chapter) proposes and tests an individual level, multiple mediation model. First, I propose that specific leadership styles (primarily learning-oriented leadership) mediate the effect of individual rank on psychological equality, and next, that psychological equality then mediates the effect of learning-oriented leadership on team learning. Also, I simultaneously compare three types of leadership to evaluate each styles' relative impact as a mediator between rank, psychological equality and team learning; the leadership styles are learning-oriented (Edmondson, 2003; Koeslag-Kreunen et al., 2018), transformational and transactional leadership (Avolio, 1999; Bass, 1985; Bass et al., 2003; Dumdum et al., 2013; Lowe et al., 1996)).

I proposed the multiple mediation model to test several key hypotheses, and in doing so, extend our current knowledge on several fronts. Drawing on the IMO model of team functioning, I am arguing that the inputs (rank) affect the outputs (team learning) through the action of the first mediator, leadership, which generates a sense of psychological equality (the second mediator) within team members, and this, in turn, leads to improved team learning. This conceptualisation of the effect of learning-oriented leadership triggering several mediating factors that ultimately support Australian Army team learning illuminates a previously unexplored contingent relationship.

[37] First, in terms of differentiating between the team level and individual levels, when referring to the team level, I talk about (team) egalitarianism, while when focusing on the individual-level perception, I call this psychological equality

6.2 INDIVIDUAL-LEVEL CONTINGENCIES IN TEAM LEARNING: PSYCHOLOGICAL EQUALITY

My conceptualisation extends the current thinking within the team/organisational learning literature by identifying and testing a new explanatory construct (which shapes the socio-cognitive effects of power/rank in hierarchical teams, in this case, of the Australian Army teams). In doing so, I am answering the call for greater attention to be paid to how power disparity affects the team and organisational learning by Schilling and Kluge (2009) and Easterby-Smith et al. (2000).

There is much focus on psychological safety as a mediating factor (Edmondson, 1999; Edmondson & Lei, 2014). Psychological safety is a well-known and well-researched construct within the team learning literature (Edmondson, 1999; Edmondson & Lei, 2014; Nembhard & Edmondson, 2006). While psychological safety continues to offer significant explanatory power for team learning (with a growing consensus that psychological safety plays a significant role in helping teams to learn) nevertheless, there are recent calls for more attention to be paid to the contingent factors (other than psychological safety) which might shape team learning (Sanner & Bunderson, 2015). For example, a recent meta-analysis identified that psychological safety does not generate team learning in all team environments (Sanner & Bunderson, 2015). In particular, Sanner and Bunderson (2015, p.224) argued that '[research] has overlooked the critical effect the nature of the task environment has on the capacity of psychological safety to have beneficial effects'. Drawing on Sanner and Bunderson's (2015) argument, I am suggesting that psychological equality may be a contingent factor that shapes the effect of psychological safety and other team mediators.

6.3 INDIVIDUAL-LEVEL CONTINGENCIES: LEARNING-ORIENTED LEADERSHIP

Paper 1 demonstrated that learning-oriented leadership plays a significant role in mediating the effect of rank on other learning dimensions at both the individual and team levels. Next, Papers 2 and 3 provided evidence that team-level egalitarianism mediated the effect of hierarchy on team learning. This chapter's Paper 4 brings two elements (leadership and egalitarianism) together into the one mediation model at the individual level. Specifically, this study investigates the extent to which learning-oriented leadership reduces the negative effect of rank on psychological equality and, in turn, inhibits team learning. In this, I aim to evaluate the relative benefits (or costs) of three leadership styles in generating team learning (via psychological equality). This analysis contributes to our understanding of the current knowledge of leadership, and in particular, learning-oriented leadership in military teams and team learning.

6.4 STATEMENT OF AUTHORSHIP

TITLE OF PAPER: Improving team learning in military teams: learning-oriented leadership and psychological equality

PUBLICATION STATUS: Published

PUBLICATION DETAILS: Stothard, C.F., and Drobnjak, M. (2020) Improving team learning in military teams: learning-oriented leadership and psychological equality. *The Learning Organisation.* DOI: https://doi.org/10.1108/TLO-12-2019-0174

NAME OF PRINCIPAL AUTHOR (Candidate): Christina Stothard

CONTRIBUTION TO PAPER: Conducted literature review, developed the conceptual model and mediating factors, constructed measures, collected the data, performed analysis on all samples, interpreted data, evaluated model, and wrote the manuscript.

OVERALL PERCENTAGE: 95%

CERTIFICATION: This paper reports on original research I conducted during my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

SIGNATURE:

NAME OF CO-AUTHOR: Maya Drobnjak

CONTRIBUTION TO PAPER: Contributed to developing conceptual model, reviewed draft manuscript.

OVERALL PERCENTAGE: 5%

SIGNATURE: _____

Improving team learning in military teams: learning-oriented leadership and psychological equality

ABSTRACT

Approach: The study proposes and tests how leadership styles (learning-oriented, transformational, and transactional leadership), and a new construct, psychological equality, help overcome the typically negative effect of rank disparity on team learning.

Purpose: Militaries have a rigid hierarchy, and rank disparity (hierarchy) inhibits team learning. However, little (quantitative) attention has been paid to understanding the factors that might help overcome the inhibiting effect of hierarchy on military team learning. This study evaluates how learning-oriented leadership helps military teams to learn by improving a sense of psychological equality.

Findings: Learning-oriented leadership supported greater psychological equality and team learning than either transformational or transactional leadership. Additionally, psychological equality significantly improved team learning. Together, learning-oriented leadership and psychological equality were found to support team learning within hierarchical teams. The findings show that team rank disparity does not inevitably stifle team learning.

Limitations: Cross-sectional archival and self-report data limits drawing causal conclusions; further longitudinal studies should be undertaken to extend and test the proposed causal relationship modelled in this study.

Implications: Generating team learning within the military does not require dismantling traditional military command, communication, and control structures; instead, specific leadership behaviours (e.g., sharing information, coaching, and avoiding blame or shame) can support psychological equality and increased team learning within military's established command and control structures.

Value: This study answered recent calls to identify the contingencies shaping team learning; improving psychological equality enhances team learning while maintaining the benefits of a clear hierarchical structure (e.g., military command and control).

INTRODUCTION

Military teams are functional units that generate operational outcomes; military operations are dangerous environments in which failing to learn is costly (Shuffler *et al.*, 2012). Sustaining team learning has proven to be an ongoing challenge for the military (Shuffler *et al.*, 2012). One barrier to learning in the military is their 'rigid hierarchy' (Popper and Lipschitz, 2002, p. 44). Power disparity has been identified as a barrier to learning in teams and organisations (Bunderson and Reagans, 2010; Easterby-Smith *et al*., 2000; Edmondson, 1999; Schilling and Kluge, 2009). These findings have sparked calls for more attention to be paid to the contingencies that shape how hierarchies affect teams (Greer *et al*., 2018) and organisations (Easterby-Smith *et al*., 2000; Schilling and Kluge, 2009).

While there is debate about the conceptual relationship between a learning organisation and organisational learning (Örtenblad, 2017), there is also consensus that they are both multilevel phenomena (Easterby-Smith *et al*., 2000; Örtenblad, 2002; Watkins and Kim, 2017). Notably, team learning is an essential component within both constructs. The study identifies a common barrier to team learning in hierarchical organisations. It then proposes and tests the mediating effect of two individual-level factors – leadership style and psychological equality – shifting the effect of rank on team learning.

Multilevel learning: Situating individuals within team learning

Team learning is best characterised as an emergent process where individuals are elemental components (Fiol and Lyles, 1985), yet 'team learning is more than the simple sum of [individual socio-cognitive] processes' (Kostopoulos *et al*., 2013, p.1431). Specifically, socio-cognitive processes are informed by each individual's specific context (Kostopoulos *et al*., 2013). This study draws on the multilevel approach to team learning (Klien and Kozlowski, 2000; Kostopoulos *et al*., 2013), which situates individuals within their context, in this case, their team. This study argues that a salient team context is team members' relative rank within hierarchical institutions such as militaries (Gordon, 2002; Wong *et al.*, 2003).

The military has 'deeply entrenched "codes" of hierarchical differences' (Wong *et al*., 2003, p. 660). For example, team members mark their rank by insignia on uniforms. Rank is consistently reinforced (e.g., subordinates must salute higher-ranking members, unless in specific and limited contexts). These practices reflect deeply entrenched and salient power structures (Gordon, 2002). Nonetheless, while the military has a strongly hierarchical structure, the 'military is far from the monolithic society often held in stereotypes' (Wong *et al*., 2003, p. 659); there is variation across and within military teams' learning (Di Schiena *et al*., 2013). For example, there were significant differences in team learning between Australian Army units (Stothard *et al*., 2013).

The effects of rank disparity (hierarchy) on individuals

Power disparity affects an individual's socio-cognitive perceptions; high and low power team members make sense of stimuli (and their experiences) differently (Fiske and Dépret, 1996; Guinote, 2007). Subordinates make negative subjective perceptions about higher-ranking members (Posner and Snyder, 1975), while higher-ranked members stereotype subordinates as incompetent and lacking resourcefulness (Vescio *et al.*, 2003). Power differences typically generate a sense of psychological distance (Van der Vegt *et al.*, 2010); subordinate members are overly deferential to superior ranks and accept inequitable participation and access to resources (Ridgeway, 2001). Conversely, superiors tend to be suspicious of subordinates' advice and ignore their input (DeRue and Ashford, 2010).

Overall, hierarchy commonly generates psychological distance (Bunderson and Reagans, 2011) that suppresses information sharing (Edmondson, 1999), reduces helping (Greer *et al.*, 2017), and creates barriers to team learning (Van der Vegt *et al.*, 2010). However, recent work has also found positive team outcomes stemming from hierarchies (Bunderson *et al*., 2016; Halevy *et al*., 2011). Several team-level contingencies have been found that help hierarchical teams learn (e.g., collective feedback, team identification, team context (i.e., environmental hardship), Bunderson and Reagans, 2011, Stothard and Sinha, 2017).

Military team learning

A significant body of research on military teams shows that team learning improves team performance (Goodwin *et al.*, 2018; Shuffler *et al.*, 2012), with much attention paid to team information processes (Ellis and Bell, 2004; Hinsz *et al.*, 1997). However, surprisingly little research focuses on the direct effect of rank disparity on team learning within military teams. The military, recognising that rank disparity does inhibit subordinates from speaking up, initiated the After Action Review (AAR) (Popper and Lipschitz, 2002; Wong *et al.*, 2003). In an AAR, lower-ranked members 'candidly' discuss the teams' activities. The AAR only occurs at a specific time and place – the process of 'candid discussion' does not necessarily occur outside the AAR (Popper and Lipschitz, 2002). While recent studies have found that a greater sense of psychological safety[38] improves military team learning (Paananen *et al.*, 2020; Veestraeten *et al.*, 2014), a meta-analysis found that focus on psychological safety may be insufficient to generate learning in all team environments (Sanner and Bunderson, 2015). There are few, if any, quantitative studies that evaluate factors that mediate the effects of rank on team learning in the military.

[38] Psychological equality is conceptually distinct from (albeit somewhat similar to) psychological safety (Edmondson, 1999). For example, we can feel valued and comfortable without feeling a sense of equality (although we might feel more comfortable once we feel equal).

There is consensus that leadership influences team performance and, specifically, person-oriented leadership improves team learning (Burke *et al*., 2006; Goodwin *et al.,* 2018; Koeslag-Kreunen *et al.,* 2018; Lowe *et al.,* 1996; Wong *et al*., 2003). There is some evidence that learning-oriented leadership (such as coaching) improves military team learning (Stothard *et al.,* 2013; Paananen *et al*., 2020). Paananen *et al*. (2020, p. 13) argued that, in the absence of learning-oriented leadership in military teams, personnel 'may not present their ideas or discuss problems' because of the 'risk' of 'hierarchy'. Similarly, Stothard *et al.* (2013) found that learning-oriented leadership was correlated with team learning (and other dimensions of a learning organisation) and that greater levels of learning-oriented leadership were related to increased team learning in the Australian Army.

Leadership for team learning

Leadership has been a primary focus within the study of teams, including military teams, and typically findings show that person-focused leadership helps with a team and task performance (Burke *et al*., 2006; Goodwin *et al.,* 2018; Koeslag-Kreunen *et al.,* 2018; Lowe *et al.,* 1996; Wong *et al*., 2003). Nevertheless, there has been little attention paid to understanding the leadership styles, which effectively reduce the adverse effects of rank disparity on team learning.

Learning-oriented Leadership (L.L.) Style. Characterised by leaders actively coaching and supporting their own and their subordinates' learning (Watkins and Marsick, 1997), this leadership style is linked to a higher rank and higher organisational learning characteristics in the military (including team learning) (Di Schiena *et al*., 2013; Stothard *et al.,* 2013). Reviews and meta-analytic studies have consistently found that more learning-focused leadership promotes a range of positive team outcomes, including team learning (Burke *et al*., 2006; Chen *et al.,* 2007; Koeslag-Kreunen *et al.,* 2018; Lowe *et al.,* 1996).

Transformational leadership (T_FORM) Transformational leadership includes charismatic, inspirational, and intellectually stimulating practices (Bass, 1985; Bass *et al*., 2003). Recent meta-analyses have found that transformational leadership promotes team performance and has a consistently positive effect on person and team outcomes (Dumdum *et al.,* 2013; Wang *et al*., 2011; Wong *et al.,* 2003).

Transactional leadership (T_ACT) A transactional leader is characterised as one who has a 'preference for risk avoidance, pays attention to time constraints and efficiency, and generally prefers process over substance as a means for maintaining contro' (Lowe *et al.,* 1996; p. 387). T_ACT is characterised as an authoritarian, directive approach (Burke *et al*. 2006; Lowe *et al*., 1996), which may produce a greater sense of psychological distance.

Psychological equality

'Egalitarianism' refers to a sense of psychological equality within organisations and nations (Hofstede, 1984; Swaab and Galinsky, 2015). Accordingly, psychological equality is defined as team members' shared belief that they are considered equal regardless of rank (Sinha and Stothard, 2020; Stothard and Sinha, 2017). In this sense, psychological equality is expected to improve team learning by reducing the psychological distance generated by rank disparity (Sinha and Stothard, 2020; Stothard and Sinha, 2017).

Conceptual model and hypotheses

The study proposes and evaluates a conceptual model that aims to account for individual rank on team learning within hierarchical teams by a key mediating factor – leadership style (see Fig 1). The model draws on Guinote's (2007) theory situated focus of power and team information-processing theory (Ellis and Bell, 2005; Hinsz et al., 1997) to postulate that a shared sense of equality will enable individual openness to team learning, a factor hypothesised to be necessary for hierarchical team learning. We propose that: (i) psychological equality supports team learning, and (ii) higher ranks will have a greater sense of psychological equality and team learning, and conversely, lower ranks will have reduced psychological equality and team learning. We posit that (iii) leadership style will reduce the effects of rank on psychological equality and team learning. Finally, (iv) that learning-oriented leadership will positively affect psychological equality and team learning rather than transformation or transactional leadership. This study answers the calls for more research on how power affects team (and organisational) learning (Easterby-Smith *et al.*, 2000; Greer *et al.*, 2018; Watkins and Kim, 2018).

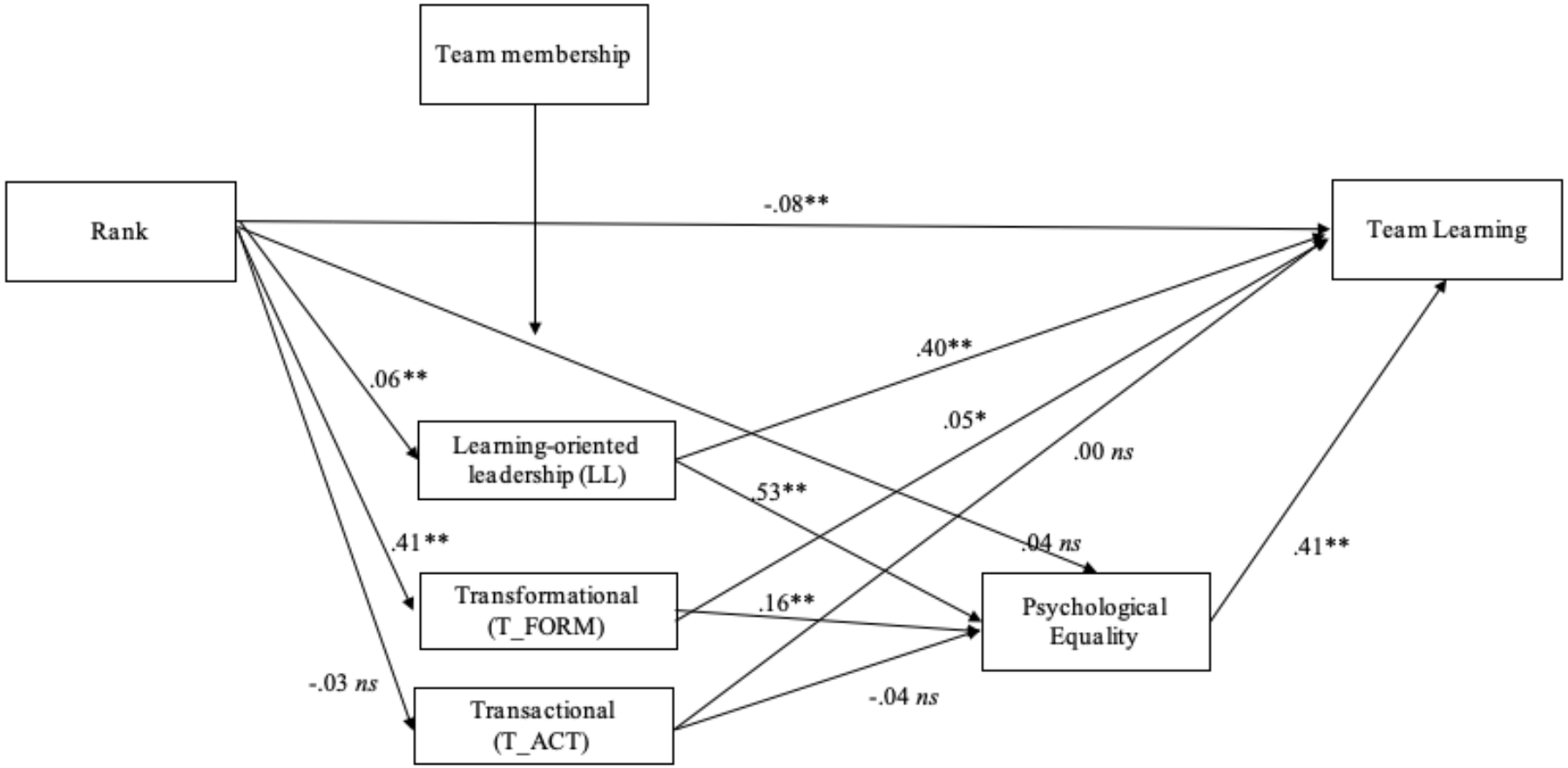

Figure 1: Mediated model of team learning: Effect of leadership styles and psychological equality, for rank on team learning.

* p<.05; ** p<.01; regression coefficients reported (Note: the moderating effect of team membership on psychological equality does not have a regression coefficient; for the interaction effect, see Table 6).

-

Direct effects

Hypothesis 1A (H1A): Higher ranks will have more positive ratings of all leadership styles.

Hypothesis 1B (H1B): Higher ranks will have a more positive sense of psychological equality.

Hypothesis 1C (H1C): Higher ranks will have a more positive rating of team learning.

Primary mediators

Hypothesis 2A (H2A): Greater levels of L.L. and T_FORM will have a positive effect on psychological equality.

Hypothesis 2B (H2B): Greater levels of T_ACT will hurt psychological equality.

Hypothesis 2C (H2C): Greater levels of L.L. and T_FORM will have a positive effect on team learning.

Hypothesis 2D (H2D): Greater levels of T_ACT will hurt team learning.

Secondary mediator

Hypothesis 3 (H3): An increased sense of psychological equality will positively affect team learning.

Mediation

Hypothesis 4 (H4): L.L. and T_FORM will mediate between rank and psychological equality.

Hypothesis 5 (H5): Psychological equality will mediate between L.L. and T_FORM and team learning.

Moderator

Hypothesis 6 (H6): Team membership will shift the direct effect of rank on psychological equality.

METHOD

Procedure

An archival data set was used, one collected as part of a more extensive research program into organisational learning in the Australian Army conducted by the authors (Stothard, 2014). The archival data was selected because it provides a representative dataset of Army personnel that focuses

on the target variables: leadership, team learning and psychological equality. The original data had been collected using a stratified sampling strategy to gather a representative sample of teams within the Australian Army. Army units were stratified by geography and function. Units (teams) were selected from each stratum to cover the range of geographic and functional teams within the Army and were approached to take part. All team members in selected teams were approached to complete the questionnaire. Operational support, administrative, combat, and medical teams were included. The data collection took place from 2007 to 2011, and the questionnaires were administered by civilians either in-person, using paper and pen, or online.

Sample

A total of 3666 respondents, nested in 92 teams, participated in the survey conducted from 2007 to 2011 (Stothard, 2014). The sample consisted of 91% males, of which 39.4% were between 18 and 25 years, 31.9% between 26 and 35 years, 19.1% between 46 and 55 years, and 1.4% were 56 years or over.

Analytic procedure. This study tested a mediation model (Hayes, 2018) and followed Aiken and West's (1991) recommendations to standardise independent variables before regressing. The direct and indirect effects of leadership styles (indirect through psychological equality) on team learning were tested using SPSS PROCESS macro. A univariate general linear model was used to test team membership. The unit of analysis was the individual and used referent-shift as a mechanism for evaluating the individual's perceptions of their team culture, climate, and behaviours (Chan, 1998).

Multifactor Leadership Questionnaire (MLQ). Transformational, transactional, and laissez-faire leadership styles were measured using the well-studied Multifactor Leadership Questionnaire (MLQ, Avolio, 1999). The MLQ, a three-factor model, was used (Avolio, 1999) to measure transformational, transactional, and laissez-faire leadership styles[39].

Transformational leadership style (T_FORM). T_FORM was made up of the following dimensions: intellectual stimulation, individual consideration, idealised influence (and behaviour), and inspirational motivation ($\alpha = 0.95$).

Transactional leadership style (T_ACT). The T_ACT was made up of contingent reward and active management by exception ($\alpha = 0.71$).

Measures

[39] Laissez-faire (L.F.) was measured. However, it was non-significant in any analyses, so it was omitted from the discussion.

Individual rank. An individual's substantive formal rank was operationalised as their hierarchical position (Klien and Kozlowski, 2000).

Psychological equality. Psychological equality is the extent to which team members see themselves and others as psychologically equal and feel respected for their roles, regardless of formal rank. It was measured using three team-referent shift items (Chan, 1998) and adapted from Watkins and Marsick (1997). The items were: 'We treat team members as equals regardless of rank, culture, or other differences,' 'We treat each other with respect,' and 'We are encouraged to ask questions regardless of rank' ($\alpha = .70$). All items were rated on the Likert scale from 1 (strongly disagree) to 6 (strongly agree).

Learning-oriented leadership (L.L.). L.L. was measured using individual-level referent-shift items adapted from Watkins and Marsick (1997). The three items included: in our team 'Supervisors share information quickly and easily,' 'Supervisors mentor and coach those they lead,' and 'Supervisors continually look for opportunities to learn' ($\alpha = .86$). All items were answered on a Likert scale from 1 (strongly disagree) to 6 (strongly agree).

Team learning. Team learning was measured using referent-shift items adapted from Watkins and Marsick (1997) and Goh and Richards (2000). The four items included: 'In our team, we openly discuss mistakes to learn from them,' 'In our workgroup, failures are discussed constructively,' 'Our workgroup/team makes lessons learned available to all its people,' and 'We view problems in our team as an opportunity to learn' ($\alpha = .74$). All items were answered on a Likert scale from 1 (strongly disagree) to 6 (strongly agree).

Team membership. Team membership was an objective, categorical variable (Klien and Kozlowski, 2000). Respondents' teams were at the 'battalion' level or equivalent[40] (Wong *et al*., 2003).

Control variables. Theory development studies increasingly limit control variables (Carlson and Wu, 2012), so only theoretically justified controls were included. Controls included age, gender, tenure (years in Defence), and the number of operational deployments.

RESULTS

Confirmatory factor analysis (CFA). Given that the three measures (psychological equality, L.L., and T.L.) were constructed from multiple sources, and psychological equality is a new construct (Watkins and Marsick, 1997; Goh and Richard, 2000), the discriminant validity of the three variables

[40] While the military has a nested team structure, the battalion level is where there are significant differences between battalions and similarities within each (compared to other levels) (Wong *et al.*, 2003).

was examined using CFA. Two models were compared: a three-factor model (λ^2= 373.2, DF =32) and a single-factor model (λ^2= 3412.34, DF=36). The overall fit of the three-factor model (CFI>.97; RMSEA≤ .05; AGFI>.95) was satisfactory, based on recommended fit indices (Hu and Bentler, 1999; Kline, 2005). The λ^2 difference test showed that the hypothesised three-factor model fit significantly better than the alternate model (λ^2 difference = 3039.05, *df* (4), $p < .001$). The measurement model's CFA supports the discriminant validity of the three measures: L.L., psychological equality, and team learning were three different constructs (Kline, 2005).

Correlation analysis. A zero-control correlation was conducted to examine the direct relationships between the independent variable (rank), the mediators (LL, T_FORM, T_ACT, and psychological equality) and the dependent variable (team learning) (Table 1). Examining the direct effect hypotheses, H1A had mixed support. Rank was significantly, although weakly, correlated with LL ($r = .09$, $p < .01$), and correlated moderately with T_FORM ($r = .23$, $p < .01$) however not with T_ACT ($r = -.02$, ns). H1B was supported: rank was significantly and moderately correlated to psychological equality ($r = .16$, $p < .01$), and H1C was supported with rank significantly, albeit weakly, correlated to team learning ($r = .04$, $p < .01$).

Mediation analysis. Hierarchical regressions were conducted to test for all H2s, H3, and H4 (see Table 2). Aiken and West (1991) recommended that the predictor, control, mediator, and moderator variables were standardised before the regression analysis. To test for mediation, three regression equations needed to be estimated to satisfy the conditions for mediation, following Baron and Kenny's (1986) procedure.

The results (see Table 2) supported H2A: LL ($B = 0.53$, $p < .01$) and T_FORM ($B = .16$, $p < .01$) significantly predicted psychological equality. H2B was supported: T_ACT had a significant negative effect on psychological equality ($B = -.08$, $p < .01$). The effect of leadership styles and psychological equality on team learning supported H2C (see Table 2). T_FORM had a small and significant effect on team learning ($B = .05$, $p < .05$), while LL had a moderately strong effect ($B = .40$, $p < .01$). H2D was not supported: T_ACT had no significant effects on team learning ($B = .00$, ns) after Step 5 (when LL was introduced).

The results supported H3 (see Table 2): psychological equality was found to be a significant predictor of team learning ($B = .41$, $p < .01$). Building on the previous hypotheses, the mediation hypotheses (H4 and H5) were supported. The first mediators, LL and T_FORM, fully mediated the effect of rank on psychological equality, thus supporting H4. The second mediator, psychological equality, partially mediated the effect of leadership styles (L.L. and T_FORM) on team learning, supporting H5.

Table 1: Means, SD, Correlations and reliability*

				Correlation coefficients									
	Variables	Mean	SD	1	2	3	4	5	6	7	8	9	10
1	Rank**	4.10	2.17	-									
2	Team learning	3.58	0.97	.04	(.74)								
3	Psychological equality (PE)	3.50	0.98	.16	.68	(.70)							
4	Learning-oriented leadership (L.L.)	3.35	1.01	.09	.69	.61	(.86)						
5	Transformational (T_FORM)	17.16	4.03	.23	.44	.42	.53	(.95)					
6	Transactional (T_ACT)	8.68	1.17	-.02	.17	.15	.21	.48	(.71)				
7	Laissez-faire (L.F.)	1.95	0.92	.19	-.29	-.28	-.34	-.62	.15	(.88)			
8	Age^	2.49	1.05	.48	.08	.14	.09	.16	.05	.18	-		
9	Gender^^	1.10	0.31	.09	-.01	.00	.02	.03	-.03	.07	.00	-	
10	Years in military^^^	3.24	1.89	.57	.00	.11	.04	.11	.08	.15	.66	.03	-
11	Deployments	1.85	0.91	.06	.07	.11	.03	.05	-.03	-.03	.12	-.10	.15

*Team unit membership is not included because it is a categorical variable and therefore not suitable for correlation analysis.

** Rank; categorised from 1= private soldier to 9= general.

^ Age: categorised 1= 18 to 25 years; 2=25 to 34 years; 3=35 to 44 years; 4=45 to 54 years; 5 = 55 or over.

^^ Gender: males =1; females = 2

^^^ Years in Defence: categorised 1= 1 to 4 years; 2= 5 to 8 years; 3=9 to 12 years; 4= 13 to 20 years; 5= 16 and over

Correlations: all correlation coefficients > = .03, $p > 0.01$. Reliabilities (Cronbach's alpha) on diagonal in italics, $N = 2650$;

Table 2: Hierarchical linear regression: psychological equality and team learning

		DV: Psychological equality (P.E.)								DV: Team learning (T.L.)									
	Variable	B	p	B	p	B	p	B	p	B	p	B	p	B	P	B	p	B	p
Step 1	Constant	3.47	**	3.27	**	3.51	**	1.17	**	3.59	**	3.59	**	3.58	**	1.48	**	.78	**
Controls	Age^	.12	**	.10	**	.06	*	.04		.13	**	.13	**	.08	*	.06		.04	*
	Years in Defence^^	.01		-.04		.00		.00		-.09	**	-.09	**	-.06	**	-.05	*	-.05	*
	Gender ^^^	.03		.00		-.02		-.01		.00		.00		-.01		-.01		.00	
	Number of Deployments	.09	**	.09	**	.07	**	.07	**	.07	**	.07	**	.07	**	.05	*	.02	
Step 2																			
IV	Rank[C]			.05	**	.01		.04				.01		-.09	**	-.07	**	-.08	**
Step 3																			
Mediator 1A	T_FORM					.47	**	.16	**					.49	**	.12	**	.05	*
	T_ACT					-.08	**	-.04						-.07	*	-.02		.00	
	L.F.					.05		.04						.01		.00		-.02	
Step 4																			
Mediator 1B	L.L.							.53	**							.62	**	.40	**
Step 5																			
Mediator 2	Psychological equality																	.41	**
	Adjusted R^2	.03	**	.07	**	.26	**	.81	**	.13	**	.13		.21	**	.50	**	.61	**

[C] Rank; categorised from 1= private soldier to 9= general.
^ Age: categorised 1= 18 to 25 years; 2=25 to 34 years; 3=35 to 44 years; 4=45 to 54 years; 5 = 55 or over.
^^ Gender: males =1; females = 2
^^^ Years in Defence: categorised 1= 1 to 4 years; 2= 5 to 8 years; 3=9 to 12 years; 4= 13 to 20 years; 5= 16 and over
The Variance Inflation Factors (VIFs) were calculated and ranged from 1.01 to 4.20, well within the recommended threshold of 10.
* $p < .05$; ** $p < .01$, $N = 265$

Moderation analysis.

A univariate general linear model (GLM) tested team membership's moderating effect on psychological equality (testing H6). Specifically, the GLM tested if there was an interaction (team membership x rank) while controlling for the direct effect of both rank and team membership. Team membership significantly interacted with rank to predict psychological equality, which supported H6 ($F(1,454)=1.25$, $p < .01$). Following recommended practice (Hayes, 2018), the significance of the direct effects of team membership ($F(1,141)=1.51$, $p < .01$) and rank ($F(1,9)=4.13$, $p <.01$) should be interpreted with caution due to the presence of the significant interaction effect. This interaction demonstrates that rank affects psychological equality as a function of team membership and indicates significant team-level effects for hierarchy.

These results, overall, supported the proposed multiple mediation model (see Fig. 1). Psychological equality showed a partial mediating effect of L.L. and T_FORM on team learning, and team membership shifted the rank-psychological equality effects (possibly due to different leader's leadership styles). Overall, the results show that the identified barriers to team and organisational learning, namely power and rank disparity, can be overcome with learning-oriented leadership, which helps imbue team members with a shared sense of psychological equality and, in doing so, supports team learning.

DISCUSSION

The study proposed and tested a conceptual model that evaluated the effects of two mediators (leadership and psychological equality) on the typically negative effect of rank disparity on team learning. Overall, the analyses showed that when team members primarily experienced learning-oriented leadership, they also perceived a greater sense of psychological equality, which improved team learning. Specifically, this shows that even in 'rigidly hierarchical' military teams (Popper and Lipschitz, 2002), team learning can be generated using a specific leadership style. The study showed that hierarchical teams could learn with the right leadership style and that rank disparity does not inevitably lead to poorer organisational learning outcomes. Instead, even in the presence of deeply entrenched hierarchical differences, the military (and other hierarchical teams such as surgical teams) can keep the benefits of a clear command and control structure (e.g., improved coordination and communication, Halevy *et al.*, 2011) *and* improve their team learning. This study answers the calls for more attention to be paid to the contingencies which shape the effect of power and rank differences (hierarchy) in team power and organisational learning literature (Greer *et al.*, 2018; Schilling and Kluge, 2009).

This study examined the effectiveness of three different leadership styles within one analysis. This study found that L.L. had a positive effect on team learning, even in the presence of transformational leadership. This result offers a new perspective, above and beyond transformational and transactional leadership (Koeslag-Kreunen *et al.*, 2017). While many studies have examined transformational and transactional leadership in the military (Wong et al., 2003), few have examined learning-oriented leadership (Paananen *et al.*, 2020; Stothard *et al.*, 2013). Generally, transactional leadership has hindered team learning (Burke *et al.*, 2006). Similarly, the results showed that transactional leadership negatively affected psychological equality and team learning before L.L. was introduced into the model. The results indicate that L.L. reduced the negative impact of authoritarian, psychologically distancing effects of task-oriented leadership style on team learning (Burke *et al*., 2006).

The positive effects of L.L. on team learning may be generated by two possible mechanisms: (i) removing adverse effects of task-oriented leadership or (ii) improving psychological equality. From this study, it is not possible to determine which might be a more important mechanism. It remains to be seen which way causality might flow; this is an avenue that future researchers and practitioners might explore. This study also offers more precise guidance to practitioners who want to improve team learning in a hierarchical team, beyond the more nebulous actions implied by transformational leadership (Van Knippenberg and Sitkin, 2013).

The findings showed that team membership significantly predicts an individual's perceptions of a sense of psychological equality. However, there was also a significant interaction effect between team membership and rank on psychological equality. Finally, the findings shed light on critical but rarely directly studied phenomena of when hierarchical teams learn. Practically, training leaders to practice learning-oriented leadership (by asking questions, listening, taking a mentoring and coaching approach, avoiding blame or shame) is an antecedent for overcoming rank disparity's psychological effects. Specifically, military team members can and do learn when they share a sense of psychological equality, even in the presence of 'deeply entrenched "codes" of hierarchical differences' (Wong *et al*., 2003, p. 660).

LIMITATIONS

This study is not without limitations. First, the use of a military sample may limit the generalisation of the findings. This study drew across all types of teams (including operational, tactical, strategic, non-operational, support, and administrative teams). While the military is similar to other organisations in relying on hierarchical teams, one could argue that hierarchy and rank is heightened in the military, making this setting unusual (Popper and Lipschitz, 2002).

This study was a cross-sectional archival study; therefore, it cannot establish a time-dependent, causal relationship between rank, leadership styles, psychological equality, or team learning. Also, the study used self-report measures drawn from an archival dataset. While ideal for reducing respondent burden, the use of archival data limits the selection and design of target constructs. For example, future investigations could include individual-level and team-level factors that might affect perceptions of psychological equality and team learning (e.g., Big Five personality factors or teams as information processors) and specific dyadic-level information (e.g., applying leader-member exchange theory to learning-oriented leadership). Future studies would ideally examine the causal links between the independent variable, rank, mediators, leadership style, and psychological equality on team learning. Future studies would also use direct measures or observational studies (to avoid self-report or common method bias concerns).

Similarly, this study was focused on the individual-level perceptions of teams. Therefore, caution needs to be taken not to assume isomorphism (i.e., where an individual-level construct is assumed to have similar properties or relationships as a team-level version of the construct) (Klien and Kozlowski, 2000). For example, there is an argument that individual-level leadership is 'manifestly different' from team-level leadership (Chen *et al.*, 2007).

CONCLUSION

The challenge of generating team learning for busy, high tempo military professionals, already burdened by the heavy demands of their 'real jobs', should not be underestimated. Competing demands would surely relegate team learning effort to the background unless team processes ignited a counter-response. Nevertheless, improvement efforts need not be delayed until tempo decreases; instead, specific leadership styles can create team processes that cultivate team learning as part of business-as-usual operations.

Hierarchy has been characterised as typically (but not inevitably) inhibiting team and organisational learning (Schilling and Kluge, 2009; Sinha and Stothard, 2020). There are calls to investigate the contingencies that influence how hierarchy affects teams (Greer *et al.*, 2018) and organisations (Schilling and Kluge, 2009). This study answers these calls by demonstrating that it is practical and possible to enhance team learning while maintaining the benefits of a clear hierarchical structure (e.g., military command and control).

Specifically, learning-oriented leadership instils a sense of psychological equality[41]which supports team learning in teams with 'deeply entrenched "codes" of hierarchical differences' (Wong

[41]. The sense of psychological equality may be analogous to the environment within an After Action Review, where team hierarchy is explicitly set aside (Popper and Lipschitz, 2002),

et al., 2003, p. 660). As such, we have developed a more nuanced understanding of what it means to be a military learning organisation, where learning-oriented leadership and psychological equality are needed elements for military teams to learn. This study offers a new explanatory mechanism (psychological equality) for why military teams may have struggled to sustain team learning, and – in doing so – has answered calls for more attention to be paid to understanding how power disparity affects teams (military teams in particular) (Greer *et al*., 2018; Shuffler *et al*., 2018).

REFERENCES

Aiken, L.S. and West, S.G. (1991), Multiple Regression: Testing and Interpreting Interactions, Sage, London, UK.

Avolio, B.J. (1999), Full Leadership Development: Building the Vital Forces in Organisations, Sage, Thousand Oaks, CA.

Baron, R.M. and Kenny, D.A. (1986), "The moderator-mediator variable distinction in social psychological research: conceptual, strategic and statistical considerations", *Journal of Personality and Social Psychology*, Vol. 51 No. 6, pp. 1173-1182.

Bass, B.M. (1985), *Leadership and Performance Beyond Expectations*, Free Press, New York, NY.

Bass, B.M., Avolio, B.J., Jung, D.I. and Berson, Y. (2003), "Predicting unit performance by assessing transformational and transactional leadership", *Journal of Applied Psychology*, Vol. 88 No. 2, pp. 207-218. DOI: 10.1037/0021-9010.88.2.207

Bunderson, J.S. and Reagans, R.E. (2011), "Power, status, and learning in organisations", *Organisation Science*, Vol. 22 No. 5, pp. 1182-1194. DOI: 10.1287/orsc.1100.0590

Bunderson, J.S., Van Der Vegt, G.S., Cantimur, Y. and Rink, F. (2016), "Different views of hierarchy and why they matter: hierarchy as inequality or as cascading influence", *Academy of Management Journal*, Vol. 59 No. 4, pp. 1265-1289. DOI: 10.5465/amj.2014.0601

Burke, C.S., Stagl, K.C., Klein, C., Goodwin, G.F., Salas, E. and Halpin, S.M. (2006), "What type of leadership behaviors are functional in teams? A meta-analysis", *The Leadership Quarterly*, Vol. 17 No. 3, pp. 288-307. DOI: 10.1016/j.leaqua.2006.02.007

Carlson, K.D. and Wu, J. (2012), "The illusion of statistical control: control variable practice in management research", *Organisational Research Methods*, Vol. 15 No. 3, pp. 413-435. DOI: 0.1177/1094428111428817

Chan, D. (1998), "Functional relations among constructs in the same content domain at different levels of analysis: a typology of composition models", *Journal of Applied Psychology,* Vol. 83 No. 2, pp.234-24. DOI: 10.1037//0021-9010.83.2.234

Chen, G., Kirkman, B., Kanfer, R., Allen, D. and Rosen, B. (2007), "A multilevel study of leadership, empowerment, and performance in teams", *Journal of Applied Psychology,* Vol. 92 No. 2, pp. 331-46. DOI: 10.1037/0021-9010.92.2.331

Di Schiena, R., Letens, G., Van Aken, E. and Farris, J. (2013), "Relationship between leadership and characteristics of learning organisations in deployed military units: an exploratory study", *Administrative Sciences,* Vol. 3 No. 3, pp. 143-165. DOI: 10.3390/admsci3030143

deRue, D.S. and Ashford, S.J. (2010), "Who will lead and who will follow? A social process of leadership identity construction in organisations", *Academy of Management Review*, Vol. 35 No. 4, pp. 627-647. DOI: 10.5465/amr.35.4.zok627

Dumdum, U.R., Lowe, K.B. and Avolio, B.J. (2002), "A meta-analysis of transformational and transactional leadership correlates of effectiveness and satisfaction: an update and extension", Avolio, B.J. and Yammarino, F.J. (Ed.s.), *Transformational and Charismatic Leadership: The Road Ahead*, Elsevier Science, Oxford, U.K., pp. 35-66.

Edmondson, A. (1999), "Psychological safety and learning behavior in work teams", *Administrative Science Quarterly*, Vol. 44 No. 2, pp. 350-383. stable URL: http://www.jstor.org/stable/2666999

Easterby-Smith, M., Crossan, M. and Nicolini, D. (2000), "Organisational learning: debates past, present and future", *Journal of Management Studies,* Vol. 37 No. 6, pp. 783-796. DOI: https://doi.org/10.1111/1467-6486.00203

Ellis, A.P. and Bell, B.S. (2005), "Capacity, collaboration, and commonality: a framework for understanding team learning", Neider, L.L. and Shriesheim, C.A. (Ed.s.), *Understanding Teams: A Volume in Research in Management*, Information Age, Greenwich, CT, pp. 1-25.

Fiske, S.T. and Dépret, E. (1996), "Control, interdependence and power: understanding social cognition in its social context", *European Review of Social Psychology*, Vol. 7 No. 1, pp. 31-61. DOI: 10.1080/14792779443000094

Goh, S. and Richards, G. (1997), "Benchmarking the learning capability of organisations", *European Management Journal*, Vol. 15 No. 5, pp. 575-583. DOI: 10.1016/S0263-2373(97)00036-4

Goodwin, G.F., Blacksmith, N. and Coats, M.R. (2018), “The science of teams in the military: contributions from over 60 years of research”, *American Psychologist,* Vol. 73 No. 4, pp. 322-333. DOI: 10.1037/amp0000259

Gordon, R.D. (2002), "Conceptualising leadership with respect to its historical – contextual antecedents to power", *Leadership Quarterly*, Vol. 13 No. 2, pp. 151-167.

Greer, L.L., Bunderen, L.V. and Yu, S. (2017), “The dysfunctions of power in teams: a review and emergent conflict perspective”, *Research in Organisational Behavior*, Vol. 37, pp. 103-124. DOI: 10.1016/j.riob.2017.10.005

Greer, L.L., de Jong, B.A., Schouten, M.E. and Dannals, J.E. (2018), “Why and when hierarchy impacts team effectiveness: a meta-analytic integration”, *Journal of Applied Psychology*, Vol. 103 No. 6, pp.591-613. DOI: 10.1037/apl0000291

Guinote, A. (2007), “Behaviour variability and the situated focus theory of power”, *European Review of Social Psychology*, Vol. 18 No. 1, pp. 256-295. DOI: 0.1080/10463280701692813

Halevy, N., Chou, E.Y. and Galinsky, A.D. (2011), “A functional model of hierarchy: why, how, and when vertical differentiation enhances group performance”, *Organisational Psychology Review*, Vol. 1 No. 1, pp. 32-52. DOI: 10.1177/2041386610380991

Hayes, A.F. (2015), “An index and test of linear moderated mediation”, *Multivariate Behavioral Research*, Vol. 50 No.1, pp. 1-22. DOI: 10.1080/00273171.2014.962683

Hofstede, G. (1984), Culture’s Consequences: International Differences in Work-related Values, Sage Publications, London, UK.

Hu, L.T. and Bentler, P. (1999), “Cutoff criteria for fit indices in covariance structure analysis: conventional criteria versus new alternatives”, *Structural Equation Modeling*, Vol. 6 No. 1, pp. 1-55. DOI: 10.1080/10705519909540118

Kline, R.B. (2005), Principles and Practices of Structural Equation Modelling, Guilford Press, New York, NY.

Klien, R.B. and Kozlowski, S.W. (2000), *Multilevel Theory Research and Methods in Organisations*, Jossey-Bass, San Francisco, CA.

Koeslag-Kreunen, M., Van den Bossche, P., Hoven, M., Van der Klink, M. and Gijselaers, W. (2018), “When leadership powers team learning: a meta-analysis”, *Small Group Research*, Vol. 49 No. 4, pp. 475-513. doi: https://doi.org/10.1177/1046496418764824

Kostopoulos, K.C. and Bozionelos, N. (2011), "Team exploratory and exploitative learning: psychological safety, task conflict, and team performance", *Group & Organisation Management*, Vol. 36 No. 3, pp. 385-415. DOI: 10.1177/1059601111405985

Kostopoulos, K.C., Spanos, Y.E. and Prastacos, G.P. (2013), "Structure and function of team learning emergence: a multilevel empirical validation", *Journal of Management*, Vol. 39 No. 6, pp. 1430-1461. DOI: 10.1177/0149206311419366

Kozlowski, S.W., Watola, D.J., Jensen, J.M., Kim, B.H. and Botero, I.C. (2009), "Developing adaptive teams: a theory of dynamic team leadership", Salas, E., Goodwin, G. and Burke, S. (Ed.s), *Team Effectiveness in Complex Organisations: Cross-disciplinary Perspectives and Approaches*, Psychology Press, New York, NY, pp. 113-156.

Lowe, K.B., Kroeck, K.G. and Sivasubramaniam, N. (1996), "Effectiveness correlates of transformational and transactional leadership: a meta-analytic review of the MLQ literature", *The Leadership Quarterly*, Vol. 7 No. 3, pp. 385-425. DOI: 10.1016/S1048-9843(96)90027-2

Marsick, V.J. and Watkins, K.E. (2003), "Demonstrating the value of an organisation's learning culture: the dimensions of the learning organisation questionnaire", *Advances in Developing Human Resources*, Vol. 5 No. 2, pp. 132-151. DOI: 10.1177/1523422303005002002

Örtenblad, A. (2002), "A typology of the idea of learning organisation", *Management Learning*, Vol. 33 No. 2, pp. 213-230. DOI: 10.1177/1350507602332004

Örtenblad, A. (2017), "Editorial", *The Learning Organisation*, Vol. 24 No. 1, pp. 2-12.

Paananen, S., Häyhä, L. and Hedlund, E. (2020), "Diversity in teams: perceptions of team learning behaviour in a military staff exercise", *Scandinavian Journal of Military Studies*, Vol. 3 No. 1, pp. 1-17. DOI: https://doi.org/10.31374/sjms.6

Popper, M. and Lipshitz, R. (2002), "Organisational learning: mechanisms, culture, and feasibility", Grey, C. and Antonacopulou, E. (Ed.s), *Essential Readings in Management Learning*, Sage Publications, London, UK, pp. 37-52.

Posner, M.I. and Snyder, C.R.R. (1975), "Facilitation and inhibition in the processing of signals", *Attention and Performance V*, pp. 669-682.

Ridgeway, C.L. (2001), "Gender, status, and leadership", *Journal of Social Issues*, Vol. 57 No. 4, pp. 637-655. DOI: 10.1111/0022-4537.00233

Ronay, R., Greenaway, K., Anicich, E.M., and Galinsky, A.D. (2012), "The path to glory is paved with hierarchy: when hierarchical differentiation increases group effectiveness", *Psychological Science*, Vol. 23 No. 6, pp. 669-677. DOI: 10.1177/0956797611433876

Sanner, B. and Bunderson, S. (2015), "When feeling safe isn't enough", *Organisational Psychology Review*, Vol. 5. No. 3, pp. 224-243. doi:10.1177/2041386614565145

Schilling, J. and Kluge, A. (2009), "Barriers to organisational learning: an integration of theory and research", *International Journal of Management Reviews*, Vol. 11 No. 3, pp. 337-360. DOI: 10.1111/j.1468-2370.2008.00242.x

Shuffler, M.L., Pavlas, D. and Salas, E. (2012), "Teams in the military: a review and emerging challenges", Laurence, J.H. and Matthews, M.D. (Ed.s), *The Oxford Handbook of Military Psychology*, Oxford University Press, New York, NY, pp.282-310.

Sinha, R. and Stothard, C.F. (2020), "Power asymmetry, egalitarianism and team learning – Part 1: conceptualising the moderating role of environmental hardship", *The Learning Organisation*. DOI: https://doi.org/10.1108/TLO-01-2020-0018.

Stothard, C.F. (2014), The Army Learning Organisation Questionnaire: Developing a valid and reliable measure of Learning Organisation characteristics (DSTO-TN-1325), Defence Science and Technology Organisation, Adelaide, South Australia.

Stothard, C., Talbot, S., Drobnjak, M. and Fischer, T. (2013), "Using the DLOQ in a military context: culture trumps strategy", *Advances in Developing Human Resources*, Vol. 15 No. 2, pp. 193-206. DOI: 10.1177/1523422313477592

Stothard, C.F. and Sinha, R. (2017), "When can hierarchy in teams help team learning? The moderating effect of a shared threat", paper presented at the 12th Industrial and Organisational Psychology Conference, Sydney, Australia, available at: https://www.psychology.org.au/for-members/publications/inpsych/2017/oct/2017-IOP-Conference (accessed 6 December 2019).

Swaab, R.I. and Galinsky, A.D. (2015), "Egalitarianism makes organisations stronger: cross-national variation in institutional and psychological equality predicts talent levels and the performance of national teams", *Organisational Behavior and Human Decision Processes*, Vol. 129, pp. 80-92. DOI: 10.1016/j.obhdp.2014.05.002

Van der Vegt, G.S., de Jong, S.B., Bunderson, J.S. and Mollemon, E. (2010), "Power asymmetry and learning in teams: the moderating role of performance feedback", *Organisational Science*, Vol. 21 No. 2, pp. 347-361. DOI: 10.1287/orsc.1090.0452

Van Knippenberg, D. and Sitkin, S.B. (2013), "A critical assessment of charismatic – transformational leadership research: back to the drawing board?", *Academy of Management Annals*, Vol. 7 No. 1, pp. 1-60. DOI: 10.1080/19416520.2013.759433

Veestraeten, M., Kyndt, E. and Dochy, F. (2014), "Investigating team learning in a military context", *Vocations and Learning*, Vol. 7 No. 1, pp. 75-100. DOI: 10.1007/s12186-013-9107

Vescio, T.K., Sechrist, G.B. and Paolucci, M.P. (2003), "Perspective taking and prejudice reduction: the mediational role of empathy arousal and situational attributions", *European Journal of Social Psychology*, Vol. 33 No. 4, pp. 455-472. DOI: 10.1002/ejsp.163

Watkins, K.E. and Kim, K. (2017), "Current status and promising directions for research on the learning organisation", *Human Resource Development Quarterly*, Vol. 29 No. 1, pp. 15-29. DOI: 10.1002/hrdq.21293

Watkins, K.E. and Marsick, V.J. (1997), *Dimensions of the Learning Organisation Questionnaire*, Partners for the Learning Organisation, Warwick, RI.

Wang, G., Oh, I.S., Courtright, S.H. and Colbert, A.E. (2011), "Transformational leadership and performance across criteria and levels: a meta-analytic review of 25 years of research", *Group & Organisation Management*, Vol. 36 No. 2, pp. 223-270. DOI: 10.1177/1059601111401017

Wong, L., Bliese, P. and McGurk, D. (2003), "Military leadership: a context-specific review", *The Leadership Quarterly*, Vol. 14 No. 6, pp. 657-692. doi:10.1016/j.leaqua.2003.08.001

6.5 Discussion and Implications

The final study demonstrated that, at the individual level, learning-oriented leadership was the primary mediator (compared to either transformational or transactional leadership styles) between rank and psychological equality. Moreover, psychological equality partially mediated the effect of learning-oriented learning on team learning. Overall, the analyses supported the proposed model, showing that learning-oriented leadership generated a greater sense of team learning both indirectly (through psychological equality) and directly, even in the presence of rank differences (and controlling for deployment). In terms of understanding the relationship between individual rank/power and team learning, the study has demonstrated that a new construct explains when Australian Army teams learn. Namely, when team members experience person-oriented leadership, they generate a sense of psychological equality within their teams. The multiple mediation model has answered the calls in the team and organisational learning literature to pay more attention to understanding the contingent factors which reduce the typical adverse effects of power on team and organisational learning (Bunderson & Reagans, 2011; Schilling & Kluge, 2009; Shuffler & Carter, 2018; Van Der Vegt & Bunderson, 2005; Van der Vegt et al., 2010).

In particular, introducing a new mediator which mediates team learning at both the team (in Paper 2 and 3, as egalitarianism) and individual level (in Paper 4, as psychological equality) offers new insights into *when, where and how* Australian Army teams moderate the typically negative effect of hierarchical differences. The construct extends our understanding of the team contexts which shape team learning, and in doing so, helps identify additional team contexts which shift the typically negative effect of power disparity (Greer & Chu, 2020; Greer et al., 2017). I argue that psychological safety and psychological equality/egalitarianism are conceptually different in this thesis[42], and in doing so, offer an additional contingent factor which is specifically focused on mitigating the known socio-cognitive effects of power disparity (Anderson & Galinsky, 2006; Dépret & Fiske, 1993; Fiske & Dépret, 1996; Guinote, 2007b, 2017). This study answers the call for greater attention to be paid to the contingencies that shape team learning beyond psychological safety, expanding our understanding of other contingencies that shape team learning (Sanner and Bunderson, 2015).

[42] However, I also suspect that these constructs are closely related empirically, if not theoretically or conceptually. For example, I can imagine a team member would feel entitled to offer an opinion or view that might be unpopular (i.e., the subordinate team member feels sufficiently respected to experience the team as psychologically safe) yet still feel psychologically distant due to real power differences within a team. Unpacking the theoretical and empirical relationship between psychological safety and equality or egalitarianism is an area which future researchers are welcome to explore.

6.6 Effect of deployment on team learning mediated by psychological equality

While deployment was not the focus in the published paper (given the broader, non-military-specific audience), it is worth examining the action of deployment within the mediation model more closely. There is consistent evidence that deployment generates negative outcomes in the military psychological literature (Brouneus, 2014; Forbes et al., 2016; Hosek et al., 2006; Nasveld et al., 2012; Wright et al., 1996). In this analysis, the mediation model treated deployment as a control. Nevertheless, the pattern of responses to deployment as the mediating factors can be examined post-hoc. Rank (B= .05, p < .01) and deployment (B = .09, p<.01) were both significantly positive predictors of psychological equality. This result indicates that both independent variables have a positive effect simultaneously. However, after Step 4 (all leadership variables entered), rank shifted to a non-significant (B = .01, *ns*) effect on psychological equality (demonstrating full mediation) (Hayes, 2017)) while deployment remained a positive predictor (B= .07, p < .01), indicating no mediating effect of leadership on the effect of deployment on psychological equality.

The effect of rank being mediated by person-oriented leadership is discussed in the paper to turn to the direct effect of deployment on psychological equality. The direct positive effect is somewhat surprising given the typically negative (individual) direct effects found when deployment is characterised as a stressor in the military psychological literature (Adler et al., 1996; Bowers et al., 1996; Driskell & Salas, 1991; Jex & Bliese, 1999; Milgram et al., 1989; Wright et al., 1996). Instead, the results indicate that deployments have a direct, positive effect on individual's perceptions of their teams by directly improving psychological equality within the Australian Army teams (over and above the effects of rank and person-oriented leadership). While this result appears to run counter to much of the conventional thinking on the effects of deployment within the military literature, on closer examination, more recent research on deployment has been found to have both positive and negative effects on the individual (Bøg et al., 2018; Newby et al., 2005). The positive relationship is similar to the more recent evidence emerging from teams in extreme contexts. In specific contingencies, teams and individuals evidence increasingly positive outcomes (Driskell et al., 2018; Klien et al., 2006; Maynard et al., 2018). This result indicates that deployment can also be a generative context for individuals and aligns with the emerging post-traumatic/adversarial growth literature (Marziliano et al., 2019; Shakespeare-Finch & Lurie-Beck, 2014). Finally, identifying a specific benefit emerging from deployment is an essential contribution to understanding the complexities of how deployment affects the Australian Army teams. The practical contribution is not to be under-estimated; without an appreciation of the positives emerging for deployment, it is possible to (inadvertently) discount the benefits when the Australian Army are planning and responding to changing operational demands.

Further, turning to examine the effect of deployment on team learning, the positive effect of deployment on team learning was fully mediated by psychological equality. In particular, the predictive effect of deployment shifted to non-significance when psychological equality was entered as a mediator at Step 5 (deployment at step 5, $B = .02$, *ns*). This result indicates that deployment does not directly improve team learning. Instead, the positive effects of deployment are mediated by an increased sense of psychological equality (and learning-oriented leadership), which then improves team learning. Overall, this study contributes to the extreme team and military literature by showing that the positive effect of deployment on team learning is mediated by a sense of psychological equality rather than a direct effect. This analysis extends the current thinking within the military literature by demonstrating that the relationship between deployment and team learning is more complex than a direct or straightforward effect. In doing so, it provides more nuanced advice for improving Australian Army team learning.

6.7 Next steps

Paper 4 showed that, at the individual level, the effect of rank on team learning was mediated by psychological equality and person-oriented leadership styles (when controlling for deployment experience). My paper results show that the overall benefits often attributed to rank may instead be better attributed to improved, more favourable climate and leadership styles. This study showed that when lower ranks experience an increase in psychological equality (through learning-oriented leadership and deployment), they also engage in higher levels of team learning.

This study brought Paper 1, 2 and 3 together and focused on the individual level to show that learning-oriented leadership (and to a lesser extent, transformational leadership) generates a greater sense of psychological equality, which then supported team learning. In doing so, I have contributed to the team and organisational learning literature (by identifying necessary contingencies which shape how rank affects team learning), and to the military psychology literature by identifying a direct, positive effect emerging from deployment as well as the mediator which explains how deployment positively affects team learning. Finally, I have contributed to the leadership literature by showing an instance where learning-oriented leadership (more so than the alternate, transformation leadership) produces team learning (via psychological equality). Together, these results provide theory-driven, evidence-based practice and recommendations for the Australian Army.

7 DISCUSSION

Finally, the re-framed research question posed at the start of chapter 4 ('What [team and individual-level] contingencies help team learning in the Australian Army?'), can be answered. I identified a significant gap in our knowledge, namely, understanding which factors help overcome the typically negative direct effect of rank disparity on team learning. There had been no direct attention paid to understanding how and when hierarchical differences within Australian Army teams inhibits team performance and team learning in particular. In response, I identified two new contingent factors (team egalitarianism and shared, environment hardships [or deployment]), which helped teams overcome the adverse effects of rank disparity/hierarchy. While necessary, other factors support team learning within hierarchical teams (see chapter 4 for a review). Nevertheless, this study helps to illuminate a previously unknown (albeit hypothesised) team context that shifts the effect of team power on team performance. In answer to the reconceptualised research question, this thesis shines a light on the understudied phenomenon (the effect of team power disparity on team learning within the Australian Army), and in doing so, extends our theoretical and empirical knowledge of how and when the effect of hierarchical differences within teams can be a positive impact.

While the research papers within this thesis contribute to the scholarly learning organisation and team learning fields, the implications of the analyses should also be communicated to military professionals and practitioners. The original aim of the AALO project was to provide the Australian Army with evidence-based recommendations to improve their team and organisational learning capabilities. The 'So what?' of my analyses needs to be communicated to those who can implement my recommendations. As such, my discussion chapter—which brings together the implications of my analyses and makes recommendations—takes the shape of a discursive paper submitted to the *Australian Army Journal*. The *Australian Army Journal* is run by the Australian Army Research Centre (2020, p.3) and aims to 'facilitate and effect collaboration between military, academic and industry partners to find answers to the new problems that now face us'. My discussion chapter (Paper 5) synthesises the results of Papers 1, 2, 3 and 4 and draws out the practical and policy implications.

7.1 STATEMENT OF AUTHORSHIP: PAPER 5

TITLE OF PAPER: Accelerating Army team learning

PUBLICATION STATUS: Submitted for Publication

PUBLICATION DETAILS: Submitted to Australian Army Journal, March 2021 and in review.

SOLE AUTHOR (Candidate): Christina Stothard

CONTRIBUTION: 100%

STATEMENT: This paper reports on original research I conducted during my Higher Degree by Research candidature and is not subject to any obligations or contractual agreements with a third party that would constrain its inclusion in this thesis. I am the primary author of this paper.

SIGNATURE:

7.2 Accelerating Army team learning

The 2020 Defence Strategic Update[43] points out that 'the drivers of change identified in the 2016 Defence White Paper … have accelerated faster than anticipated' so that Australia is now facing 'increasing[ly] strategic competition' and 'aggressive use of … tactics to coerce states' within our local region. Chief of Army's *Accelerated Warfare*[44] outlines the thinking on how the Army can respond to our increasingly competitive local region. Much attention in the Strategic Update is focused on acquiring equipment and materiel; yet as the Army well knows, acquiring equipment and materiel, while necessary, is not sufficient by itself to generate the optimal strategic or operational advantage. Instead, any technical advantage is optimised only once teams exploit the technical capability to its absolute advantage. Yet understanding *how, when* or *where* teams learn to optimise any technical advantage is less clear. This paper brings together a series of studies which illuminates specific, practical and concrete factors which help to identify when, where and how Australian Army teams learn successfully.

The uptake of new technologies by teams often appears to be taken for granted (e.g., within the White Paper 2020, only a single sentence identifies that increased workforce needs to support an intensive acquisition phase). Nevertheless, the Chief of Army, Lieutenant General Richard Burr, and Director General, Future Land Warfare, Brigadier Langford emphasise the vital role of the human (i.e., teams) in optimising any technological advantages in the Army's Accelerated Warfare concept; 'when people think about military innovation, they often think of equipment or materiel. Or, as I like to call it, "stuff". Yet innovation … in a more profound way, is to be found in [developing] methods or concepts that are new or not easily anticipated'[45]. In this sense, the Accelerated Warfare concept implicitly places team learning at the centre of the Army's ability to generate an operational force.

Anchored in Brigadier Langford's argument that '[Australian Army] … should always seek to learn… being curious and inquisitive… and not ever reach a point where we think that through technology delivery that we cannot be surprised or compromised because that will be fatal'[46], this paper argues that the Army needs to focus on team learning since such learning is known to generate a sustainable competitive advantage. I am not suggesting that technological developments are irrelevant; instead, I am arguing that team learning (as a process) is the mechanism through which the Army optimises any technical advantages. Specifically, there is consistent evidence that speeding up

[43] Defence, D. o. , 2020, 2020 Defence Strategic Update & 2020 Force Structure Plan. D. o. Defence. Canberra

[44] Chief of Army, *Army in Motion: Accelerated Warfare,* Department of Defence, Australian Army, Canberra, accelerated warfare [Accessed 01 January 2021]

[45] Ian Langford. *Accelerated Warfare*. Australian Army Research Centre [website]. 19 February 2019. Accessed: January 2020 at https://researchcentre.army.gov.au/library/seminar-series/accelerated-warfare

[46] Langford, 2019.

team learning improves many aspects of team performance[47]. This becomes especially critical when introducing new equipment or technical materiel into teams and expecting improved performance.

This paper presents the integrated findings from a series of research papers that focused on understanding Australian Army team learning.[48] [49] [50] [51] The data was initially collected for the 'Army as a Learning Organisation'[52] project, and recent analyses applied contemporary multilevel theory and methods (i.e., quantitative analytic methods specific to nested data) to understand when and where Army team learning improves. Overall, this paper integrates my psychological research analyses into a coherent whole. In doing so, it provides the Army with evidence-based recommendations that will help accelerate the Army's warfighting capabilities.

7.3 WHAT IS TEAM LEARNING?

In the team sense, learning is not merely memorising doctrine or learning by rote (although both of these are considered to be specific types of individual learning). Instead, team learning is defined as a set of shared understandings, practices and processes occurring within a team as a collective[53]. Team learning provides the context within which individuals learn and it is team members' collective behaviours and perceptions which create the team-level learning. In practical terms, team learning looks like team members' checking their assumptions, looking for opportunities to improve team processes, and sharing solutions to problems within their team(s). Evidence consistently shows that increasing the rate of team learning has a measurable improvement on team

[47] Amy Edmondson, R. Bohmer and Francisco Gino, 2001/2019, 'Speeding up team learning'. *Harvard Business Review*.

[48] Chris Stothard, 2020. 'Is the DLOQ learning-oriented leadership isomorphic? Learning-oriented leadership mediates hierarchical teams' learning dimensions', *The Learning Organisation*, ahead-of-print.

[49] Ruchi Sinha and Chris Stothard, 2020a. 'Power asymmetry, egalitarianism and team learning – Part 1: conceptualizing the moderating role of environmental hardship', *The Learning Organisation*, 27: 389-401.

50 Ruchi Sinha and Chris Stothard, 2020b. "Power asymmetry, egalitarianism and team learning – part II: empirical examination of the moderating role of environmental hardship", *The Learning Organisation*, ahead-of-print.

[51] Chris Stothard and Maya Drobnjak, 2020. Improving team learning in hierarchical teams: learning-oriented, transformational and transactional leadership, and psychological equality within military teams". *The Learning Organisation*, ahead-of-print.

52 Chris Stothard, 2014. The Army Learning Organisation Questionnaire: Developing a valid and reliable measure of Learning Organisation characteristics. DSTO. Land Division. Adelaide, South Australia, Department of Defence.

[53] Bradford Bell, Steve Kozlowski, and Sabrina Blaweth, 2012. 'Team Learning: A theoretical Integration and review'. *The Oxford Handbook of Organisational Psychology*. S. W. Kozlowski. Oxford, UK, Oxford University Press. 2: 859-909.

outcomes/performance[54] [55]. So much so that many organisational leaders[56] continue to urge teams to learn faster across many different domains, including the leaders in the Australian Army.

As a concept, team learning can appear both obvious (e.g., team learning is about improving team performance faster) and amorphous (e.g., by teams, do we mean how the team as a single entity, or how each individual within the team, learns? In either case, who or what is doing the actual learning in 'team learning'?). I draw on recent theoretical and methodological advances in organisational behaviour to define team learning as being made up of *both* individual and team elements[57]. Individuals are nested in teams, and teams provide the context within which individuals act. This definition avoids assumptions of reductionism (i.e., learning is an individual action, ignoring that all individuals are situated within a specific social learning or team context[58]) and holism (i.e., a misapplication of systems thinking, which argues that a team cannot meaningfully be sub-divided into component elements, namely, individuals[59]). In doing so, I examined both individual and team level perspectives to better understand what, when, and where Australian Army teams learn.

While team learning is typically considered an element (or level) within organisational learning, team learning is focused on the immediate team context within which an individual soldier works. In this sense, team learning does not directly include organisational processes such as formal knowledge or information management networks. Much attention has previously focused on organisational learning, including the Army's formal knowledge systems, organisational culture, or informal/social networks within the Australian Army[60]. Similarly, much attention has been paid (in military psychology) to understanding an individual's shared mental models, and similar cognitive approaches[61]. However, what has been lacking is a focus on understanding the team's collaborative learning environment within the Australian Army teams. For example, no research attention has been paid to understanding the contingencies that shape Australian Army team learning.

---

[54] Konstantinos C. Kostopoulos and Nikos Bozionelos, 2011. 'Team exploratory and exploitative learning: Psychological safety, task conflict, and team performance'*, Group & Organisation Management* 36: 385-415

[55] Steven Kozlowski, 2018. 'Enhancing the Effectives of work groups and teams: A reflection.*' Perspectives on Psychological Science* 13: 205-212.

[56] Langford, 2019.

[57]Bell, Kozlowski and Blaweth, 2012.

[58] Patricia O'Toole and Steven Talbot, 2011. 'Fighting for Knowledge: Developing Learning Systems in the Australian Army.' *Armed Forces & Society* 37(1): 42-67.

[59] Derek Cabrera, 2006. *Systems Thinking*. Ithaca, NY, Cornell University.

[60] O'Toole and Talbot, 2011.

[61] James Grand, Michael Braun, Goran Kuljanin, Steve Kozlowski, and Georgia Chao 2016. 'The dynamics of team cognition: A process-oriented theory of knowledge emergence in teams.' Journal of Applied Psychology 101: 1353-1385; Gerald Goodwin, Nikki Blacksmith, and Meredith Coats, 2018. 'The science of teams in the military: Contributions from over 60 years of research.' American Psychologist 73: 322-333;

7.4 How can team learning accelerate the Army's warfighting capability?

Military histories are filled with examples of failures to learn[62] to the point that we now have a military adage that 'Army always fights the last war'. A classic military example of a failure to learn is encapsulated by Major General John Sedgwick (Union Army, American Civil War, 1887) with his now famous last words: 'They can't hit an elephant at this dist…..'[63]. Perhaps, if Major General Sedgwick had paid attention to his teams' information, checked his assumptions, and then ducked, he may very well have avoided the incoming sniper shot. Learning, at its simplest, is an individual gathering new information or skills, and then integrating and synthesising the new knowledge into their established knowledge or skills[64]. Finally, individual learning includes seamlessly incorporating the new skill or knowledge into learners' repertoire of responses. Team learning, when seen as a simple aggregation of individual learning, appears entirely unproblematic.

In an intensely competitive environment (such as war) maintaining the status quo is tantamount to defeat, Brigadier Langford argued in *Accelerated Warfare*. This is a subtle and vital point to understand. The absence of learning is not only learning the wrong thing; instead, the absence of learning looks like business as usual with little energy applied to improving. In a highly competitive environment, small advantages have to be generated by accumulating minor improvements, over time, across processes or procedures (possibly while you are working or waiting for the next technological paradigm change). For example, in 2002, the British cycling team had little success in its 79-year history (e.g., it had only won a single Olympic gold medal in that period). Six years later, at the Beijing Olympics, the cycling squad won seven out of the ten gold medals available in track cycling (and again, at the 2012 London Olympics)[65] . How? The British Olympic track cycling team leader realised that while cycling is a technical and equipment-based sport (so materials are critical), the winning edge they sought could not be achieved in a single, substantial technological leap. Instead:

> *It struck me that we should think small, not big, and adopt a philosophy of continuous improvement through the aggregation of marginal gains. Forget about perfection; focus on progression, and compound the improvements… We searched for small improvements everywhere and found countless opportunities. Taken together, we felt they gave us a*

[62] John Nagl, 2005. *Learning to eat soup with a Knife: Counterinsurgency Lessons from Malaya and Vietnam*. Chicago, University of Chicago Press; Field, 2019. 'Habermas, interests and organizational learning: A critical perspective.' *The Learning Organisation* 26: 252-263.

[63] Langford, 2019.

[64] Bell, Kozlowski and Blaweth, 2012.

[65] Eben Harrell, 2016. 'How 1% performance improvements led to Olympic gold.' *Harvard Business Review*. Accessed [14 January 2021] at https://hbr.org/2015/10/how-1-performance-improvements-led-to-olympic-gold

competitive advantage… We hired a surgeon to teach our athletes about proper hand-washing to avoid illnesses during the competition (we also decided not to shake hands during the [Beijing] Olympics). ... We brought our own mattresses and pillows so our athletes could sleep in the same posture every night.

Perhaps the most powerful benefit is that [focusing on finding improvements] creates a contagious enthusiasm. Everyone starts looking for ways to improve. There's something inherently rewarding about identifying marginal gains—the bonhomie is similar to a scavenger hunt. People want to identify opportunities and share them with the group. Our team became a very positive place to be.

One caveat is that the whole marginal gains approach doesn't work if only half the team buy-in. In that case, the search for small improvements will cause resentment. If everyone is committed, in my experience, it removes the fear of being singled out—there is mutual accountability, which is the basis of great teamwork.

The British Olympic track cycling leader's final point needs emphasizing; looking for learning became a team expectation, a norm, and something they all did. In this case, learning was not something that only their leader did, or which only occurred during a formal post-competition review, nor did they just do 'what they had always done'. Under the new team expectations, learning practices and processes were not optional—it became the new normal. Within the British cycling team, all the team examined their assumptions and processes, shared knowledge, and drew on multiple sources of expertise. Together, their approach led to the cumulative effect of many 1% gains that did, indeed, deliver accelerated performance. It is this process of team learning that I am interested in; specifically, I focused on understanding when and where Australian Army teams show a shared understanding of learning.

So, what *is* team learning? I defined team learning as primarily a process[66]. Team learning is the extent to which teams (and individuals) engage in mutual processes, including open discussion of mistakes, sharing and testing lessons learnt, or identifying potential (or actual) problems, and viewing everyday work as an opportunity to improve their way of doing work[67]. As mentioned above, the British Olympic cycling team exemplifies how imbuing a shared approach to team learning delivered

[66] Katherin Roloff, Anita Wooley and Amy Edmondson, 2011. 'The Contribution of Teams to Organisational Learning'. *Handbook of Organisational Learning and Knowledge Management.* M. Easterby-Smith and M. A. Lyles, John Wiley & Sons: 249-272.

[67] Mieke Koeslag-Kreunen, Piet Van den Bossche, Michael Hoven, Marcel van der Klink and Wim Glijselaers, 2018. 'When leadership powers team learning: a meta-analysis.' *Small-Group Research* 49(4): 475-513; Victoria Marsick. and Karen Watkins, 2003. 'Demonstrating the value of an organization's learning culture: The Dimensions of Learning Organisations Questionnaire.' *Advances in developing human resources* 5: 88-99

sustained success. So, when I use the term 'team learning', I am describing a specific set of behaviours and processes that occur both at the individual and shared team levels (e.g., team norms or expectations).

7.5 What stops Australian Army teams from learning?

So, if team learning was all so simple, why don't we all do it all the time? The answer is that team learning is not entirely so unproblematic or straightforward as it first appears. While evidence shows that many factors impact how teams learn, one aspect in particular has been shown to consistently inhibit team learning: namely, hierarchical gaps (i.e., power disparity)[68]. Evidence shows that hierarchy typically (albeit not exclusively) inhibits critical team communications and processes, which, ultimately, reduces team learning (and, therefore, team performance). However, there is also recent evidence that shows team context can shift the typically negative team-level effect of power disparity to a positive[69].

It is well known that military institutions are 'deeply hierarchical' organisations[70]. For example, hierarchical disparity inhibiting communication was identified as a significant factor in the Australian Army accident where two military pilots died (known as the 2006 Black Hawk helicopter accident). The Board of Inquiry[71] identified that the large hierarchical disparity (termed 'cockpit gradient' to describe the differences between senior and junior pilot/co-pilot ranks) was a contributing factor to the accident. The Aircraft Accident Investigation Team (AAIT) report identified that the:

> *steep Captain/co-pilot authority gradient between CAPT Bingley and CAPT 7 … the fact that the manoeuvre continues without what appeared to be any interaction from the co-pilot led me to suspect that the cockpit authority gradient affected his ability to communicate his concern … the difficulties … will be further compounded when a very junior pilot is expected to monitor the performance of a senior pilot and QFI such as Black One on 29 November 2006.*

---

[68] Lindred Greer, Bart de Jong, Maartje Schouten, and Jennifer Dannals, 2018. 'Why and when hierarchy impacts team effectiveness: A meta-analytic integration.' *Journal of Applied Psychology* 103(6): 591—613

[69] Greer et al., 2018.

[70] Michael Popper and Ron Lipshitz, 2000. 'Organizational learning: Mechanisms, culture, and feasibility'. *Essential Readings in Management Learning*. C. Grey and E. Antonacopulou. London, UK, Sage Publications. 31: 181-196; Leonard Wong, Paul Bliese and Dennis McGurk, 2003. 'Military leadership: A context specific review.' *The Leadership Quarterly* 14(6): 657-692

[71] D. D. Levine, 2008. *BlackHawk 221 Board of Inquiry 2007-2008*. D. o. Defence. Canberra, Commonwealth of Australia.

Social and organisational power[72] disparity affects us at a fundamental level; evidence consistently shows that who to, when and where we pay attention is determined by perceptions of power disparity[73]. Specifically, hierarchical power differences (such as a subordinate vs superior officer relationship) affects us at the cognitive level[74]. Psychological research consistently shows that increasing power reduces powerholders' social attention, reduces recognition of subordinates' emotions, reduces trust, and increases the stereotyping of subordinates.[75]. Powerholders are also typically less motivated to investigate the state of less-powerful subordinates' well-being. Power disparity directly affects subordinates' perceptions, attitudes, and behaviours; subordinates are deferential towards and resentful of their higher-powered team members. These results demonstrate that a hierarchical power structure inhibits many of the critical team processes and behaviours which underpin team learning, such as speaking up, information sharing, identifying mistakes or offering solutions[76]. Recent evidence shows that hierarchical power differences typically inhibit team learning (unless specific factors occur which shift this relationship to a positive)[77].

While there is an argument that clear hierarchical structures help teams perform by clarifying and coordinating roles[78], much of the evidence relies on individual-level analyses rather than evaluating the team as a whole[79]. Yes, hierarchical structures have been found to improve individuals' performance within teams. However, individual-level benefits of rank disparity do not directly translate to team-level benefits. Specifically, a hierarchy has not been found to help team-level communication, nor clarify roles[80]. Instead, it appears that the individual-level benefits of communication and roles generated by team hierarchical structure are just that—individual level. It

---

[72] Power, in this paper, is defined as the control over valued resources. Fiske and Bradhal (2007, p. 679) definition where social power is "relative control over another's valued outcomes". Susan Fiske and J. Berdahl, 2007. 'Social Power'. *Social Psychology: Handbook of basic principles*. A. W. Kruglanski and E. T. Higgins, The Guildford Press**:** 678-692

[73] Anna Guinote, 2017. 'How power effects people: activation, wanting and goal seeking.' *Annual Review of Psychology* 68(1): 353-381; Lindred Greer, 2014. 'Power in teams: Effects of team power structures on team conflict and team outcomes'. *Handbook of conflict management research.* O. B. Ayoko, N. M. Ashkanasy and K. A. John. Cheltenham, UK, Edward Elgar Publishing: 93-10

[74] Guinote, 2017; Greer, 2014

75 Greer, Jong, Schouten, and Dannals, 2018

[76] Lindred Greer, Lisanne Van Bunderen, and Yu Siyu, 2017. 'The dysfunctions of power in teams: A review and emergent conflict perspective.' *Research in Organizational Behavior* 37: 103-124.

[77] Stothard, 2020; Sinha and Stothard (2020a, 2020b), Stothard and Drobnjak (2020).

[78] Nir Halevy, Eileen Chou and Adam Galinsky, 2011. 'A functional model of hierarchy: Why, how, and when vertical differentiation enhances group performance.' Organizational Psychology Review 1(1): 32-52.

[79] Lindred Greer and Charlie Chu, 2020. 'Power struggles: when and why benefits of power for individuals paradoxically harm groups.' *Current Opinion in Psychology* 33: 162-166.

[80] Greer et al., 2018

may be that the perceived benefits at the individual level of hierarchical teams are generated through alternate mechanisms (such as leadership practices or perspectives) rather than the non-existent communication clarity emerging from a hierarchical structure.

7.5.1 When do hierarchical teams learn?

Recent research shows that while hierarchical differences have a typically negative effect on team outcomes[81] (including team learning[82]) there is a crucial factor that can shift hierarchy's effect into a positive: namely, a team context. For example, teams and individuals focus on the collective level (e.g., the 'we') rather than on the individual level (e.g., the 'me'). Specifically, recent thinking around the impact of power disparity in teams has pointed to the vital role of team conflict and cohesion in shaping the impact of hierarchy on team outcomes[83]. Consistent evidence is emerging that increasing pro-social or collective perspectives within hierarchical teams (either through collective feedback or through a leader's collective value) generates a positive effect from hierarchical teams[84]. In other words, or more practically, power differences within teams do not inevitably lead to poorer team outcomes; instead, poor team outcomes occur in hierarchical teams where leaders are seen to be serving themselves or their self-interests instead of helping the teams' overall/collective interests[85].

7.6 Australian Army teams: Hierarchy, egalitarianism and deployment

Teams are core to the Army's capability to generate force; this statement will not surprise any Australian soldier. What might be a surprise is the driving factors which improve team learning in the Australian Army; specifically, Army teams learn best when there is a shared sense of (psychological) egalitarianism. A shared sense of egalitarianism is not merely nice to have; instead, this shared team climate directly improves Army teams' capacity to learn faster and better. In arguing for a shared sense of equality (or egalitarianism), I am *not* arguing for the flattening of the Army's real hierarchical command structure. On the contrary, my analyses showed that team learning's greatest gains were within teams with the *largest* spread of ranks *and* with a sense of psychological equality. The critical point is that, even within the same rank structure across teams, Australian Army teams can and do vary in their degree of egalitarianism. The overall organisational context does not set the sense of egalitarianism; instead, teams' psychological equality varies across the Army.

---

[81] Greer et al., 2020; Greer et al., 2017.

[82] Amy Edmondson, 1999. Psychological safety and learning behaviour in work teams. *Administrative Science Quarterly*, 44:350-383

[83] Greer and Chu, 2020; Greer et al., 2018; Greer et al., 2017

[84] J. Stuart Bunderson and Ray Reagans, 2011. 'Power, status, and learning in organizations.' *Organisation Science* 22: 1182-1194

[85] Bunderson and Reagens, 2002; Greer et al., 2017

The results showed that each Australian Army team could be characterised as having a specific team learning and egalitarian climate (over and above each individual's perceptions), and more importantly, these characteristics vary for a range of reasons[86]. Consequently, this quantitative evidence shows that the Australian Army is not a monolithic whole. Instead, Army teams differ significantly in their team expectations, processes and practices (particularly in terms of information sharing, identification of mistakes and provision of potential solutions). This then begs questions about what, if any, differences these team environments make? What makes some Australian Army teams learn, while others do not?

7.6.1 WHAT DRIVES TEAM LEARNING?

Overall, a shared sense of egalitarianism drives team learning in the Australian Army. Further, Australian Army teams reported an increased sense of psychological equality (or egalitarianism) when (i) they experienced more deployments *and* (ii) had a greater spread of ranks/higher degree of hierarchy within a team[87]. This result is *not* merely a matter of deployment leading to improved team learning[88], nor was it only teams made up of higher ranks improving team learning. A more nuanced process was occurring: teams with a greater spread of ranks[89] *in the presence of* more deployments, *generated* a greater sense of team egalitarianism or collective perspective. In contrast, teams more similar in rank (so less hierarchy), even when experiencing a similar number of deployments, demonstrated less team egalitarianism or reduced collective perspective. Further, hierarchical teams with fewer deployments (or not deployed) showed the lowest levels of egalitarianism.

Importantly, and somewhat counterintuitively, more deployments (at the team level) did *not* directly improve team learning. Instead, analyses showed that deployment (of more hierarchical teams) improved a sense of egalitarianism, which *then* improved team learning. So, what might be happening? Recent research shows that the typically negative influence of power differences shifts in response to team context. For example, when team leaders demonstrated a more collective perspective (that is, using their power to improve team outcomes rather than improving their position at the team

[86] While this is a simple and straightforward result, this result aligns with qualitative evidence that militaries are not a hegemonic/monolithic, single organizational climate or culture. Instead, the Australian Army teams vary for various reasons, including deployment experience, type of team, task interdependence, etc.

[87] In the analysis, I controlled the mean level of rank in the teams because there is a differential effect of high or low mean power levels in teams (e.g. all equally high-powered teams behave differently from all equally low-powered teams); the average power level in teams matters. Greer et al., 2017, Greer et al., 2020.

[88] The deployment did not directly affect individual-level team learning when I also included learning-oriented leadership and psychological equality in the regression/statistical model. The model shows that the positive effect of deployment on team learning was fully mediated by learning-oriented leadership and psychological equality.

[89] The team's mean rank level was statistically controlled.

members' expense), teams had less conflict and improved performance. Essentially, the common theme is that team context matters, and in particular, leaders' practices and approaches are critical.

7.6.2 Deployment shaping team learning through egalitarianism (psychological equality)

The role of deployment in shaping team members' experiences is not surprising; much effort has been applied to better understanding the adverse outcomes from deployment (deployment as one example of extreme contexts or environments) for individuals and teams. We know that deployment causes many negative (individual-level) outcomes; this has been very well studied. What has been less well-studied is the emergence of positive individual effects or the team-level deployment outcomes (either positive or negative). Recent research attention has been paid to understanding how, when and why 'post-traumatic growth' can occur, alongside the (much better known) post-traumatic stress (PTS)[90]. Further, recent research have also focused on understanding the team-level effects and what team-level contexts might shift the negative impact of team hierarchy on team outcomes in extreme environments.

Current thinking shows that Australian Army teams (and team members) learn when on deployment. For example, O'Toole and Talbot[91] discussed social learning in the Australian Army: 'Most participants acknowledged that operations/deployment provided them with their most powerful learning experience. Operational experience [deployment] was regarded as the "pinnacle" in terms of learning, offering the "ultimate" learning experience. Similarly, participants in the Army Learning Organisation study reported that the learning while on deployment was 'more real' than in barracks: 'In [location] when I went to plan an operation . . . we were running that ourselves, planning it and running it, and then we actually got to see what the benefits were because there was a final result at the end of it and it was real'.

My argument here is more nuanced than 'deployment directly drives teams to learn'; instead, I compared the relative effect of deployments on team learning directly and indirectly (via a shared sense of egalitarianism). I hypothesised that deployment triggers a process of re-evaluation[92] of team power[93]. Within the profoundly hierarchical Australian Army, deployment is insufficient to generate team learning (despite the apparent qualitative evidence and many case studies). Instead, what is also needed (alongside deployment) is a team environment that allows team members to believe that they

[90] Richard Tedeschi and Lawrence Calhoun, 2004. 'Post-traumatic growth: A new perspective on psychotraumatology.' *Psychiatric Times* 21: 58-60.

[91] O'Toole and Talbot, 2014, 50.

[92] Perhaps through a process of sense-making and sense-breaking of the stereotyped thinking around power disparity, or probably due to collective perspectives that may emerge during deployment.

[93] Unfortunately, I cannot speculate on the exact individual-level mechanisms since the data did not allow for more detailed analyses. This is an area for further research and investigation.

are respected and valued, *then* the team will produce more team learning. Quantitative modelling[94] supported this argument: deployment, in and of itself, is not a sufficient condition for team learning to occur. Instead, when hierarchical teams deploy and team members re-evaluate their thinking around roles and expectations (to generate a sense of psychological equality), this leads to team learning. It is this re-evaluation (characterised as egalitarianism) that then supports improved team learning.

7.6.3 LEARNING-ORIENTED LEADERSHIP

To identify practical recommendations, I next investigated the extent to which three different leadership practices predicted an individual's sense of psychological equality and team learning. Specifically, I compared the relative impact of learning-oriented leadership, transformational and transactional leadership on a sense of psychological equality, and finally, on team learning (simultaneously). Learning-oriented leadership [95] was found to generate a greater sense of psychological equality, as well as positively predict team learning, compared to the more familiar transformational[96] or transactional[97] leadership styles.

While much attention has been paid to transformational leadership within the Army, little attention has been paid to understanding how learning-oriented leadership influences teams and individuals, either directly or indirectly. Overall, the results showed that learning-oriented leadership had more than twice the degree of a positive impact than transformational leadership in generating psychological equality. Focusing on team learning, learning-oriented leadership was considerably more important (by almost a magnitude of 10) than transformational leadership (which had a non-significant effect). The results showed that learning-oriented leadership leads to improved psychological equality (independent of an individual's rank).

Rank had a different relationship to psychological equality and team learning. For team learning, rank had a direct and positive effect (i.e., the more senior the rank, the more positive team learning perceptions). In contrast, rank was irrelevant to the perceptions of psychological equality[98]. Together, the results showed that rank did not determine psychological equality perceptions; instead,

---

[94] Using a recently developed methodological technique emerging from multilevel modelling in organisational behaviour, Mathieu and Chen, 2011.

[95] Characterised as sharing information quickly and easily, sharing lessons learnt, and taking a coaching approach (e.g., identifying and supporting ways to improve performance).

[96] Recent research has rethought the validity and reliability of charismatic leadership in general and transformational leadership in particular. Dean Van Knippenberg and Sim Sitkin, 2012. 'A critical assessment of charismatic-transformational leadership research: Back to the drawing board. *Academy of Management Annals*, 7: 1-60.)

[97] Transactional leadership hurt psychological equality and team learning (after taking transformational and learning-oriented leadership into account).

[98] This was a somewhat surprising result; in practical terms, this shows that psychological equality is shared across all ranks (and can be improved with specific leadership styles).

learning-oriented leadership (and to a lesser extent, transformational leadership) positively influenced psychological equality, which then supported team learning. Evaluating the effect of deployment on psychological equality and team learning showed that deployment at the individual level directly and positively impacted perceptions of psychological equality. This effect remained even when accounting for the more significant impact of positive leadership styles on psychological equality. Further, when looking at the effect of deployment on team learning, the results showed that psychological equality was the mechanism through which deployment positively impacted team learning. These results indicate a complex relationship between rank, deployment, leadership style and team characteristics on team learning. In simple terms, learning-oriented leadership directly affects psychological equality and, ultimately, team learning. Also, I found deployment to affect both psychological equality and team learning, however, only in specific circumstances (namely, only within more hierarchical teams).

Overall, the results of quantitative modelling provided an evidence base for Army leaders and trainers to develop programs or mechanisms to improve psychological equality and team learning (in the absence of deployment). In particular, learning-oriented leadership practices or training experiences which shift team members' expectations will improve team learning, both directly and indirectly. This result may become even more critical if or when the Australian Army slows its operational tempo (and reduces the opportunity to experience deployments). Similarly, team learning becomes more acute when or if the Australian Army aims to accelerate its warfighting capabilities. Identifying the necessary pre-condition for team learning in the Australian Army supports practical recommendations, which will ultimately help the Australian Army achieve its aim of *Accelerated Warfare*.

7.7 RECOMMENDATIONS

The studies underpinning this paper show that hierarchical differences within teams do not inevitably hinder team learning; notably, the Army can take practical steps to improve team learning (and in doing so, reduce the harmful effects of hierarchical disparity). These practical steps include:

RECOMMENDATION: INCULCATE THE LEARNING-ORIENTED LEADERSHIP PRACTICES

Learning-oriented leadership practices incorporates the following:

- Share information quickly and easily.
- Invite team participation, e.g., 'catch team doing something good' and reward desired behaviours or patterns in teams and individuals.
- Reward individuals when they share a problem or spot an error.
- Formally and informally analyse failures and share the lessons learnt.

- Explicitly take a coaching approach (e.g., identify specific ways to improve when faced with problems in teams and build on current strengths).
- Look for opportunities to learn for themselves and their teams, find them, and implement solutions.
- Be clear about what failure is blame-worthy vs praise-worthy:
    - blame-worthy failure, e.g., individual choosing to deviate from a prescribed practice or process;
    - praise-worthy failure, e.g., testing or experimenting to understand a complex environment or process better.
- Look for opportunities to learn for yourself and your team.

RECOMMENDATION: IDENTIFY THE TEAM-LEVEL BENEFITS OF SHARED DEPLOYMENT AND BUILD ON THE BENEFITS. Building on the positive experiences emerging from deployments at the team level (while not discounting the damage and adverse effects on individuals) will help support greater team learning. This recommendation becomes more important when the deployment rotations are winding down or changing. Identifying team-level benefits incorporates the following:

- Identify the ways in which deployment changed and improved team's expectations, processes and procedures. If not already done, include the changed expectations and processes into team Standard Operation Procedures. Capture the benefits and learning already experienced within teams who have deployed to share with new started/recruits.
- When teams do not (or are not likely) to deploy, invest time and effort into intense team-level training which simulate shared threats and hardships, for a sustained time period; this will give team members opportunities to re-evaluate their roles and responsibilities, and to identify the collective perspective.
- Increase the range of ranks within teams when either on deployment or on training opportunities. This will give all ranks the opportunity to learn respect for each other's roles within the teams, and to see how respect helps the team perform.

RECOMMENDATION: INSTIL A SHARED SENSE OF RESPECT WITHIN ARMY TEAMS. A shared sense of egalitarianism and psychological equality is marked by respect for all team members. While learning-oriented leadership (in Recommendation 1) improves a shared sense of egalitarianism in teams, other practices can also be employed. In particular, increasing the shared levels of respect within teams can improve psychological equality.

Respect can be owed (e.g., by virtue of rank) and respect can also be earned (e.g., by way of competence and contribution during deployments or, alternatively, during training simulations)[99]. Owed respect helps us to feel included and valued as part of the team and organisation, while earned respect recognises specific qualities or behaviours. Improving a shared sense of respect and psychological equality can be implemented by doing the following:

- Establish a firm baseline of owed respect for all personnel. Every soldier should feel that their dignity is recognised and respected. This is especially important for lower-level soldiers. Respect is infinite; giving owed respect is not a zero-sum game.
- See respect as a time-saver, not a time waster. Improving respect is a function of *how* you do what you are already doing. Increasing the respect in team relationships does not add more time or effort into your current communication within your team (e.g., being polite).
- Identify how respect is earned within the team; the specific tasks or roles that earn respect varies by team, role and function.
- Common ways for leaders to show respect is to delegate important tasks, to remain open to advice, and to publicly back your staff and teammates in critical situations.
- Think about the mix of owed respect and earned respect within your team; is the current mix appropriate to generate a shared sense of egalitarianism? Is earned respect generated for appropriate or beneficial behaviours within the team?
- Know when efforts to be respectful go wrong; if efforts are inconsistent or haphazard, soldiers will see such attempts as manipulative or disingenuous. If a supervisor or superior officer only offers respect in the presence of others, then their words or actions will appear to be insincere.
- Make sure you give earned respect when it is deserved. If praise is given for undeserving actions, it will appear to be tokenistic, and counterproductive.

Ultimately, it is learning-oriented leadership, a robust and shared sense of respect and egalitarianism, and team learning, which will determine if the Australian Army can indeed accelerate their warfighting beyond technical or materiel acquisitions. Teams who proactively identify problems, share solutions, develop and implement improvements will find that 1% gain across many systems, equipment, materiel, and procedures within the Army. Together, Australian Army teams can deliver the *Accelerated Warfare* which Australia needs. This paper places the team at the centre of capability development and delivery because it is the soldiers (within their teams) who use all the ‘stuff’ to

[99] Kristie Rogers 2018. ‘Do your employees feel respected?’ *Harvard Business Review*, July-August; Kirstie Rogers and Blake E. Ashforth, 2017, ‘Respect in Organizations: Feeling Valued as ‘We’ and ‘Me.’” *Journal of Management*, 43(5): 1578–1608. doi:10.1177/0149206314557159.

generate real force (to use Brigadier Langford's term). Only when Australian Army teams learn to explore, investigate and exploit every bit of stuff they have (through a process of team learning), will the Australian Army deliver the maximum fighting effort.

8 CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

'All I'm saying is simply this: that all mankind is tied together; all life is interrelated, and we are all caught in an inescapable network of mutuality, tied in a single garment of identity. Whatever affects one directly, affects all indirectly. For some strange reason I can never be what I ought to be until you are what you ought to be. And you can never be what I ought to be until I am what I ought to be—this is the interrelated structure of reality.' Martin Luther King, 1965

The overall objective of this thesis originated from the AALO research project was to help the Australian Army improve its learning capabilities. After identifying and addressing the flaws in the original AALO model, I reconceptualised the AALO as an empirically grounded taxonomy. Rethinking the original AALO model allowed me to 'go back to basics', and I took on a multilevel perspective in proposing and evaluate several contingent models. The contingent models provided new insights into when, where and how Australian Army teams learn. In the discussion section above (Paper 5), I outlined the practical policy recommendations emerging from my synthesised analyses. Next, I turned to explore the implications of my research within the scholarly and Australian Defence research communities (noting that many specific implications have already been explored within the papers).

Taking a multilevel perspective to frame the reconceptualised AALO meant that I could apply correctly a specified systems thinking approach, rather than the faulty misspecification of systems thinking used by Senge (1990). Further, because the multilevel perspective (paradigm) has emerged from the same theoretical schools of thought (e.g., Checkland, 2000; Von Bertalanffy, 1967), the theoretical basis of a systems approach is maintained within the AALO while improving its application to the Australian Army. The multilevel perspective provides a more sophisticated and nuanced explanatory power. In particular, multilevel theory and methods aim to identify and elucidate cross-level mechanisms and boundaries, in contrast to Senge's (1990) systems approach to organisation (AIken et al., 2019; Bliese et al., 2007; Eckardt et al., 2020; Humphrey & LeBreton, 2019; Kostopoulos et al., 2013; Mathieu & Luciano, 2019). The multilevel paradigm of systems thinking to organisations also provides significant theoretical and methodological advantages over the more typical Australian Defence systems thinking approach when applied to organisations. I recommend using the multilevel perspective (theory, methods and analysis) to the Australian Defence research community when addressing the organisational, team, or individual phenomena.

In terms of scholarly and academic impact, many implications of the new contingent factors (egalitarianism and environmental hardship/deployment) have been discussed within my published research papers. However, I do want to draw attention to further research that needs to be done on these factors. First, psychological equality and team egalitarianism are concepts that should be developed further; in particular, it would be helpful to understand the relationship between psychological equality and the increasingly popular concept of psychological safety (Edmondson, 1999; Edmondson & Lei, 2014). The reviewers regularly raised questions about the theoretical and empirical relationship between psychological equality and psychological safety during the publication process. This relationship remains an area for further investigation. For example, Edmondson and Lei (2014) and Sanner and Bunderson (2015) called for greater attention to be paid to the boundary conditions which determine psychological safety. I would suggest that a necessary boundary condition of feeling psychologically safe would be determined by an interaction between an individual's rank or power within their team, the overall team power, together with their sense of psychological equality. This is a question for future researchers to answer.

Another critical question that remains unanswered in my research is what, exactly, might be the specific mechanism(s) or contingencies under which deployment (sometimes) acts to shift soldiers' preconceptions and expectations about power and hierarchy. This question aligns very much with emerging research into teams in extreme environments and extreme teams (Bell et al., 2018; Driskell et al., 2018; Hannah et al., 2009; Klien et al., 2006; Maynard et al., 2018; Meslec et al., 2020). Answering these questions has the potential to provide exciting insights into understanding how context affects teams and, in doing so, help answer long-standing calls for more attention to be paid to the context within organisational research (Johns, 2006; Wong et al., 2003; Zellmer-Bruhn & Gibson, 2006).

Also, understanding the mechanisms through which deployment (as a team context) acts on teams to shift the nature of team hierarchy or rank disparity will help integrate the divergent results found within the team power literature (Greer & Chu, 2020; Greer et al., 2017). In particular, my research found that teams with a greater spread of ranks in a specific team context (deployment) showed more significant levels of psychological egalitarianism and team learning. I have proposed and evaluated an important team context that moderates the effect of hierarchy on team learning, and in doing so, extended our current knowledge of when and where hierarchical teams learn. While questions remain about the exact individual mechanisms, my model aligns with Greer and Chu's (2020) argument that team context determines the effect of hierarchical differences on team performances.

However, it remains to be seen how my moderator, deployment (i.e., environmental hardship), fits within Greer and colleague's (Greer & Chu, 2020; Greer et al., 2017; van Bunderen et al., 2018)

argument that it is team conflict which moderates the effect of hierarchical differences on team performance. Exploring the theoretical and empirical relationship between team dynamics under hardship will pose interesting questions; for example, does team hardship lead to reduced team conflict by implicitly emphasising a collective perspective within the team? Teams with a more collective perspective typically demonstrate more positive team learning or performance (Bunderson & Reagans, 2011; Bunderson et al., 2016; Van der Vegt et al., 2010). So, does deployment shift the team's perspective towards a more collective view of themselves and their team members and, in doing so, change their view of power and rank disparity and team learning?

In terms of learning organisation literature, by reconceptualising the AALO as an empirically grounded multilevel, multidimensional taxonomy, I have also helped clarify the definitional confusion emerging within the AALO (by removing poorly specified models or assumptions). While I have proposed a new approach to an old problem, my framing of the AALO construct essentially takes the learning organisation construct back to its original form (Örtenblad, 2002; Örtenblad et al., 2013; Watkins & Marsick, 1996). What remains to be seen and investigated is how the elements within the taxonomy might be causally related. Within the scholarly learning organisation, team and organisational learning literature, there is a wealth of research and evidence which can be drawn on to explore the contingent relationships within the AALO (noting that any modelling would need to identify an appropriate outcome or target variable to avoid further confounding definitions).

My research papers have also helped broaden military team thinking by identifying a team-level positive emerging from deployment. Traditionally, much military team research has focused on mitigating the individual-level stresses caused by deployment rather than identifying any positive effects (Bowers et al., 1996; Cannon-Bowes & Salas, 1998; Driskell et al., 1988; Driskell & Salas, 1991; Forbes et al., 2018). I drew on the growing interest in post-traumatic growth emerging from the clinical psychological field to help explain the positive effects of deployment and extended these into the team-level phenomenon (Calhoun & Tedeschi, 2004; Habib et al., 2018; Mark et al., 2018; Tedeschi & Calhoun, 2004a, 2004b). My findings align with more recent individual-level research, which has focused on explaining the diverging and complex effects of deployment for military personnel (Habib et al., 2018; Mark et al., 2018). This is not to deny that deployment (and other trauma) has harmful effects at the individual level. Instead, my research contributes to a more nuanced and complex understanding of soldiers' responses to deployment. I have also demonstrated team-level positive outcomes after deployment, pushing the construct (adversarial growth or post-traumatic growth) into a multilevel framework. There is little research into team level positive outcomes from hardship or trauma currently. However, given the recent COVID19 pandemic and responding demand for greater knowledge of the effect of hardships and trauma on teams and individuals, this could be an area of emerging research interest more broadly.

In conclusion, this thesis has covered a wide range of literature, from systems thinking, learning organisation and organisational learning, team learning, and domains that affect teams and team learning, including power in teams and extreme environments. Also, I drew on the notion of post-traumatic growth to help identify and explain my findings of positive experience emerging from hardship/deployment. In doing so, I have provided evidence-based recommendations for the Australian Army to improve their team learning capacity and support their learning organisation capabilities. Specifically, I uncovered evidence of when and where Australian Army teams learn. Army teams learn more when they, first, have a range of ranks, and next, share deployments. Further, Army leaders can instil a shared sense of egalitarianism and psychological equality by showing learning themselves.

Finally, to illustrate the importance of drawing all of these together to impact Australian Army team learning, I again draw on Captain Thorburn's (2021) lived experience. Thorburn (2021, p.1) reflects that once he understood the importance of teamwork, trust, team-learning and leading collaboratively, then:

> *[I] achieved buy-in, trust, mutual understanding, common purpose, and shared ownership. Your team will, most of the time, be able to work through and solve problems for itself. They will know one another so well, and have worked through so many problems together, that they will intuitively understand what is occurring and what needs to be done… For me, the essence of good leadership is about collaboration and facilitation; the team having enough context to diagnose the problem, and enough freedom to own the solution.*

Overall, Thorburn's (2021) experience echoes the themes within my thesis and shows how team learning can be improved, and in turn, improve Army's ability to generate its warfighting capacity.

9 REFERENCES

Adler, A. B., Vaitkus, M. A., & Martin, J. (1996). Combat exposure and post-traumatic stress symptomatrology amound U.S. soldiers deployed to the Gulf War. *Military Psychology*, *8*(1), 1-14. https://doi.org/10.1207/s15327876mp0801_1

AIken, J. R., Hanges, P. J., Chen, T., LeBreton, J. M., & Humphrey, S. E. (2019). The means are the end: Complexity science in Organizational Research. In S. E. Humphrey & J. M. LeBreton (Eds.), *The Handbook of Multilevel Theory, Measurement and Analysis* (pp. 115-140). APA PsycBooks.

Anderson, C., & Galinsky, A. D. (2006). Power, optimism, and risk-taking. *European Journal of Social Psychology*, *36*(4), 511-536. https://doi.org/10.1002/ejsp.324

Anicich, E. M., Swaab, R. I., & Galinsky, A. D. (2015). Hierarchical cultural values predict success and mortality in high-stakes teams. *Proceedings of the National Academy of Sciences*, *112*(5), 1338-1343. https://doi.org/ https://doi.org/10.1073/pnas.1408800112

Antonacopoulou, E. P., Moldjord, C., Steiro, T. J., & Stokkeland, C. (2019). The New Learning Organisation: Part 1 - Institutional reflexivity, high agility organising and learning leadership. *The Learning Organization*, *26*(3), 304-318. https://doi.org/10.1108/TLO-10-2018-0159

Argote, L., Beckman, S. L., & Epple, D. (1990). The persistence and transfer of learning in industrial settings. *Management Science*, *36*(2), 140-154. http://links.jstor.org/sici?sici=0025-1909%28199002%2936%3A2%3C140%3ATPATOL%3E2.0.CO%3B2-0

Argyris, C., & Schon, D. A. (1974). *Theory in practice: Increasing professional effectiveness*. Jossey-bass.

Avolio, B. J. (1999). *Full leadership development: Building the vital forces in organizations*. Sage.

Basan, T. (2020). A new approach to collective training - Lessons drawn from sport and music. *The Cove*. https://cove.army.gov.au/article/collective-training-transformation-hamel-the-exercise-the-series-the-campaign-plan-and-the

Bass, B. M. (1985). *Leadership and performance beyond expectations* Free Press.

Bass, B. M., Avolio, B. J., Jung, D. I., & Berson, Y. (2003). Predicting unit performance by assessing transformational and transactional leadership. *Journal of applied psychology*, *88*(2), 207. https://doi.org/10.1037/0021-9010.88.2.207

Becker, S. W., & Baloff, N. (1969). Organization struture and complex problem solving. *Administrative science quarterly*, *14*(2), 260-271. https://doi.org/10.2307/2391104

Bell, B. S., Kozlowski, S. W., & Blawath, S. (2012). Team Learning: A theoretical Integration and review. In S. W. Kozlowski (Ed.), *The Oxford handbook of organizational psychology* (Vol. 2, pp. 859-909). Oxford University Press.

Bell, S. T., Fisher, D. M., Brown, S. G., & Mann, K. E. (2018). An approach for conducting actionable research with extreme teams. *Journal of Management, 44*(7), 2740-2765. https://doi.org/10.1177/0149206316653805

Bliese, P., Chan, D., & Ployhart, R. E. (2007). Multilevel methods: Future directions in measurement, longitudinal analyses, and nonnormal outcomes. *Organization Research Methods, 10*(4), 551-563.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In K. J. Klein & S. W. Kozlowski (Eds.), *Multilevel Theory, Research, and Methods in Organizations* (pp. 349-381). Jossey-Bass.

Bliese, P. D., Halverson, R. R., & Schriesheim, C. A. (2002). Benchmarking multilevel methods in leadership: The articles, the model, and the data set. *The leadership quarterly, 13*(1), 3-14. https://doi.org/10.1016/S1048-9843(01)00101-1

Bloom, M. (1998). The performance effects of pay dispersion on individuals and organizations. *Academy of Management Journal, 42*(1), 25-40. https://doi.org/10.2307/256872

Bøg, M., Filges, T., & Klint Jørgensen, A. M. (2018). Deployment of personnel to military operations: Imact on mental health and social functioning. *Systematic Review, 14*(1), 1-127. https://doi.org/10.4073/csr.2018.6

Boone, C., & Hendriks, W. (2009). On management team diversity and firm performance: Moderators of functional-background and locus-of-control diversity. . *Management Science, 55*(2), 165–180.

Bowers, C. A., Weaver, J. L., & Morgan, B. B. (1996). Moderating the performance effects of stressors. In J. E. Driskell & E. Salas (Eds.), *Stress and Human Performance*. Psychology Press.

Brett, J. F., Pinkley, R. L., & Jackofsky, E. F. (1996). Alternatives to having a BATNA in dyadic negotiation: The influence of goals, self-efficacy and alternatives on negotiated outcomes. *International Journal of Conflict Management, 7*(2), 121-138. https://doi.org/10.1108/eb022778

Bricknell, M. C., Williamson, V., & Wessely, S. (2020). Understanding military combat mental health. *Occupational Medicine 70*(4), 216-218.

Brouneus, K. (2014). On returning from peacekeeping: A review of current research on psychological well-being in military personnel returning from operational deployment. *Journal of Military*

and Vetarans' Health, 22(1), 24-29. https://jmvh.org/wp-content/uploads/2014/03/JMVH-March_2014-1.pdf

Brown, J. (2013). FIfty shades of grey: Officer culture in the Australian Army. *Australian Army Journal, 10*(3), 244-254. https://www.lowyinstitute.org/publications/fifty-shades-grey-officer-culture-australian-army

Buchanan, M. D. (2011). *The Canadian Army and the Learning Organization: An example of contradictions?* Canadian National Forces College]. https://www.cfc.forces.gc.ca/259/290/297/286/buchanan.pdf

Bunderson, J. S., & Boumgarden, P. (2011). Structure and learning in self-managed teams: Why 'bureacratic' teams can be better learners. *Organization Science, 21*, 609-624.

Bunderson, J. S., & Reagans, R. E. (2011). Power, status, and learning in organizations. *Organization Science, 22*(5), 1182-1194. https://doi.org/10.1287/orsc.1100.0590

Bunderson, J. S., & Sutcliffe, K. M. (2003). Management team learning orientation and business unit performance. *Journal of applied psychology, 88*(3), 552–560. https://doi.org/ https://doi.org/10.1037/0021-9010.88.3.552

Bunderson, J. S., & Van Der Vegt, G. S. (2018). Diversity and inequity in management teams: A review oand integration of reearch on vertical and horizontal member differences. *Annual Review of Organizational Psychology and Organizational Behavior, 5*, 47-73. https://doi.org/10.1146/annurev-orgpsych-032117-104500

Bunderson, J. S., Van Der Vegt, G. S., Cantimur, Y., & Rink, F. (2016). Different views of hierarchy and why they matter: Hierarchy as inequality or as cascading influence. *Academy of Management Journal, 59*(4), 1265-1289. https://doi.org/10.5465/amj.2014.0601

Burgoyne, J. (1999). Design of the Times. *People Management, 5*(11), 35-44.

Burke, C. S., Stagl, K. C., Klein, C., Goodwin, G. F., Salas, E., & Halpin, S. M. (2006). What type of leadership behaviors are functional in teams? A meta-analysis. *The leadership quarterly, 17*(3), 288-307. https://doi.org/10.1016/j.leaqua.2006.02.007

Cabrera, D. (2006). *Systems Thinking* Cornell University]. Ithaca, NY.

Cabrera, D., Cabrera, L., & Powers, E. (2015). A unifying theory of systems thinking with psycho-social applications. *Systems Research and Behavioural Science, 32*(5), 534-545. https://doi.org/10.1002/sres.2351

Caldwell, R. (2012). Leadership and Learning A critical re-examination of Senge's Learning Organization. *Systemic Practice and Action Research, 25*, 39-55. https://doi.org/10.1007/s11213-011-9201-0

Calhoun, L., & Tedeschi, R. G. (2004). Author's response "The foundations of posttraumatic growth: New considerations. *Psychological inquiry*, *15*(1), 93-102. https://doi.org/10.1207/s15327965pli1501_03.

Cannon-Bowes, J. A., & Salas, E. (Eds.). (1998). *Making decisions under stress: Implications for individual and team training*. APA Press.

Carson, J. B., Tesluk, P. E., & Marrone, J. A. (2010). Shared leadership in

teams: An investigation of antecedent conditions and performance. *Academy of Management Journal, 50*(5), 1217–1234.

Catignani, S. (2014). Coping with Knowledge: Organizational Learning in the British Army? *Journal of Strategic Studies*, *37*(1), 30-64. https://doi.org/10.1080/01402390.2013.776958

Centre, A. A. K. (2019). *Land Warfare Doctrine 7-0: Training and Education*. Australian Army. https://australianarmycadets.files.wordpress.com/2018/03/lwd_7-0_training_and_education_2018_full.pdf

Chattopadhyay, P., & Finn, C. (2010). Affective responses to professional dissimilarity: A matter of status. *Academy of Management Journal*, *53*(4), 808-826. https://doi.org/10.5465/AMJ.2010.52814603

Checkland, P. (2000). Systems thinking, systems practice: includes a 30-year retrospective. *Journal-Operational Research Society*, *51*(5), 647-647.

Chen, G., & Bliese, P. (2002). The role of different levels of leadership in predicting self- and collectie efficacy: Evidence of discounuity. *Journal of applied psychology*, *87*(3), 549-556. https://doi.org/10.1037/0021-9010.87.3.549

Chen, G., Bliese, P., Payne, S. C., Zaccaro, S., Simsarian Webber, S., Mathieu, J. E., & Born, D. H. (2002). Simultaneous examination of the antecedents and consequences of efficacy beliefs at multiple levels of analysis. *Human Performance*, *15*, 381-409. https://doi.org/10.1207/s15327043hup1504_05

Chen, G., Kirkman, B. L., Kanfer, R., Allen, D., & Rosen, B. (2007). A multilevel study of leadership, empowerment, and performance in teams. *Journal of applied psychology*, *92*(2), 331. https://doi.org/10.1037/0021-9010.92.2.331

Chen, G., Mathieu, J. E., & Bliese, P. (2005). A framework for conducting multi-level construct validation. In F. J. Yammarino & F. Dansereau (Eds.), *Multi-level issues in Organizational Behavior and Processes* (Vol. 3, pp. 273-303). Emerald

Chen, P., & Unewisse, M. (2016). *A systems thinking approach to engineering challenges of military systems-of-systems* (DST-Group-TR-3271).

https://www.dst.defence.gov.au/sites/default/files/publications/documents/DST-Group-TR-3271_0.pdf

Chen, S., Lee-Chai, A. Y., & Bargh, J. A. (2001). Relationship orientation as a moderator of the effects of social power. *Journal of personality and social psychology, 80*(2), 173-187. https://doi.org/10.1037/0022-3514.80.2.173

Chief of Army. (2018). *Army in Motion: Accelerated Warfare*. Australian Army. https://researchcentre.army.gov.au/library/other/accelerated-warfare

Churchill, w. (1948). *The Gathering Storm: The Second World War* (Vol. 1). Houghton Mifflin Company. https://www.fadedpage.com/showbook.php?pid=20190527

Cook, S. (2004). The rise of systems engineering within Australian defence organisation. IEEE International Engineering Management Conference,

Cook, S., Lawson, E., & Allison, J. (1999). Towards a unified systems methodology for Australian Defence Systems-of-Systems. *Engineering*. https://doi.org/10.1002/J.2334-5837.1999.TB00137.X

Cooke, N. J., Gorman, J. C., Duran, J. L., & Taylor, A. R. (2007). Team cognition in experienced command and control teams. *Journal of Experimental Psychology: Applied, 13*(1), 146-157. https://doi.org/10.1037/1076-898X.13.3.146

Cooke, N. J., Gorman, J. C., Myers, C. W., & Duran, J. L. (2012). Interactive Team Cognition. *Cognitive Science, 37*(2), 255-285. https://doi.org/10.1111/cogs.12009

Cortina, J. S. (2016). Defining and operationalizing theory. *Journal of Organizational Behavior, 37*(8), 1142-1149. https://doi.org/10.1002/job.2121

Curşeu, P. L., & Sari, K. (2015). The effects of gender varitey and power disparity on group cognitive complexity in collaborative learning groups. *Interactive Learning Environments, 23*(4), 425-436. https://doi.org/10.1080/10494820.2013.788029

Dahl, R. A. (1957). The concept of power. *Behavioural Science, 2*(3), 201-215. https://doi.org/10.1002/bs.3830020303

Danescu-Niculescu-Mizil, C., Lee, L., Pang, B., & Kleinberg, J. (2012). Echos of power: language effects and power differences in social interaction. WWW '12: Proceedings of the 21st international conference on World Wide Web,

De Dreu, C. K., Giebels, E., & Van de Vliert, E. . (1998). Social motives and trust in integrative negotiation: The disruptive effects of punitive capability. . *Journal of applied Psychology, 83(3), 408., 83*(3), 408-422. https://doi.org/10.1037/0021-9010.83.3.408

de Kwaadsteniet, E. W., & van Dijk, E. (2010). Social status as a cue for tacit coordination. . *Journal of Experimental Social Psychology, 46*(3), 515–524. https://doi.org/https://doi.org/10.1016/j.jesp.2010.01.005

De Somer, G., & Schmidtchen, D. J. (1999). *Professional mastery: the human dimension of warfighting capbility for the Army-After-Next*. Land Warfare Studies Centre, Australian Army.

DeChurch , L. A., Bufton, G. M., Kay, S. A., Velez, C. V., & Contractor, N. (2019). Organizational Learning and MutliTeam Systems. In L. Argote & J. M. Levine (Eds.), *The Oxford Handbook and Group and Organizational Learning*. Oxford University Press.

DeChurch , L. A., & Marks, M. A. (2006). Leadership in multiteam systems. *Journal of applied psychology, 91*(2), 311-329. https://doi.org/10.1037/0021-9010.91.2.311

DeChurch , L. A., & Mesmer-Magnus, J. (2010). Measuring Shared Team Mental Models: A meta-analysis. *Group Dynamics: Theory, Research, and Practice, 14*(1), 1-14. https://doi.org/10.1037/a0017455

DeChurch , L. A., & Zaccaro, S. (2010). Perspectives: Teams won't solve this problem. *Human Factors, 52*(2), 329-334.

Defence, D. o. (2020). *2020 Defence Strategic Update & 2020 Force Structure Plan*. https://www1.defence.gov.au/strategy-policy/strategic-update-2020

Dépret, E., & Fiske, S. T. (1993). Social cognition and power: Some cognitive consequences of social structure as a source of control deprivation. In G. F. Weary G., Marsh K.L. (Ed.), *Control Motivation and Social Cognition*. Springer,. https://doi.org/ https://doi.org/10.1007/978-1-4613-8309-3_7

DeWall, C. N., Baumeister, R. F., Mead, N. L., & Vohs, K. D. (2011). How leaders self-regulate their task performance: Evidence that power promotes diligance, depletion and distain. *Journal of personality and social psychology, 100*(1), 47-65. https://doi.org/10.1037/a0020932

Dhananjaya Dahanayake, N., & Gamlath, S. (2013). Learning organization dimensions of the Sri Lanka Army. *The Learning Organization 20*(2), 195-215. https://doi.org/https://doi.org/10.1108/09696471311328451

DiBella, A. J. (1995). Developing Learning Organizations: A Matter of Perspective. Academy of Management proceedings, Briarcliff Manor, NY

DiBella, A. J. (2010, 8 March). Can the Army Become a Learning Organization? A question reexamined. https://www.army.mil/article/36320/can_the_army_become_a_learning_organization_a_question_reexamined

DiBella, A. J. (2011). Learning Portfolios: An alternative to Learning Organizations. In M. Easterby-Smith & M. A. Lyles (Eds.), *Handbook of Organizational Learning and Knowledge Management* (pp. 183-198). John Wiley & Sons.

Dimovski, V., & Škerlavaj, M. (2005). Performance effects of organizational learning in a transitional economy. *Problems and Perspectives in Management, 3*(4), 1-16.

DiRosa, G. A., Estrada, A. X., & DeCostanza, A. H. (2015). Cohesion with Large Collectives: A multiteam perspective. In E. Salas, W. B. Vessey, & A. X. Estrada (Eds.), *Team Cohesion: Advances in Psychological Theory, Methods and Practice* (Vol. 17). Emerald Group Publishing, .

Driskell, J. E., Carson, R., & Moskal, P. (1988). *Stress and Human Performance: Final Report* (N. T. S. Center, Ed.). Naval Training Systems Center. https://apps.dtic.mil/dtic/tr/fulltext/u2/a198791.pdf

Driskell, J. E., & Salas, E. (1991). Group decision making under stress. *Journal of applied psychology*, *78*(3), 473-478. https://doi.org/10.1037/0021-9010.76.3.473

Driskell, T., Driskell, J. E., Burke, C. S., & Salas, E. (2017). Team Roles: A review and integration. *Small group research*, *48*(4), 482-511. https://doi.org/10.1177/1046496417711529

Driskell, T., Salas, E., & Driskell, J. E. (2017). Teams in extreme environments: Alterations in team development and teamwork. *Human Resource Management Review*, *28*, 434-449. https://doi.org/10.1016/j.hrmr.2017.01.002

Driskell, T., Salas, E., & Driskell, J. E. (2018). Teams in extreme environments; Alterations to team development and teamwork. *Human Resource Management Review*, *28*(4), 434-449. https://doi.org/10.1016/j.hrmr.2017.01.002.

Drobnjak, M., Stothard, C., Talbot, S., Watkins, K. E., & McDowall, D. (2013). Learning, trust and change within the Australian Army: the development of the Army Learning Organization Questionnaire (ALOQ). In A. Örtenblad (Ed.), *Handbook of Research on the Learning Organization: Adaptions and Context* (pp. 159-178). Edward Elgar Publishing.

Dumdum, U. R., Lowe, K. B., & Avolio, B. J. (2013). A meta-analysis of transformational and transactional leadership correlates of effectiveness and satisfaction: An update and extension. . In B. J. Avolio & F. J. Yammarino (Eds.), *Transformational and Charismatic Leadership: The Road Ahead 10th Anniversary Edition* (pp. 39-70). Emerald Group Publishing Limited.

Dyrenfurth, A. (2016). *Mateship: A very Australian History*. Wiley. https://doi.org/10.1002/j.1839-4655.2002.tb01117.x

Dyson, T. (2019). The military as a learning organization: establishing the fundamentals of best-practice in lessons learned. *Defence Studies, 19*(2), 107-129. https://doi.org/10.1080/14702436.2019.1573637

Dyson, T. (2020). *Organisational learning and the Modern Army: A new model for Lessons-Learned Process*. Routledge.

Easterby-Smith, M., Crossan, M., & Nicolini, D. (2000). Organizational learning: debates past, present and future. *Journal of management studies, 37*(6), 783-796. https://doi.org/10.1111/1467-6486.00203

Eckardt, R., Yammarino, F. J., Dionne, S. D., & Spain, S. M. (2020). Multilevel methods and statistics: The New Frontier. *Organization Research Methods*. https://doi.org/10.1177/1094428120959827

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative science quarterly, 44*(2), 350-383. http://www.jstor.org/stable/2666999

Edmondson, A. (2003). Speaking up in the operationing room: How team leaders promote learning in interdisciplinary action teams. *The Journal of Management Studies, 40*(6), 1419-1452.

Edmondson, A. (2012). *Teaming: How organisations learn, innovate and compete in the Knowledge Economy*. Jossey-Bass.

Edmondson, A., Bohmer, R. M., & Gino, F. (2001). Speeding up team learning. *Harvard Business Review*. https://hbr.org/2001/10/speeding-up-team-learning

Edmondson, A., & Lei, Z. (2014). Psychological Safety: The history, renaissance, and future of an interpersonal construct. *Annual Review of Organizational Psychology and Organizational Behavior, 1*, 23-42. https://doi.org/10.1146/annurev-orgpsych-031413-091305

Edmondson, A., & Moingeon, B. (1998). From organizational learning to the learning organization. *Management learning, 29*(1), 5-20.

Egan, T., Yang, B., & Bartlett, K. R. (2004). The effects of organizational learning culture and job satisfaction on motivation to transfer learning and turnover intention. *Human Resource Development Quarterly, 15*(3), 279-301. https://doi.org/10.1002/hrdq.1104

Ellinger, A. D., Ellinger, A. E., Yang, B., & Howton, S. W. (2002). The relationship between the learning organization concept and firms' financial performance: An empirical assessment. *Human Resource Development Quarterly, 13*(1), 5-22. https://doi.org/10.1002/hrdq.1010

Ely, R. J., & Thomas, D. A. (2001). Cultural diversity at work: The effects of diversity perspectives on work group processes and outcomes. *Administrative science quarterly, 46*(2), 229-273.

Finger, M., & Burgin Brand, S. (1999). The concept of the "Learning Organisation" applied to the transformation of the Public Sector. In M. Easterby-Smith, L. Araujo, & J. Burgoyne (Eds.), *Organizational Learning and the Learning Organization* (pp. 130-156). Sage Publications.

Fiol, C. M., & Lyles, M. A. (1985). Organizational learning. *Academy of management review, 10*(4), 803-813. https://doi.org/10.5465/amr.1985.4279103

Fiore, S. M., Smith-Jentsch, K. A., Salas, E., Warner, N., & Letsky, P. (2018). Towards an understanding of macro-cognition in teams: Developing and defining complex collaborative processes and products. *Theoretical Issues in Ergomoics Science, 11*(4), 250-271. https://doi.org/10.1080/14639221003729128

Fiske, S. T. (2010). Interpersonal stratification: status, power and subordination. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of Social Psychology* (pp. 941-982). John Wiley & Sons.

Fiske, S. T., & Berdahl, J. (2007). Social Power. In A. W. Kruglanski & E. T. HIggins (Eds.), *Social Psychology: Handbook of basic prinicples* (pp. 678-692). The Guildford Press.

Fiske, S. T., & Dépret, E. (1996). Control, interdependence and power: Understanding social cognition in its social context. *European review of social psychology, 7*(1), 31-61. https://doi.org/10.1080/14792779443000094

Foley, R. T., Griffin, S., & McCartney, H. (211). Transformation in contract: Learning the lessons of modern war. *International Affairs, 87*(2), 253-270. https://doi.org//10.1111/j.1468-2346.2011.00972.x

Forbes, D., O'Donnel, M., Brand, R. M., Korn, S., Creamer, M. C., McFarlane, A., Sim, M., Forbes, A. B., & Hawthorne, G. (2016). The long-term mental health impact of peace-keeping: prevalence and predictors of psychiatric disorder. *British Journal of Psychiatry, 2*(1), 32-27. https://doi.org/10.1192/bjpo.bp.115.001321

Forbes, D., Pedlar, D., Adler, A. B., Bennett, C., Bryant, R., Busuttil, W., Cooper, J., Creamer, M. C., Fear, N. T., Greenberg, N., Heber, A., Hinton, M., & Mal Hopwood, R. J., Ellie Lawrence-Wood, Alexander McFarlane, Olivia Metcalf, Meaghan O'Donnell, Andrea Phelps, J. Don Richardson, Nicole Sadler, Paula P. Schnurr, Marie-Louise Sharp, James M. Thompson, Robert J. Ursano, Miranda Van Hooff, Darryl Wade & Simon Wessely (2018). Treatment of military-related post-traumatic stress disorder: challenges, innovations, and the way forward. *International Review of Psychiatry, 31*(1), 95-110. https://doi.org/10.1080/09540261.2019.1595545

Force, A. D. (2006). *ADDP 7.0: Doctrine and Training*. https://www.defence.gov.au/ADFWC/Documents/DoctrineLibrary/ADDP/ADDP7.0-Training.pdf

French, J. R., & Raven, B. (1959 (2016)). The bases of social power. In J. M. Shafritz, J. S. Ott, & Y. S. Jang (Eds.), *Classics of organisational theory* (pp. 311-320). Cegnage Learning.

Frick, B., Prinz, J., & Winkelmann, K. (2003). Pay inequalities and team performance: Empirical evidence from the North American major leagues. *International Journal of Manpower*, *24*(4), 472-488. https://doi.org/10.1108/01437720310485942

Friedman, V., Lipshitz, R., & Popper, M. (2005). The Mystification of Organizational Learning. *Journal of Management Inquiry*, *14*(1), 19-30. https://doi.org/10.1177/1056492604273758

Fromm, E. (1941). *Escape from Freedom*. Avon.

Galinsky, A. D., Chou, E. Y., Halevy, N., & Van Kleef, G. A. (2012). The far reaching effects of power: At the individual, dyadic, and group levels. In M. A. Neale & E. B. Mannix (Eds.), *Looking back, Moving forward: A review of group and team-based research* (Vol. 15, pp. 81-113). Emerald Group Publishing.

Galinsky, A. D., Gruenfeld, D. H., & Magee, J. C. (2003). From power to action. *Journal of personality and social psychology*, *85*(3), 453-466. https://doi.org/10.1037/0022-3514.85.3.453

Galinsky, A. D., Magee, J. C., & Inesi, M. E. (2006). Power and perspectives not taken. *Psychological science*, *17*(12), 1068-1074. https://doi.org/10.1111/j.1467-9280.2006.01824.x

Galinsky, A. D., Rucker, D. D., & Magee, J. C. (2015). Power: Past findings, present considerations, and future directions. In M. E. Mikulincer, P. R. Shaver, J. A. Simpson, & J. F. Dovidio (Eds.), *APA handbook of personality and social psychology, Volume 3: Interpersonal relations.* (pp. 421-460). American Psychological Association.

Garvin, D. A. (1993). Building a learning organization. *Harvard Business Review*, 78-91.

Garvin, D. A., Edmondson, A., & Gino, F. (2008). Is yours a Learning Organisation? *Harvard Business Review*, *86*(3), 109-116.

Gerras, S. J. (2002). *The Army as a Learning Organization* US Army War College]. Carlisle Barracks, PA.

Gibson, C., & Vermeulen, F. (2003). A healthy divide: Subgroups as a stimulus for team learning behavior. *Administrative science quarterly*, *48*(2), 202-239.

Giebels, E., Carsten, K. W., & Van Der Vliert, E. (2000). IInterdependence in negotiation: effects of exit options and social motive on distributive and integrative negotiation. *European Journal of Social Psychology*, *30*(2), 255-272.

Gino, F., Argote, L., Miron-Specktor, E., & Todorova, G. (2010). First, get your feet wet: The effects of learning form direct and indirect experience on team creativity. *Organizational Behavior and Human Decision Processes, 111*, 102-115.

Glover, L. (2018, 17 April 2021). Mateship. *Anzac Portal*. https://anzacportal.dva.gov.au/resources/leslie-glover-mateship

Goh, S., & Richards, G. (1997). Benchmarking the learning capability of organizations. *European Management Journal, 15*(5), 575-583. https://doi.org/10.1016/S0263-2373(97)00036-4

Gonzaga, G. C., Keltner, D., & Ward, D. (2008). Power in mixed-sex stranger interactions. *Cognitive and Emotion, 22*(8), 1555-1568. https://doi.org/10.1080/02699930801921008

Goodwin, G. F., Blacksmith, N., & Coats, M. R. (2018). The science of teams in the military: Contributions from over 60 years of research. *American Psychologist, 73*(4), 322-333. https://doi.org/10.1037/amp0000259

Grand, J. A., Braun, M. T., Kuljanin, G., Kozlowski, S. W., & Chao, G. T. (2016). The dynamcis fo team cognition: A process-oriented theory of knowledge emergence in teams. *Journal of applied psychology, 101*, 1353-1385. https://doi.org/10.1037/apl0000136

Grant, A. (2021). *Think Again: The power of knowing what you don't know*. Penguin.

Grant, R. W., & Keohane, R. O. (2005). Accountability and abuses of power in world politics. *American Political Science Review, 99*(1), 29-43. https://doi.org/10.1017/S0003055405051476

Green, P. (1990). Risk Factors for PTSD and other diagnoses in a general sample of Vietnam Veterans. *American Journal of Psychiatry, 147*(6), 729-733. https://doi.org/doi.org/10.1176/ajp.147.6.729

Greer, L. L. (2014). Power in teams: Effects of team power structures on team conflict and team outcomes. In O. B. Ayoko, N. M. Ashkanasy, & K. A. Jehn (Eds.), *Handbook of conflict management research* (pp. 93-108). Edward Elgar Publishing.

Greer, L. L., Caruso, H. M., & Jehn, K. A. (2011). The bigger they are, the ahrder they fall: Linking team power, conflict, congruence, and team performance. *Organizational Behavior and Human Decision Processes, 116*, 116-128.

Greer, L. L., & Chu, C. (2020). Power struggles: when and why benefits of power for individuals paradoxically harm groups. *Current Opinion in Psychology, 33*, 162-166. https://doi.org/https://doi.org/10.1016/j.copsyc.2019.07.040

Greer, L. L., de Jong, B. A., Schouten, M. E., & Dannals, J. E. (2018). Why and when hierarchy impacts team effectiveness: A meta-analytic integration. *Journal of applied psychology*, *103*(6), 591-613. https://doi.org/10.1037/apl0000291

Greer, L. L., Van Bunderen, L., & Yu, S. (2017). The dysfunctions of power in teams: A review and emergent conflict perspective. *Research in Organizational Behavior*, *37*, 103-124. https://doi.org/10.1016/j.riob.2017.10.005

Greer, L. L., & Van Kleef, G. A. (2010). Equality versus differenitation: The effects of power dispersion on group interaction. *Journal of applied psychology*, *95*(6), 1032-1044. https://doi.org/10.1037/a0020373

Grieves, J. (2008). Why we should abandon the idea of the learning organization. *The Learning Organization*, *15*(6), 463-473. https://doi.org/10.1108/09696470810907374

Griffith, J. (1998). The Army's new unit personnel replacement and its relationship to unit cohesion and social support. *Military Psychology*, *1*(1), 17-34.

Groysberg, B., Healy, P. M., & Maber, D. A. (2011). What drives sell-side analyst compensation at high-status investment banks? *Journal of Accounting Research*, *49*(4), 969-1000. https://doi.org/10.1111/j.1475-679X.2011.00417.x

Gruenfeld, D. H., Mannix, E. B., Williams, K. Y., & Neale, M. A. (1996). Group composition and decision making: How member familiarity and information distribution affect process and performance. *Organizational Behavior and Human Decision Processes*, *67*(1), 1-15.

Gruenfeld, D. H., & Tiedens, L. Z. (2010). Organizational preferences and their consequences. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of Social Psychology* (Vol. 3, pp. 1252-1287). John Wiley & Sons.

Guinote, A. (2007a). Behaviour variability and the situated focus theory of power. *European review of social psychology*, *18*(1), 256-295. https://doi.org/0.1080/10463280701692813

Guinote, A. (2007b). Power affects basic cognition: Increased attentional inhibition and flexibility. *Journal of Experimental Social Psychology*, *43*(5), 685-697. https://doi.org/10.1016/j.jesp.2006.06.008

Guinote, A. (2007c). Power and Goal Pursuit. *Personality and Social Psychology Bulletin*, *33*(8), 1076-1087. https://doi.org/10.1177/0146167207301011

Guinote, A. (2017). How power effects people:activation, wanting and goal seeking. *Annual Review of Psychology*, *68*(1), 353-381. https://doi.org/10.1146/annurev-psych-010416-044153

Guinote, A., & Weick, M. (2012). Does power magnify the expression of dispositions? . *Psychological science*, *23*(5), 475-482. https://doi.org/10.1177/0956797611428472

Gwinn, J. D., Judd, C. M., & Park, B. (2013). Less power = less human? Effects of power differentials on dehumanization. *Journal of Experimental Social Psychology*, *49*(3), 464-470. https://doi.org/10.1016/j.jesp.2013.01.005

Habib, A., Stevelink, S. A. M., Greenberg, N., & Williamson, V. (2018). Post-traumatic growth in (ex-) military personnel: review and qualitative synthesis, . *Occupational Medicine*, *68*(9), 617–625. https://doi.org/10.1093/occmed/kqy140

Halevy, N., Chou, E. Y., Cohen, T. R., & Livingston, R. W. (2012). Status conferral in intergroup social dilemmas: Behavioral antecedents and consequences of prestige and dominance. *Journal of personality and social psychology*, *102*(2), 351–366. https://doi.org/https://doi.org/10.1037/a0025515

Halevy, N., Chou, E. Y., & Galinsky, A. D. (2011). A functional model of hierarchy: Why, how, and when vertical differentiation enhances group performance. *Organizational Psychology Review*, *1*(1), 32-52. https://doi.org/10.1177/2041386610380991

Hall, J. A., Schmid Mast, M., & Latu, I. (2015). The vertical dimension of social relations and accurate interpersonal perception: A meta-analysis. *Journal of Non-verbal Behaviour*, *39*, 131-163. https://doi.org/10.1007/s10919-014-0205-1

Hannah, S. T., Uhl-Ben, M., Avolio, B. J., & Cavarreta, F. L. (2009). A framework for examining leadership in extreme contexts. *The Leadership Quarterly,*, *20*, 897-919. https://doi.org/https://core.ac.uk/download/pdf/17235973.pdf

Hannan, M. T., & Freeman, J. (1984). Structural inertia and organizational change. *American Sociological Review*, 149-164.

Haslam, A. S., McGarty, C., Brown, P. M., Eggins, R. A., Morrison, B. E., & Reynolds, K. J. (1998). Inspecting the Emperor's new clothes: Evidence that random selection of leaders can enhance group performance. *Group Dynamics: Theory, Research, and Practice*, *2*(3), 168-184.

Hasselbladh, H., & Ydén, K. (2020). Why Military Organizations Are Cautious About Learning? . *Armed Forces & Society*, *46*(3). https://doi.org/10.1177/0095327X19832058

Haveman, H. A., Mahoney, J. T., & Mannix, E. B. (2019). Editors Comments: The role of thoery in management reearch. *Academy of management review*, *44*(2), 241-243. https://doi.org/10.5465/amr.2019.0034

Hayes, A. F. (2015). An index and test of linear moderated mediation. *Multivariate behavioral research*, *50*(1), 1-22.

Hayes, A. F. (2017). *Introduction of mediation, moderation and conditional process analysis: A regression-based approach*. Guildford Publications.

Hedberg, B. (1981). How Organizations Learn and Unlearn. In P. Nystrom & W. Starbuck (Eds.), *Handbook of Organizational Design: Adapting Organizations to their environment* (pp. 1-27). Oxford University Press.

Hoffman, M., Chan, D., Chen, G., Dansereau, F., Rousseau, D., & Schneider, B. (2019). Panel Interview: Reflections on Multilevel Theory, Measurement, and Analysis. In S. E. Humphrey & J. M. LeBreton (Eds.), *The Handbook of Multilevel Theory, Measures and Analysis*. American Psychological Association. https://doi.org/10.1037/0000115-001

Hofstede, G. (1984). *Culture's consequences: International differences in work-related values* (Vol. 5). Sage.

Hollingshead, A. B., & Fraidlin, S. N. (2003). Gender stereotypes and assumptions abour expertise in transactive memory. *Journal of Experimental Social Psychology, 39*(4), 355-363. https://doi.org/10.1016/S0022-1031(02)00549-8

Hoogervorst, N., De Cremer, D., van Dijke, M., & Mayer, D. M. (2012). When do leaders sacrifice?: The effects of sense of power and belongingness on leader self-sacrifice. *The Leadership Quarterly, , 23*(4), 883-896. https://doi.org/10.1016/j.leaqua.2012.05.006

Hosek, J., Kavanagh, J., & Miller, L. (2006). *How deployments effect service members*. RAND Corporation.

House, R., Rousseau, D., & Thomas-Hunt, M. (1995). The meso paradigm: A framework for the integration of micro and macro organisational behavior. In L. L. Cummings & B. M. Staw (Eds.), *Research in Organisational Behavior* (Vol. 17, pp. 71-114). JAI Press.

Hsu, S.-W., & Lamb, P. (2020). Still in search of the learning organization? Towards a radical account of the Fifth Discipline: The Art and Practice of the Learning Organization. *The Learning Organization, 27*(1), 31-41. https://doi.org/10.1108/TLO-09-2019-0142

Humphrey, S. E., & LeBreton, J. M. (2019). *Handbook of multilevel theory, measurement and analysis*. American Psychological Association https://doi.org/10.1037/0000115-025

Hunter, C. (2018). Mateship meant everything. *Australian War Memorial*. https://www.awm.gov.au/articles/blog/bill-grayden-and-kokoda

Hurst, D. (2020, 5 July 2020). 'Alarm bells': how China's assertiveness led to Australia's defence overhaul. *The Guardian*. https://www.theguardian.com/australia-news/2020/jul/05/alarm-bells-how-chinas-assertiveness-led-to-australias-defence-overhaul

Ilgen, D. R., Hollenbeck, J. R., Johnson, M., & Jundt, D. (2005). Teams in Organizations: From Input-Process-Output models to IMOI models. *Annual Review of Psychology, 56*, 517-543.

Inesi, M. E., Gruenfeld, D. H., & Galinsky, A. D. (2012). How power corrupts relationships: Cynical attributions for others' generous acts. *Journal of Experimental Social Psychology, 48*(4), 795-803. https://doi.org/10.1016/j.jesp.2012.01.008

Ingersoll, R. M. (2003). *Who controls teachers' work? Power and accountability in America's Schools*. Harvard University Press.

Janis, I. L., & Mann, L. (1977). *Decision making; A psychological analysis of conflict, choice and commitment*. Free Press.

Jewell, R. T., & Molina, D. J. (2004). Productive efficiency and salary distribution: The case of US major league baseball. *Scottish Journal of Political Economy, 51*(1), 127-142. https://doi.org/10.1111/j.0036-9292.2004.05101008.x

Jex, S., & Bliese, P. (1999). Efficiacy as a moderator of the impact of work-related stressors: A multilevel study. *Journal of applied psychology, 84*(3), 349-361. https://doi.org/10.1037/0021-9010.84.3.349

Johns, G. (2006). The essential impact of context on organizational behavior. *Academy of management review, 31*(2), 386-408. https://doi.org/10.5465/amr.2006.20208687

Johnston, D., Hutchins, S., Bishop, M., Ferguson, A., Payne, M., & Stottt Despoja, N. (2006). *Reforms to Australia's military justice system: Parlimentary review*. Commonwealth of Australia. https://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Foreign_Affairs_Defence_and_Trade/Completed_inquiries/2008-10/legmiljustice/report01/index

Johnston, J., Poirier, R., & Smith-Jentsch, K. A. (1998). Decision-making Under Stress: Creating a research methodology. In J. A. Cannon-Bowers & E. Salas (Eds.), *Making Decisions under Stress* (pp. 9-59). Americian Psychological Association.

Kahana, E., Kahana, B., Harel, Z., & Rosner, T. (1988). Coping with Extreme Trauma. In J. P. Wilson, Z. Harel, & B. Kahana (Eds.), *Human Adaptation to Extreme Stress; From the Holocaust to Vietnam* (pp. 55-79). Springer Link.

Kamphuis, W. (2010). *Teams under threat: Uncovering and overcoming rigidity* Tilburg University]. Tilburg University. https://research.tilburguniversity.edu/en/publications/teams-under-threat-uncovering-and-overcoming-rigidity-effects

Kelly, D., & Amburgey, T. L. (1991). Organizational inertia and momentum: A dynamic model of strategic change. *Academy of Management Journal, 34*(3), 591-612. https://doi.org/10.5465/256407

Kelman, H. C. (1958). Compliance, indentification, and internalisation of three processes of attitudinal change. *Journal of conflict resolution, 2*(1), 51-60.

Keltner, D., Gruenfeld, D. H., & Anderson, C. (2003). *Power, approach and inhibition*. G. S. o. Business.

Kim, J., Egan, T., & Tolson, H. (2015). Examining the Dimensions of the Learning Organization Questionnaire: A review and critique of research utiliizing the DLOQ. *Human Resource Development Review, 14*(1), 91-112. https://doi.org/10.1177/1534484314555402

Kinney, W. (2012). Comparing PTSD among returning Afghanistan and Iraq war veterans: Symptons and suffering similar to ordeals of Persian Gulk and Vietnam War Veterans. *Journal of Military and Vetarans' Health, 20*(3), 21-23. https://jmvh.org/wp-content/uploads/2012/08/JMVH-Vol20-August-2.pdf

Kipnis, D. (1972). Does power corrupt? *Journal of personality and social psychology, 24*(1), 33-41.

Kipnis, D., Castell, J., Gergen, M., & Mauch, D. (1976). Metamorphic effects of power. *Journal of applied psychology, 61*(2), 127-135. https://doi.org/10.1037/0021-9010.61.2.127

Klein, K. J., & Kozlowski, S. W. (2000). *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions*. Jossey-Bass.

Klien, K. J., Ziegert, J. C., Knight, A. P., & Xiao, Y. (2006). Dynamic Delegation: Shared, Hierarchical and Deindividualized Leadership in Extreme Action Teams. *Administrative science quarterly, 51*(4), 590-621. https://doi.org/10.2189/asqu.51.4.590

Koenen, K. C., Stellman, J. M., Stellman, S. D., & Sommer, J. F. (2003). Risk factors for course of post-traumatic stress disorder among Vietnam veterans: A 14-year follow-up of American Legionnaires. *Journal of Consulting and Clinical Psychology, 71*(6), 980-986. https://doi.org/10.1037/0022-006X.71.6.980

Koeslag-Kreunen, M., Van den Bossche, P., Hoven, M., Van der Klink, M., & Gijselaers, W. (2018). When leadership powers team learning: a meta-analysis. *Small group research, 49*(4), 475-513. https://doi.org/https://doi.org/10.1177/1046496418764824

Kostopoulos, K. C., & Bozionelos, N. (2011). Team exploratory and exploitative learning: Psychological safety, task conflict, and team performance. *Group & Organization Management, 36*(3), 385-415. https://doi.org/10.1177/1059601111405985

Kostopoulos, K. C., Spanos, Y. E., & Prastacos, G. P. (2013). Structure and function of team learning emergence: A multilevel empirical validation. *Journal of Management, 39*(6), 1430-1461. https://doi.org/10.1177/0149206311419366

Kozlowski, S. W. (1998). Training and developing adaptive teams: theory, principles and research. In J. A. Cannon-Bowers & E. Salas (Eds.), *Decision Making under Stress* (pp. 115-153). American Psychological Association.

Kozlowski, S. W. (2018). Enhancing the Effectives of work groups and teams: A reflection. *Perspectives on Psychological Science, 13*(2), 205-212. https://doi.org/DOI: 10.1177/1745691617697078

Kozlowski, S. W., & Bell, B. S. (2008). Team learning, development, and adaptation. In V. I. Sessa & M. London (Eds.), *Workgroup learning* (pp. 15-44). Lawrence Erlbaum Associates.

Kozlowski, S. W., & Chao, G. T. (2012). The dynamics of emergence: Cognition and cohesion in work teams. *Managerial and Decision Economics, 33*(5-6), 335-354. https://doi.org/10.1177/2041386614547955

Kozlowski, S. W., Chao, G. T., & Jensen, J. M. (2010). Building an Infrastructure for Organizational Learning: A multilevel approach. In S. W. Kozlowski & E. Salas (Eds.), *Learning, Training and Development in Organizations* (pp. 363-404). Routledge.

Kruglanski, A. W., & Webster, D. M. (1996). Motivated closing of the mind: Seizing and freezing. *Psychological Review, 103*(2), 263-283.

Lähteenmäki, S., Toivonen, J., & Mattila, M. (2002). Critical aspects of Organizational Learning Research and Proposals for its measurement. *British Journal of Management, 12*(3), 113-129. https://doi.org/10.1111/1467-8551.00189

Lange, D., & Bliese, P. (2019). A temporal perspective emergence: Using three-level mixed-effects models to track consensus emergence in groups. In S. E. Humphrey & J. M. LeBreton (Eds.), *The Handbook of Multilevel Theory, Measurement and Analysis* (pp. 516-540). American Psychological Association.

Langford, I. (2019). *Accelerated Warfare*. Australian Army Research Centre. https://researchcentre.army.gov.au/library/seminar-series/accelerated-warfare

Lau, D. C., & Murnighan, J. K. (2005). Interaction within group and subgroups: The effect of demographic fault lines. *Academy of Management Journal, 48*(4), 645-659.

Laurin, K., Fitzsimons, G. M., Finkel, E. J., Carswell, K. L., vanDellen, M. R., Hofmann, W., Lambert, N. M., Eastwick, P. W., Fincham, F. D., & Brown, P. C. (2016). Power and the pursuit of a partner's goals. *Journal of personality and social psychology, 110*(6), 840-868. https://doi.org/10.1037/pspi0000048

Levinthal, D., & March, J. G. (1981). A model of adaptive organizational search. *Journal of Economic Behavior and Organization, 2*(4), 307-333.

Lewis, K., Lange, D., & Gillis, W. (2005). Transactive memory systems, learning and learning transfer. *Organizational Science, 16*(6), 581-598.

Liang, D. W., Moreland, R. L., & Argote, L. (1995). Group versus individual training and group performance: The mediating factor of transactive memory. *Personality and Social Psychology Bulletin, 21*(4), 384-393.

Lowe, K. B., Kroeck, K. G., & Sivasubramaniam, N. (1996). Effectiveness correlates of transformational and transactional leadership: A meta-analytic review of the MLQ literature. *The leadership quarterly, 7*(3), 385-425. https://doi.org/10.1016/S1048-9843(96)90027-2

Lynch, R. A. (2011). Foucault's theory of power. In D. Tayloer (Ed.), *Micheal Foucault: Key Conceptus* (pp. 13-26). Acumen Publishing.

Magee, J. C., & Galinsky, A. D. (2008). Social hierarchy: The self-reinforcing nature of power and status. *The Academy of Management Annuals, 2*(1), 351–398. https://doi.org/ https://doi.org/10.1080/19416520802211628

Main, B. G. M., O'Reily, C. A., & Wade, J. (1993). Top Executive Pay: Tournament or teamwork? *Journal of Labor Economics, 11*(4), 606-628. https://doi.org/10.1086/298309

Maner, J. K., & Mead, N. L. (2010). The essential tension between leadership and power: When leaders scarifices group goals for the sake of self-interest. *Journal of personality and social psychology, 99*(3), 482-487. https://doi.org/10.1037/a0018559

Mannix, E. B. (1993). The influence of power distribution norms, and task meeting structure on resource allocation in small group negotiation. *International Journal of Conflict Management, 4*(1), 5-23. https://doi.org/10.1108/eb022719

Manz, C. C., & Giola, D. A. (1983). The interrelationship of power and control. *Human relations, 36*(5), 459-475. https://doi.org/10.1177/001872678303600504

Marcus, R. (2015). Military innovation and tactical adaptation in the Israel-Hizballah conflict: the institutionalization of lesson-learning in the IDF. . *Journal of Strategic Studies, 38*(4), 500-528. https://doi.org/10.1080/01402390.2014.923767

Marcus, R. (2019). Learning 'Under Fire": Israel's improvised military adaptation to Hamas tunnel warfare. . *Journal of Strategic Studies, 42*(3-4), 344-360. https://doi.org/10.1080/01402390.2017.1307744

Mark, K., Stevelink, S., Choi, J., & Fear, N. (2018). Post-traumatic growth in the military: a systematic review. *Occupational and environmental medicine, 75*, 904-915. https://doi.org/75. 10.1136/oemed-2018-105166.

Martins, L. L., Schilpzand, M. C., Kirkman, B. L., Ivanaj, S., & Ivanaj, V. (2013). A contingency view of the effects of cognitive diversity on team

performance: The moderating roles of team psychological safety and

relationship conflict. . *Small group research, 44*(2), 96-126.

Marziliano, M., Tuman, M., & Moyer, A. (2019). The relationship between post-traumatic stress and post-traumatic growth in cancer patients and survivors: A systematic review and meta-analysis. *Psycho-Oncology, 29*(4), 604-616. https://doi.org/10.1002/pon.5314

Mathieu, J. E., & Chen, G. (2011). The etiology of the multilevel paradigm in management research. *Journal of Management, 37*(2), 610-641. https://doi.org/10.1177/0149206310364663

Mathieu, J. E., Heffner, T. S., Goodwin, G., Salas, E., & Cannon-Bowes, J. A. (2000). The influence of shared mental models on team processes and performance. . *Journal of applied psychology, 85*(2), 273-283.

Mathieu, J. E., & Luciano, M. (2019). Multilevel emergence in work collectives. In S. E. Humphrey & J. M. LeBreton (Eds.), *The Handbook of Multilevel Theory, Measurement and Analysis* (pp. 163-186). American Psychology Association. https://doi.org/10.1037/0000115-008

Mayar, R. C., David, J. H., & Schoorman, F. D. (1995). An integrated Model of Organizational Trust. *The Academy of Management Review, 20*(3), 709-734.

Maynard, T. M., MKennedy, D. M., & Resick, C. J. (2018). Teamwork in extreme environments: Lessons, challenges, and opportunitiesTeamwork in extreme environments: Lessons, challenges, and opportunities. *Journal of Organizational Behavior, 39*(6), 695-700. https://doi.org/10.1002/job.2302

McGrath, J. E. (1957). *A framework for integration of small group research studies*. Air Force Office of Scienctific Research.

McGrath, J. E. (1984). *Social Psychology: A brief introduction*. Rinehart & Winston.

Merali, Y., & Allen, P. (2011). Complexity and Systems Thinking. In P. Allen, S. Macguire, & B. McKelvey (Eds.), *The SAGEHandbook of Complexity and Management* (pp. 31-52). SAGE Publications.

Meredith, L. S., Carra S. Sims, Benjamin Saul Batorsky, Adeyemi Theophilus Okunogbe, Brittany L. Bannon, and Craig A. Myatt,. (2017). *Identifying Promising Approaches to U.S. Army Institutional Change: A Review of the Literature on Organizational Culture and Climate.* (RR-1588-A). https://www.rand.org/pubs/research_reports/RR1588.html

Meslec, N., Duel, J., & Soeters, J. (2020). The role of teamwork on team performance in extreme military environments: an empirical study. *Team Performance Management, 26*(5/6), 325-339. https://doi.org/10.1108/TPM-02-2020-0009

Milgram, N. A., Orenstein, R., & Zafrir, E. (1989). Stressors, personal resources and social supports in military performance during wartime. *Military Psychology, 1*(4), 185-199. https://doi.org/10.1207/s15327876mp0104_1

Mitchell, R. K., & Boyle, B. (2015). Professional diversity, identify salience and team innovation: the moderating role of openmindedness norms. *Journal of Organizational Behavior, 36*(6), 873-894.

Mitchell, R. K., Boyle, B., Parker, V., Giles, M., Chiang, V., & Joyce, P. (2015). Managing inclusiveness and diversity in teams; How leader inclusiveness mediates performance through status and team identity. *Human Resource Management, 54*(2), 217-239. https://doi.org/10.1002/hrm.21658

Moreland, R. L., & Myaskovsky, L. (2000). Exploring the performance beneftis of group training: Transactive memory or improved communication? *Organizational Behavior and Human Decision Processes, 82*(1), 117.

Nagl, J. A. (2005). *Learning to eat soup with a knife: Counterinsurgency lessons from Malaya and Vietnam*. University of Chicago Press.

Nasveld, P., Cotea, C., Pullman, S., & Pietrzak, E. (2012). Effects of deployment on mental health in moderan miltiary forces: A review of longitudinal studies. *Journal of Military and Vetarans' Health, 20*(3), 24-36. https://jmvh.org/wp-content/uploads/2012/08/JMVH-Vol20-August-2.pdf

Nembhard, I. M., & Edmondson, A. (2006). Making it safe: The effects of leadership inclusiveness and professional status on psychological safety and improvement effort in health care teams. . *Journal of Organizational Behavior, 27*(7), 941-966.

Newby, J. H., McCarroll, J. E., Ursano, R. J., Fan, Z., Shigemura, J., & Tucker-Harris, Y. (2005). Positive and negative consequences of a military deployment. *Military medicine, 170*(10), 815-819.

Nissan, T., Shapiro, O., & Liberman, N. (2015). Effects of power on mental rotation and emotion recognition in women. *Personality and Social Psychology Bulletin, 41*(10), 1425-1437.

O'Toole, P., & Talbot, S. (2011). Fighting for Knowledge: Developing Learning Systems in the Australian Army. *Armed Forces & Society, 37*(1), 42-67. https://doi.org/10.1177/0095327X10379731

Oc, B., Bashshur, M. R., & Moore, C. (2015). Speaking truth to power: The effect of candid feedback on how individuals with power allocate resources. *Journal of applied psychology, 100*(2), 450-463. https://doi.org/0.1037/a0038138

Omarova, A., Richmond, M., & Ireland, V. (2018). A systems approach to analysing organisational-adaptability: Review of the Australian Army Lessons- Newwork as a case study. Data and Decisions in Action 2: Proceedings of the ASOR/DORS Conference,

Ortenblad, A. (2007). Senge's many faces: Problem or opportunity? *The Learning Organization, 14*(2), 108-122. https://doi.org/10.1108/09696470710726989

Örtenblad, A. (2001). On the differences between organizational learning and learning organization. *The Learning Organization, 8*(3), 125-133. https://doi.org/10.1108/09696470110391211

Örtenblad, A. (2002). A typology of the idea of learning organization. *Management learning, 33*(2), 213-230. https://doi.org/10.1177/1350507602332004

Örtenblad, A. (2018). What does "learning organization" mean? *The Learning Organization, 25*(3), 150-158. https://doi.org/10.1108/TLO-02-2018-0016

Örtenblad, A. (2019). *The Oxford Handbook of the Learning Organization*. Oxford University Press.

Örtenblad, A., Fan, Z., Peng, C., Li, B., Li, Z., & Cong, X. (2013). Putting the learning organization into context: contributions from previous works. In A. Örtenblad (Ed.), *Handbook of Research on the Learning Organization* (pp. 35-50). Edward Elgar Publishing.

Orvis, K. L., Ruark, G., Pierce, L., & Goodwin, G. (2009). *Scenario training for agile teams (STAT): Development of a company leadership team training tool*. U.S. Army Research Institute.

Overbeck, J. R., & Park, B. (2001). When power does not corrupt: Superior individuation processes among powerful perceivers. *Journal of personality and social psychology, 81*, 549-565.

Overbeck, J. R., & Park, B. (2006). Powerful perceivers, powerless objects: Flexibility of powerholders social attention. *Organizational Behavior and Human Decision Processes, 99*, 227-243.

Paananen, S., Häyhä, L., & Hedlund, E. (2020). Diversity in Teams: Perceptions of Team Learning Behaviour in a Military Staff Exercise. *Scandinavian Journal of Military Studies, 3*(1), 1–17. https://doi.org/https://doi.org/10.31374/sjms.6

Patel, P. C., & Cooper, D. (2014). Structural power equality between family and non-family TMT members and the performance of family firms. *Academy of management journals, 57*(6), 1624-1649.

Pearce, C. L., & Sims, H. P., Jr. (2002). Vertical versus shared leadership as predictors of the effectiveness of change management teams: An examination of aversive, directive, transactional, transformational, and empowering leader behaviors. *Group Dynamics: Theory, Research, and Practice, 6*(2), 172-197. https://doi.org/10.1037/1089-2699.6.2.172

Pedler, M., & Burgoyne, J. (2017). Is the Learning Organization still alive. *The Learning Organization, 24*(2), 119-126. https://doi.org/10.1108/TLO-12-2016-0087

Peters, T. (1992). *Liberation Management*. Knopf.

Pinkley, R. L., Neale, M. A., & Bennett, R. J. (1994). The impact of alternatives to settlement in dyadic negotiations. *Organizational Behavior and Human Decision Processes, 57*(1), 97-116.

Pokharel, M. P., & Choi, S. O. (2015). Exploring the relationship between the learning organization and organizational performance. *Management Research Review, 38*(2), 126-148. https://doi.org/10.1108/mrr-02-2013-0033

Polyhart, R. E., & Hendricks, J. L. (2019). The missing levels of microfoundations: A call for bottom-up theory and methods. In S. E. Humphrey & J. M. LeBreton (Eds.), *The Handbook of Multilevel Theory, Measurement and Analysis* (Vol. 141-162). American Psychological Association https://doi.org/10.1037/0000115-007

Popper, M., & Lipshitz, R. (2000). Organizational learning: Mechanisms, culture, and feasibility. In C. Grey & E. Antonacopulou (Eds.), *Essential Readings in Management Learning* (Vol. 31, pp. 181-196). Sage Publications.

Porath, C., Overbeck , J. L., & Pearson, C. M. (2008). Picking Up the Gauntlet: How Individuals Respond to Status Challenges. *Journal of Applied Social Psychology, 38*(2), 1945-1980. https://doi.org/10.1111/j.1559-1816.2008.00375.x

Reep, J. A. (2021). Expertise and distributed team cognition: A critical review and research agenda. In M. McNeese, E. Salas, & M. R. Endsley (Eds.), *Foundations and Theoretical Perspeectives of dsitributed team cognition* (pp. 185-208). CRC Press.

Reese, S. R. (2020a). Reflecting on impacts of Peter Senge's Fifth Discipline on learning organizations. *The Learning Organization, 27*(1), 75-80. https://doi.org/10.1108/TLO-01-2020-244

Reese, S. R. (2020b). Taking the learning organization mainstream and beyond the organizational level: an interview with Peter Senge. *The Learning Organization, 27*(1), 6-16. https://doi.org/10.1108/TLO-09-2019-0136

Rentsche, J. R., & Klimoski, R. (2001). Why do 'great minds' think alike?: Antcedents of team member schema agreement. *Journal of Organizational Behavior, 22*, 107-120.

Richards, D. G., & Guell, R. (1998). Baseball success and the structure of salaries. . *Applied Economics Letters 5*(5), 291-296. https://doi.org/10.1080/758524403

Righetti, F., Luchies, L. B., van Gils, S., Slotter, E. B., Witcher, B., & Kumashiro, M. (2015). he prosocial versus proself power holder: How power influences sacrifice in romantic relationships. *Personality and Social Psychology Bulletin*, *41*(6), 779-790. https://doi.org/10.1177/0146167215579054

Roloff, K. S., Woolley, A. W., & Edmondson, A. C. (2011). The Contribution of Teams to Organizational Learning. In M. Easterby-Smith & M. A. Lyles (Eds.), *Handbook of Organizational Learning and Knowledge Management* (pp. 249-272). John Wiley & Sons.

Ronay, R., ., Greenaway, K., Anicich, E. M., & Galinsky, A. D. (2012). The Path to Glory Is Paved With Hierarchy: When Hierarchical Differentiation Increases Group Effectiveness. . *Psychological science*, *23*(6), 669-677. https://doi.org/10.1177/0956797611433876

Rosen, S. P. (1991). *Winning the next War: Innovation and the Modern Military*. . Cornell University Press.

Rousseau, D. (1985). Issues of level in organizational research: Multi-level and cross-level perspectives. *Research in Organizational Behavior*, *7*, 1-37.

Rousseau, D. (2011). Reinforcing the Micro/Macro Bridge: Organizational thnking and pluralistic vehicles. *Journal of Management*, *37*(2), 429-442. https://doi.org/10.1177/0149206310372414

Rulke, D. L., & Galaskiewicz, J. (2000). Distribution of knowledge, group network structure and group performance. *Management Science*, *46*(5), 612-625.

Rulke, D. L., & Rau, D. (2000). Investigation the encoding process and transactive memory development in group training. *Group & Organization Management*, *25*(4), 373-396.

Russell, B. (1938). *Power: A new social analysis*. W.W. Norton and Co.

Ryan, M. (2016). *The Ryan Review: A study of Army's education, training and doctrine needs for the future*. A. A. R. Centre. https://researchcentre.army.gov.au/sites/default/files/2016_05_dgt_theryanreview_web.pdf

Salas, E., Bowers, C. A., & Cannon-Bowers, J. A. (2009). Military Team Research: !0 years of progress. *Military Pscyhology*, *7*(2), 55-75. https://doi.org/10.1207/s15327876mp0702_2

Sanner, B., & Bunderson, J. S. (2015). When feeling safe isn't enough: Contextualizing models of safety and learning in teams. *Organizational Psychology Review*, *5*(3), 224-243. https://doi.org/10.1177/2041386614565145

Sarin, S., & McDermott, C. (2003). The effect of team leader characteristics on learning, knowledge application and performance of cross-functional new product development teams. *Decision Sciences*, *34*(4), 707-739.

Sassenberg, K., Ellemers, N., Scheepers, D., & Scholl, A. . (2014). Power corrupts revisited: The role of construal of power as opportunity or responsibility. In J.-W. van Prooijen & P. A. M. van Lange (Eds.), *Power, politics, and paranoia: Why people are suspicious of their leaders* (pp. 73-87). Cambridge University Press.

Sauer, N. C., & Kauffeld, S. (2013). Meetings as Networks: Applying Social Network Analysis to team interaction. *Communications Methods and Measures, 7*(1), 26-47. https://doi.org/10.1080/19312458.2012.760729

Sawaoka, T., Hughes, B. L., & Ambady, N. (2015). Power Heightens sensitivity to unfairness against self. *Personality and Social Psychology Bulletin, 41*(8), 1023-1035. https://doi.org/10.1177/0146167215588755

Schilke, O., & Cook, K. S. (2015). Sources of alliance partner trustworthiness: Integrating calculative and relational perspectives. *Strategic Management Journal, 36*(2), 276-297. https://doi.org/10.1002/smj.2208

Schilling, J., & Kluge, A. (2009). Barriers to organizational learning: An integration of theory and research. *International journal of management reviews, 11*(3), 337-360. https://doi.org/10.1111/j.1468-2370.2008.00242.x

Schmid Mast, M., & Jones, K. (2009). Give a person power and he or she will show interpersonal sensitivity: the phenomenon and its why and when. *Journal of personality and social psychology, 97*(5), 835-850. https://doi.org/10.1037/a0016234

Schmid , P. C., & Amodio, D. M. (2017). Power effects on implicit prejudice and stereotyping: The role of intergroup face processing. *Social Neuroscience, 12*(2), 218-231. https://doi.org/10.1080/17470919.2021.1906745

Senge, P. M. (1990). *The Fifth Discipline: The Art and Practice of the Learning Organization*. Currency.

Senge, P. M. (2006). *The fifth discipline: The art and practice of the learning organization*. Doubleday.

Serena, C. (2011). *A revolution in military adaptation: the US Army in the Iraq War*. Washington Georgetown University Press.

Serfaty, D., Entin, E., & Johnston, J. (1998). Team Coordiantion Training. In J. A. Cannon-Bowers & E. Salas (Eds.), *Making Decisions under Stress* (pp. 221-245). McGrath-Hill.

Sessa, V. I., & London, M. (2006). *Continuous Learning: Individual, group and organizational perspectives*. Lawrence Erlbaum Associates.

Shakespeare-Finch, J., & Lurie-Beck, J. (2014). A meta-analytic clarification of the relationship between post-traumatic growth and symptoms of post-traumatic distress disorder. *Journal of Anxiety Disorders, 28*(2), 233-229. https://doi.org/ 10.1016/j.janxdis.2013.10.005

Shoebridge, M. (2020, 14 March 2021). Defence strategic update promises real change but more is needed. *The Strategist*. https://www.aspistrategist.org.au/defence-strategic-update-promises-real-change-but-more-is-needed/nag

Shuffler, M. L., & Carter, D. R. (2018). Teamwork situated in multiteam systems: Key lessons learned and future opportunities. *American Psychologist, 73*(4), 390-406. https://doi.org/10.1037/amp0000322

Simon, H. A. (1957). *Models of man: social and rational*. Wiley.

Simon, H. A. (1973). The organization of complex systems. In H. H. Pattee (Ed.), *Hierarchy theory* (pp. 1-27). Braziller.

Smith, P. K., & Trope, Y. (2006). You focus on the forest when you're in charge of the trees: Power priming and abstract information processing. *Journal of personality and social psychology, 90*(4), 578-596. https://doi.org/10.1037/0022-3514.90.4.578

Smith-Jentsch, K. A., Campbell, G. E., Mianovich, D. M., & Reynolds, A. M. (2001). Measuring teamwork mental models to support training needs assessment, development, and evaluation: Two empirical studies. *Journal of Organizational Behavior, 22*, 179-194.

Snyder, C. R. (2016). *Learning Organization Models and Their Application to the U.S. Army*. USA Research Institute for the Behavioral and Social Sciences.

Soeters, J. (2018). Organizational cultures in the Military. In Caforio G. & N. M. (Eds.), *Handbook of the Sociology of the Military*. Springer, Cham.

Sondak, H., & Bazerman, M. H. (1991). Power balance and the rationality of outcomes in matching markets. *Organizational Behavior and Human Decision Processes, 50*(1), 1-23.

Stothard, C., Drobnjak, M., & Talbot, S. (unpublished, 2014). *Australian Army Learning Organisation: Qualitative findings and themes*. Defence Science and Technology Organisation.

Stothard, C., Talbot, S., Drobnjak, M., & Fischer, T. (2013). Using the DLOQ in a military context: Culture trumps strategy. *Advances in developing human resources, 15*(2), 193-206. https://doi.org/doi.org/10.1177/1523422313477592

Stuart, H. (2011). *Membership change: A network perspective* University of Toronto]. Toronto. https://central.bac-lac.gc.ca/.item?id=NR77648&op=pdf&app=Library&oclc_number=1019495828

Swaab, R., Schaerer, M., Anicich, E., Ronay , R., & Galinsky, A. (2014). The Too-Much-Talent Effect: Team Interdependence Determines When More Talent Is Too Much or Not Enough. *Psychological Science. , 25*(8), 1581-1591. . https://doi.org/10.1177/0956797614537280

Swaab, R. I., & Galinsky, A. D. (2015). Egalitarianism makes organizations stronger: Cross-national variation in institutional and psychological equality predicts talent levels and the performance of national teams. *Organizational Behavior and Human Decision Processes, 129*, 80-92. https://doi.org/10.1016/j.obhdp.2014.05.002

Talbot, S. (2013). Learning to Add Value: Fostering cultures of effective learning in the Australian Army. *Australian Army Journal, 10*(3), 159-171.

Talbot, S., Stothard, C., Drobnjak, M., & McDowall, D. (2014). *Learning organisations: A literature review and critique* (DSTO-TR-2928). D. S. a. T. Group. https://apps.dtic.mil/sti/pdfs/ADA625029.pdf

Tarakci, M., Greer, L. L., & Groenen, P. J. (2016). When does power disparity help or hurt group performance? *Journal of applied psychology, 101*(3), 415-429. https://doi.org/10.1037/apl0000056

Tay, L., Woo, S. E., & Vermunt, J. K. (2014). A conceptual and methodological framework for psychometric isomorphism: Validation of multilevel construct measures. *Organizational research methods, 17*(1), 77-106. https://doi.org/10.1177/1094428113517008

Tedeschi, R. G., & Calhoun, L. G. (2004a). Posttraumatic growth: A new perspective on psychotraumatology. *Psychiatric Times, 21*(4), 58-60.

Tedeschi, R. G., & Calhoun, L. G. (2004b). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological inquiry, 15*(1), 1-18. https://doi.org/10.1207/s15327965pli1501_01

Thibaut, J. W., & Kelley, H. H. (1959). *The Social Psychology of Groups*. John Wiley & Sons.

Thorburn, C. (2021, 14 March 2021). Learning and leading through collaboration. *The Cove*. https://cove.army.gov.au/article/learning-and-leading-through-collaboration

Tiedens, L. Z., & Fragale, A. R. (2003). Power moves: Complementarity in dominant and submissive non-verbal behavior. *Journal of Applied Social Psychology, 84*(3), 558-568.

Tjosvold, D., Yu, Z.-Y., & Hui, C. (2004). Team learning from mistakes: the contribution of cooperative goals and problem-solving. *The Journal of Management Studies, 41*(7), 1223-1245.

Tost, L. P., Gino, F., & Larrick, R. P. (2013). When power makes others speechless: The negative impact of leader power on team performance. *Academy of management Jounral, 56*(5), 1465-1486.

Triandis, H. C., & Gelfand, M. (1998). Converging measures of horizontal and vertical individualism and collectivism. *Journal of personality and social psychology, 74*, 118-128.

Trzebiatowski, T. M., & Trevor, C. O. (2016). *Talent dispersion and team performance* Academy of Management Proceedings,

Tsang, E. W. (1997). Organizational learning and the learning organization: a dichotomy between descriptive and prescriptive research. *Human relations, 50*(1), 73-89.

Tsang, E. W. (2017). How the concept of organizational unlearning contributes to studies of learning organizations: A personal reflection. *The Learning Organization, 24*(1), 39-48. https://doi.org/10.1108/TLO-10-2016-0064

Uitdewilligen, S., & Waller, M. J. (2018). Information sharing and decision-making in multidisciplinary crisis management teams. *Journal of Organizational Behavior, 39*(6), 731-748. https://doi.org/10.1002/job.2301

van Bunderen, L., van Knipperberg, D., & Greer, L. L. (2018). When interteam conflict spirals into intrateam power struggles: The pivotal role of team power structures. *The Academy of Management Journal, 61*(3), 1100-1130. https://doi.org/10.5465/amj.2016.0182

van de Ven, A. H., & Poole, M. S. (1995). Explaining development and change in organizations. *The Academy of Management Review, 20*(3), 510-540. https://doi.org/10.2307/258786

Van Der Vegt, G. S., & Bunderson, J. S. (2005). Learning and performance in multidisciplinary teams: The importance of collective team identification. *Academy of Management Journal, 48*(3), 532-547.

Van der Vegt, G. S., De Jong, S. B., Bunderson, J. S., & Molleman, E. (2010). Power asymmetry and learning in teams: The moderating role of performance feedback. *Organization Science, 21*(2), 347-361. https://doi.org/10.1287/orsc.1090.0452

Van Kleef, G. A., De Dreu, C. K. W., & Manstead, A. S. R. (2004). The interpersonal effects of emotions in negotiations: A motivated information processing approach. *Journal of personality and social psychology, 87*(4), 510-528. https://doi.org/10.1037/0022-3514.87.4.510

Van Knippenberg, D., & Sitkin, S. B. (2013). A critical assessment of charismatic—transformational leadership research: Back to the drawing board? *Academy of management Annals, 7*(1), 1-60. https://doi.org/10.1080/19416520.2013.759433

Van Thielen, T., Decramer, A., Vanderstraeten, A., & Audenaert, M. (2018). When does performance management foster team effectiveness? A mixed-method field study on the influence of environmental extremity. . *Journal of Organizational Behavior, 39*(6), 766-782. https://doi.org/10.1002/job.2297

Veestraeten, M., Kyndt, E., & Dochy, F. (2014). Investigating team learning in a military context. *Vocations and learning, 7*(1), 75-100. https://doi.org/10.1007/s12186-013-9107

Vescio, T. K., Snyder, M. R., & Butz, D. A. (2003). Power in Stereotypically Masculine Domains: A social influence strategy X stereotype match model. *Journal of personality and social psychology, 85*(6), 1062-1078. https://doi.org/10.1037/0022-3514.85.6.1062

Von Bertalanffy, L. (1967). General theory of systems: Application to psychology. *Social Science Information, 6*(6), 125-138. https://doi.org/10.1177/053901846700600610

Von Bertalanffy, L. (1968). *General Systems Theory*. Geogre Braziller, Inc.

Watkins, K. E., & Dirani, K. M. (2013). A meta-analysis of the dimensions of a learning organization questionnaire looking across cultures, ranks and industries. . *Advances in developing human resources, 15*, 148-162. https://doi.org/10.1177/1523422313475991

Watkins, K. E., & Kim, K. (2018). Current status and promising directions for research on the learning organization. *Human Resource Development Quarterly, 29*(1), 15-29. https://doi.org/10.1002/hrdq.21293|

Watkins, K. E., & Marsick, V. J. (1993). *Sculpting the Learning Organization: Lessons in the art and science of systematic change*. Jossey-Bass.

Watkins, K. E., & Marsick, V. J. (1996). *In action: Creating the Learning Organisation*. American Society for Training and Development.

Weick, M., & Guinote, A. (2008). When subjective experiences matter: Power increases reliance on the ease of retrieval *Journal of personality and social psychology, 94*(6), 956-970. https://doi.org/10.1037/0022-3514.94.6.956

Weldy, T., & Gillis, W. (2010). The learning organisation: Variations at different organizational levels. *The Learning Organization, 17*(5), 455-470. https://doi.org/10.1108/09696471011059831

Whitson, J. A., & Galinsky, A. D. (2008). Lacking control increases illusory pattern perceptions. *Science, 322*(5898), 115-117.

Williams, J. (2007). *Is the US Army a learning organisation?* [Report, US Army War Colllege]. https://apps.dtic.mil/dtic/tr/fulltext/u2/a469631.pdf

Williams, T. (2020). An evidence-based approach to Unit-level teaching and learning. *Journal of Military Learning*(April 2020). https://www.armyupress.army.mil/Journals/Journal-of-Military-Learning/Journal-of-Military-Learning-Archives/April-2020/Williams-Evidence-Based/

Wilson, L. E., Gahan, M. E., Lennard, C., & Robertson, J. (2020). Why do we need a systems thinking approach to military forensic science in the comptemporary world? *Australian Journal of Forensic Sciences, 52*(3), 323-336. https://doi.org/10.1080/00450618.2018.1515248

Wolfe, R. J., & McGinn, K. L. (2005). Perceived relative power and its influency on negotiations. *Group Decision and Negotiation, 14*(1), 3-20. https://doi.org/10.1007/s10726-005-3873-8

Wong, L., Bliese, P., & McGurk, D. (2003). Military leadership: A context specific review. *The leadership quarterly, 14*(6), 657-692. https://doi.org/10.1016/j.leaqua.2003.08.001

Woolley, A. W., Chabris, C. F., Pentland, A., Hashmi, N., & Malone, T. W. (2008). Evidence for a collective intelligence factors in the performance of human groups. *Science, 330*, 686-688.

Wright, K., Marlowe, D., & Gifford, R. (1996). Deployment stress and operation Desert Shield: Preparation for War. In R. J. Ursano & A. Norwood (Eds.), *Emotional Aftermath of the Persian Gulf War* (pp. 283-313). Americian Psychiatric Press.

Yang, B., Watkins, K. E., & Marsick, V. J. (2004). The construct of the learning organization: Dimensions, measurement, and validation. *Human Resource Development Quarterly, 15*(1), 31-55.

Zellmer-Bruhn, M. E. (2003). Interruptive events and team knowledge acquisition. *Management Science, 49*(4), 514-528. https://doi.org/10.1287/mnsc.49.4.514.14423

Zellmer-Bruhn, M. E., & Gibson, C. (2006). Multinational organizational context: Implications for team learning and performance. *Academy of Management Journal, 49*(3). https://doi.org/10.5465/amj.2006.21794668

Zimbardo, P. (2007). *The Lucifer Effect*. Random House.

Zitek, E. M., & Tiedens, L. Z. (2012). The fluency of social hierarchy: The easo with which hierarchical relationships are seen, remembered, learned and likeds. *Journal of personality and social psychology, 102*(1), 98-115. https://doi.org/10.1037/a0025345